LIBRARY

ST BARTHOLOMEW'S HOSPITAL

VII 52

22900336634

The Pharmaceutical Journal

AND

Transactions.

THIRD SERIES. VOLUME XXII.

FIFTY-FIRST YEAR OF PUBLICATION.

1891-92.

LONDON:
J. & A. CHURCHILL, 11, NEW BURLINGTON STREET;
EDINBURGH: JAMES THIN; DUBLIN: FANNIN & Co.
LEIPZIG: A. TWIETMEYER.
1892.

WELLCOME INSTITUTE
LIBRARY
Coll. welMOmec
Call No. Ser QV1 1033

The
Pharmaceutical Journal
AND
Transactions.

VOL. LI. (THIRD SERIES, VOL XXII.).—JULY 4, 1891.

ST BARTHOLOMEW'S HOSPITAL LIBRARY

THE SOLVENT ACTION OF ALCOHOL OF DIFFERENT DEGREES OF STRENGTH ON SOME OF THE DRUGS USED IN MAKING PHARMACOPŒIAL TINCTURES.

BY E. H. FARR AND R. WRIGHT.

(*Continued from Vol. XXI., page* 1039.)

NOTE IV.—ON TINCTURE OF JABORANDI.

Jaborandi was introduced into use in European medical practice by Dr. Gubler, of Paris, in the year 1874. In the same year it was submitted to a chemical examination by Rabuteau, who found it to contain a volatile principle, a bitter principle soluble in water and alcohol; but no alkaloid.

In 1875 Gerrard and Hardy, working independently of each other, discovered that the active principle of the drug was an alkaloid, upon which the name pilocarpine was bestowed by the former. They obtained the alkaloid as a soft, pale-coloured substance, having a somewhat aromatic odour and slightly bitter taste. In addition to the alkaloid pilocarpine, Gerrard obtained an acrid resin soluble in ether, tannic acid, volatile oil and chlorophyll. Gerrard first obtained the alkaloid from the bark by treating the soft extract yielded by an 84 per cent. tincture with water, filtering the aqueous solution, adding an excess of ammonia and shaking out the alkaloid with chloroform. He subsequently recommended the preparation of pilocarpine from a 50 per cent. tincture of the bark or leaves by evaporating the tincture to a soft extract, digesting the extract in water, filtering, adding ammonia in excess, shaking out the alkaloid with chloroform, and allowing the latter solution to evaporate.

In a subsequent communication Mr. Gerrard reported having obtained the nitrate and hydrochlorate of pilocarpine in a crystalline condition. These salts of the alkaloid are now extensively employed in medicine, the nitrate being official in the Pharmacopœias of England and Spain, and the hydrochlorate in those of Germany, Austria, Hungary, Holland, Belgium, and the United States.

In 1876 the drug was made the subject of an investigation by Kingzett, upon the basis of the previous work of Gerrard and Hardy. He prepared pilocarpine in a pure condition, and as the result of an ultimate analysis of the alkaloid, and also of its platinum salt, he fixed the formula as $C_{23}H_{34}N_4O_4+4H_2O$. He also showed that the alkaloid yielded trimethylamine by the dry distillation of its chloroplatinate with an excess of alkali.

The question of the existence of a second alkaloid in jaborandi has been much discussed, and cannot even now be regarded as having been definitely settled. In 1880 Harnack and Mayer claimed to have isolated a second alkaloid from the leaves, which they named jaborine. This, they stated, was formed when pilocarpine was heated with acids, and they also prepared it from the mother liquors from which salts of pilocarpine had crystallized out. They failed entirely, however, to show that jaborine existed ready formed in the plant, and say at the conclusion of their note on the subject, "While the jaborine in the fluid extract cannot be detected with certainty by physiological experiments, the *possibility* is not excluded that small quantities of jaborine are contained ready formed in the leaves of jaborandi itself." Messrs. Harnack and Meyer also prepared pure pilocarpine and studied its gold and platinum compounds. To the alkaloid they ascribed the formula $C_{11}H_{16}N_2O_2$. Kingzett and Gerrard subsequently maintained that Harnack and Meyer had failed to show that jaborandi contained a second alkaloid, the former strongly contending, on the contrary, that there could exist only one alkaloid in the drug.

In 1885 Merck announced the discovery in jaborandi leaves of two other alkaloids—pilocarpidine and jaboridine. He stated that neither jaborine nor jaboridine exist ready formed in the plant, but are oxidation products of pilocarpine and pilocarpidine. Merck gave $C_{10}H_{14}N_2O_2$ as the formula of pilocarpidine and $C_{10}H_{12}N_2O_3$ as that of jaboridine, and assuming $C_{11}H_{16}N_2O_2$ to represent pilocarpine, he supposed it to be a methyl substitution product of pilocarpidine; and as the formula of the latter differs from that of nicotine ($C_{10}H_{14}N_2$), only by O_2 he considered that pilocarpidine might prove to be dihydroxylnicotine.

In 1887 Hardy and Calmels succeeded in effecting the synthesis of pilocarpine. Starting from β-pyridine-α-lactic acid, they converted it by several intermediate steps into pilocarpidine, from the methiodide of which, by oxidation, they obtained pilocarpine.

In our experiments with jaborandi eleven specimens of the leaves, obtained from various sources, were operated upon. All were reduced to No. 40 powder, and as our former work led to the conclusion that a menstruum of low alcoholic strength was best adapted for the exhaustion of the drug, a series of tinctures was prepared from each specimen with menstrua of 80, 70, 60, 50 and 40 per cent. strength (by volume). The B. P. process was followed in every case, and percolation was continued until the requisite volume of tincture had been obtained.

Before deciding upon a process for the estimation of the tinctures, a few tentative experiments were made, in order to ascertain what process was most suitable for the purpose. Three hundred c.c. of a standard tincture was prepared with a 60 per cent. menstruum from a good specimen of drug. The estimation of the alkaloidal content of this standard tincture was then attempted by each of the following processes, the usual precautions being taken to prevent loss of alkaloid in washing with chloroform, etc.

Experiment I.—The tincture was evaporated with a little water until all spirit was removed, and the residual liquor allowed to cool. It was then acidified with 1 c.c. semi-normal sulphuric acid and filtered, the dish and filter being rinsed with acidulated water, and the rinsings added to the filtrate. The latter was then made alkaline with ammonia, and the alkaloid shaken out with two successive 15 c.c. chloroform. The chloroformic solution was washed with a little slightly ammoniated water, and then drawn off and evaporated, the residue being heated at 100° until the weight was constant.

Experiment II.—The tincture was evaporated to low bulk, water being added, until all spirit was driven off. The residual liquid was allowed to cool, an excess of dilute sulphuric acid added, the alkaloidal solution filtered, the dish rinsed with acidulated water, and the rinsings added to the original liquid. A slight excess of ammonia was then added, and the alkaloid removed by shaking with two successive 15 c.c. chloroform. From the mixed chloroformic solutions the alkaloid was extracted by shaking with 30 c.c. water acidulated with 2 c.c. seminormal sulphuric acid. (This was divided into 3 portions which were used successively.) The alkaloidal solutions were mixed, a slight excess of ammonia added, the alkaloid shaken out with chloroform, the chloroformic solution evaporated and the residue dried and weighed.

Experiment III.—The tincture was evaporated with the addition of water, until all spirit had been removed, the residual liquor allowed to cool and acidified by the addition of 1 c.c. seminormal sulphuric acid. It was then filtered, the dish and filter rinsed with acidulated water, and the rinsings added to the filtrate. The solution was washed with ether, sp.g. 720, and was then made alkaline with ammonia and the alkaloid shaken out with three successive 15 c.c. ether. The ethereal solution was allowed to evaporate and the alkaloidal residue heated at 100° till constant, and weighed.

Experiment IV.—It was proposed to precipitate the alkaloid after removal of spirit, by means of a solution of iodine in potassium iodide, wash the precipitate, dissolve in solution of sodium hyposulphite, add ammonia and recover the alkaloid by means of chloroform. The iodine precipitate, however, separated out as a dense resinoid mass and the process was found to be unworkable.

Experiment V.—The tincture was evaporated with the addition of water until all spirit was removed, the residual liquor allowed to cool and acidified with dilute sulphuric acid. It was then filtered, the dish and filter rinsed with acidulated water and the rinsings added to the filtrate, which was then shaken with two successive 15 c.c. of chloroform to remove colouring matter. The alkaloidal solution was rendered alkaline by the addition of ammonia in slight excess, and the alkaloid removed by agitation with two successive 15 c.c. chloroform. The chloroformic solution was shaken with slightly ammoniated water, and was then drawn off and evaporated and the residue heated at 100° till constant, and weighed.

Experiment VI.—The tincture was evaporated to a thin syrup and 30 c.c. of 90 per cent. alcohol added. After separation of mucilaginous matter the fluid portion was poured upon a filter and the mucilaginous deposit dissolved in a little distilled water, the solution again treated with alcohol and filtered. The mixed filtrates were then evaporated, water being added from time to time until all spirit was removed. The residual liquor was allowed to cool, and was then acidified with dilute sulphuric acid and the alkaloid estimated by process No. 2.

The following were the results obtained :—

Exp. 1 . . .	50 c.c. tincture	= ·037	gram alkaloid
„ 2 . . .	50 c.c. „	= ·0275	„ „
„ 3 . . .	50 c.c. „	= ·008	„ „
„ 4 . . .	Unworkable		
„ 5 . . .	50 c.c. tincture	= ·028	„ „
„ 6 . . .	50 c.c. „	= ·029	„ „

Confirmatory estimations were made with a 40 per cent. tincture, processes No. 2 and No. 5 being employed. Two estimations were made with process No. 5, in one of which (*a*) the tincture was first evaporated and treated with strong alcohol to remove mucilaginous matter, and in the other (*b*) this preliminary treatment was omitted.

The results were as follows :—

By process 2 .	50 c.c. tincture	= ·029	gram alkaloids
„ „	5 (*a*) 50 c.c. „	= ·027	„ „
„ „	5 (*b*) 50 c.c. „	= ·022	„ „

The following process was ultimately decided upon and was used for the estimation of all the tinctures :—

Fifty c.c. of the sample to be estimated was introduced into a porcelain dish and evaporated over a water-bath, water being added, if necessary, until all spirit was driven off. The alkaloidal liquor was allowed to cool, 1 c.c. seminormal sulphuric acid added, and the solution filtered through cotton wool, the dish being rinsed with acidulated water and the rinsings added to the filtered liquid. The latter was then rendered alkaline by the addition of 2 c.c. B.P. liquor ammoniæ, and the liberated alkaloid taken out by agitation with two successive 15 c.c. chloroform.

To obtain the alkaloid in a pure condition, it was withdrawn from solution in chloroform by shaking with acidulated water, 25 c.c. distilled water being acidified with 2 c.c. semi-normal sulphuric acid, and added in three successive portions. The mixed acid solutions were again rendered alkaline with ammonia, and shaken with two successive 15 c.c. chloroform. The chloroformic alkaloidal solution was then agitated with a little slightly ammoniated water, and after separation was drawn off and evaporated, and the residue heated in a water oven at 100° till the weight was constant.

The amount of mucilaginous matter present in the 40, 50 and 60 per cent. tinctures was so great as to produce emulsification of the chloroform when that liquid was shaken up with them, and it was therefore necessary to remove such matters by means of strong alcohol, as described under process

Table I.—Showing Quantitative Results of Estimation of Samples of Tincture of Jaborandi.

No. of sample.	Amount of alkaloid in grams from 100 c.c. tincture.					Amount of extractive in grams from 100 c.c. tincture.				
	80 p. c. tincture.	70 p. c. tincture.	60 p. c. tincture.	50 p. c. tincture.	40 p. c. tincture.	80 p. c. tincture.	70 p. c. tincture.	60 p. c. tincture.	50 p. c. tincture.	40 p. c. tincture.
1	·096	·104	·120	·128	·116	4·60	4·98	5·22	4·80	4·52
2	·044	·044	·052	·060	·048	3·16	3·50	3·98	4·12	4·38
3	·028	·040	·036	·032	·032	3·14	3·30	3·70	4·02	4·14
4	·092	·096	·112	·136	·132	4·36	4·76	4·98	5·36	5·32
5	·060	·072	·080	·120	·124	3·94	4·28	4·36	4·60	4·84
6	·072	·084	·088	·110	·108	2·44	2·84	3·16	3·30	3·38
7	·118	·130	·134	·140	·138	5·60	6·00	6·16	6·18	6·24
8	·032	·034	·038	·040	·038	4·12	4·68	5·32	5·54	5·64
9	·132	·152	·148	·148	·152	6·12	6·14	6·58	6·68	6·68
10	·128	·128	·138	·136	·140	5·46	6·02	6·22	6·36	6·38
11	·098	·098	·102	·108	·104	4·62	4·66	4·80	4·94	4·96
Average . .	·082	·089	·095	·105	·103	4·32	4·65	4·95	5·08	5·13

The above represent the mean of two estimations in each case.

Table II.—Showing Results Obtained on Mixing the Samples of Tincture (1) *with Water, and* (2) *with* 90 *per cent. Alcohol.*

No	Result when 1 vol of tincture is mixed with 3 vols. alcohol.					Result when 1 vol. of tincture is mixed with 2 vols. water.				
	80 per cent. tincture.	70 per cent. tincture.	60 per cent. tincture.	50 per cent. tincture.	40 per cent. tincture.	80 per cent. tincture.	70 per cent. tincture.	60 per cent. tincture.	50 per cent. tincture.	40 per cent. tincture.
1	Clear, then sl. flo. ppt.	Sl. cl., then clear with flo. ppt.	Cloudy, then clear with b'lky fl. ppt.	Clo., then clear with bl'ky fl. ppt.	Very bulky floc. ppt.	Turbid. green waxy ppt.	Turbid, green waxy ppt.	Turbid, then clear, with bulky fl. ppt.	Cloudy, then clear, with floc. ppt.	Cloudy opalescent, then clear with fl. ppt.
2	Clear, then sl. flo. ppt.	Sl cl., then clear with flo. ppt.	Cloudy. then clear with flocc. ppt.	Clo., then clear with bl'ky fl. ppt.	Very bulky floc. ppt.	Turbid, green waxy ppt.	Turbid, green waxy ppt.	Cloudy, no ppt.	Cloudy, no ppt.	Slight cloudiness, very slight floc. ppt.
3	Clear, then sl. flo. ppt.	Sl. opal., then clear with fl. ppt.	Immediate flocc. ppt.	Bulky floc. ppt.	Very bulky floc. ppt.	Turbid, no ppt	Turbid, no ppt.	Turbid, no ppt.	Cloudy, no ppt.	Cloudy opalescent, slight floc. ppt.
4	Clear, then sl. flo. ppt.	Opalescent, then clear with fl ppt.	Cloudy opal. then cl. with sl. ppt.	Sl. cloud., then cl. with floc. ppt.	Cloudy floc. ppt. on standing	Turbid. green waxy ppt.	Turbid, then clear with fl. ppt.	Cloudy, then clear, with fl. ppt.	Slight cloudiness, then cl. with floc. ppt.	Cloudy opalescent, then clear with fl. ppt.
5	Clear, then sl. flo. ppt.	Faint. clo., then clear with fl. ppt.	Sl. cloudy, then cl. with floc. ppt.	Cl , then clear with floc. ppt.	Cloudy, then clear with b'lky fl. ppt.	Turbid, [sl. green waxy ppt.	Turbid, green waxy ppt.	Cloudy, no ppt.	Slight cloudiness. ft. floc. ppt.	Cloudy opalescent, then clear, with slight floc. ppt.
6	Clear, then sl. flo. ppt.	Opal., then clear with sl. flo. ppt.	Opal., then clear with floc. ppt.	Opal., then clear with floc. ppt.	Opal , then clear with floc. ppt.	Turbid, no ppt.	Cloudy, then turbid, no ppt.	Cloudy, slight waxy ppt.	Opalescent sl floc. ppt.	Opalescent, then clear. with slight floc ppt.
7	Clear, then sl. flo. ppt.	Opalescent, then clear with fl. ppt.	Opal., then clear with floc. ppt.	Opal., then clear with b'lky fl ppt.	Opal., then clear with floc ppt.	Turbid. no ppt.	Turbid, no ppt.	Cloudy, ppt. in clots on standing.	Cloudy, then cl. with floc. ppt.	Cloudy, then clear. with fl. ppt
8	Clear, then sl. flo. ppt.	Sl. opal., then clear with fl. ppt.	Clo., then clear with floc. ppt.	Cloudy, then clear with b'lky fl. ppt.	Cloudy, then clear with b'lky fl. ppt.	Turbid, no ppt.	Turbid, slight green dep.	Cloudy, then turbid, no ppt.	Cloudy. then turbid, no ppt.	Opalescent, then clear, with slight floc. ppt.
9	Clear, then sl. flo. ppt.	Opalescent, then clear with fl. ppt.	Clo., then clear with floc. ppt.	Cloudy, then clear with floc. ppt.	Cloudy, then clear with b'lky fl. ppt.	Turbid, green waxy ppt.	Turbid, green waxy ppt.	Cloudy, floc. ppt.	Cloudy. then cl. with floc. ppt.	Cloudy, then clear, with floc. ppt.
10	Sl. opal. then ft. flo. ppt.	Cloudy, then clear with floc. ppt.	Clo., then clear with b'lky fl. ppt.	Cloudy, then clear with floc. ppt.	Cloudy, then clear with b'lky fl. ppt	Turbid, green waxy ppt.	Turbid, then clear, with fl. ppt.	Cloudy, then clear, with bulky fl. ppt.	Cloudy, then cl. with bulky fl. ppt.	Cloudy, then clear, with bulky floc. ppt.
11	Clear, then sl. flo. ppt.	Sl. opal., then cl. with sl. fl. ppt.	Clo., then clear with floc. ppt.	Cloudy, then clear with flo:. ppt.	Cloudy, then clear with b'lky fl. ppt.	Turbid, gre. n waxy ppt.	Turbid, then cloudy with green waxy ppt.	Cloudy, then clear, with bulky fl. ppt.	Cloudy, then cl. with bulky fl. ppt.	Opalescent, then clear, with floc. ppt.

Table III.—Showing Results of Experiments on Process for Making Tincture.

	Alkaloid per cent.				Extractive per cent.			
	By simple maceration.	By double maceration.	By B.P. process.	By continuous percolation.	By simple maceration.	By double maceration.	By B.P. process.	By continuous percolation.
No. 1. .	·100	·112	·124	·136	3·88	4·38	5·14	5·88
No. 2. .	·120	·124	·138	·154	4·62	4·68	5·42	6·10

6, before proceeding with the estimation of the tincture.

The alkaloid as obtained by the above process is an almost colourless, viscid, sticky mass, without odour, but having a faintly but persistently bitter taste. It is somewhat soluble in water, and the aqueous solution yields white precipitates with solution of tannic acid, mercuric chloride, and Mayer's reagent, an orange-red precipitate with Thresh's reagent and a lemon-yellow precipitate with phosphomolybdic acid.

Owing to its hygroscopic nature, the final residue, when removed from the drying closet, was allowed to cool in a desiccator over strong sulphuric acid before being weighed, and this operation was performed as quickly as possible. The percentage amount of extractive was ascertained by evaporating 10 c.c. of the tincture, heating the residue at 100° till the weight was constant, and multiplying the result by ten. The percentages of alkaloid and extractive are shown in Table I. The behaviour of the tinctures on admixture (1) with water and (2) with 90 per cent. alcohol was noted, and the results are given in Table II. The results recorded in that table show the appearance presented immediately after mixing the liquids, and also after standing for twenty-four hours.

A reference to Table I. will show that a tincture of jaborandi of maximum strength may be obtained by the use of a 50 per cent. menstruum.

Here again the alkaloidal yield of the various tinctures discloses a remarkable difference in strength, the amount ranging between the limits of ·032 and ·148. That so great a variation should exist in the alkaloidal content of standard tinctures, prepared with the utmost care from well authenticated specimens of the drug, is a matter of serious consequence. A parallel series of experiments, conducted alongside those the results of which are embodied in the present note, convinces us that this want of uniformity in tinctures can be remedied, not only in the case of jaborandi, but also in the case of some other drugs.

The average amount of alkaloid yielded by our own samples of 50 per cent. tincture is ·105 per cent., and we are prepared to advocate the fixing of a standard of ·1 per cent. for this tincture.

Having ascertained by experiment the most suitable menstruum for the extraction of jaborandi leaves, and also the average content in alkaloid and extractive of the tinctures prepared with menstrua of different degrees of strength, it was thought expedient to test the effect of the employment of different processes upon the yield of extractive and alkaloid.

For this purpose two good specimens of the drug were selected, and a series of tinctures made from each, with a 50 per cent. menstruum, by the following processes :—

1. Two ounces of the leaves in No. 40 powder was macerated for seven days with 8 fluid ounces of menstruum with occasional agitation. The fluid portion was then strained off and the marc submitted to pressure, the liquids mixed and made up to 8 fluid ounces, and the tincture filtered.

2. Two ounces of the leaves in No. 40 powder was macerated with 4 fluid ounces of menstruum for forty-eight hours. The fluid portion was then separated by pressure, the marc macerated with the remainder of the menstruum for twenty-four hours, and the tincture again expressed. The expressed liquids were mixed and made up to 8 fluid ounces with menstruum, and the tincture filtered.

3. The B.P. process—maceration and percolation—displacing the last portion of the spirit.

4. Two ounces of the leaves in No. 40 powder was moistened with 3 fluid drachms of menstruum and packed in a conical percolator ; spirit was then added and percolation allowed to proceed continuously, but slowly, until 8 fluid ounces of percolate had been collected.

The tinctures as thus prepared were estimated by the process already given, with the results indicated in Table III. The results there detailed emphasise very strongly what has already been stated in our previous notes as to the advantages presented by the process of continuous percolation over those of maceration and macero-percolation.

THE MANUFACTURE OF BIRCH OIL.*

A profitable industry, and one of which but little is known to the world at large, is carried on among the hills of New England. It is the manufacture of birch oil, and five years ago it was an industry that paid the limited number of men engaged in it a very handsome return for their labour, but the placing upon the market of an adulterated oil has cut down the price of the pure article, and now the manufacturer fails to realize the liberal reward for his labour that he did formerly.

Birch oil has a market value as a flavour. It is used largely in the manufacture of confectionery and is sold, almost invariably, under a label that calls for the essence or extract of wintergreen. Pure extract or essence of wintergreen does not exist, nor is there any need of it, for the clarified oil of birch gives one a perfect wintergreen flavour, and it is so pungent that the smallest drop placed upon the tongue will blister it.

The manufacture of pure birch oil is now confined to the State of Connecticut, where there are eight mills now in operation. Ten years ago the industry was known only in Pennsylvania, and all the birch oil marketed passed through the hands of one wholesale drug firm in Philadelphia. The increased demand for the oil resulted in its adulteration, and in the manufacture by a company of German chemists in Philadelphia of what is known to the trade as a synthetic oil.

Ten years ago hardly anything was known of the manufacture of birch oil outside of Pennsylvania, and the secret of clarifying the oil was known to only a very few. About that time Rev. Tom Dickerson, of Essex, Connecticut, saw an opportunity to turn the vast forests of birch that crown the hills of New England into profitable use, and he sent his son to Pennsylvania for the purpose of learning the process of manufacturing the oil. The son secured a position in a birch mill, where he worked eighteen months, and during that time he had got an idea of how the work was done, and he managed to learn what chemicals were used in clarifying the oil. With this knowledge young Dickerson returned to Connecticut and engaged with his father in the manufacture of the first birch oil extracted east of the Keystone State.

The first birch mill was built at Joshuatown, a delapidated hamlet on the Connecticut River, nearly opposite Essex, and there Tom Dickerson and Son began the work that in three years gave them both an independent fortune. The success of the shrewd minister

* From the *Scientific American*, June 13.

stirred the blood in the veins of some of the observing Yankees, and within two years there were six birch mills in operation within a radius of ten miles of Joshuatown, and this number has increased to eight. Although the clarifying of the oil is not an open secret, it is known to a large number of men who are engaged in the business.

With a capital of twenty-five hundred dollars a man can set up his plant and begin the manufacture of birch oil. The best and most profitable mills are equipped with six water-tight wooden tanks about six feet square. In some cases these tanks are so built that a fire may be set under them for the purpose of boiling the water that they contain. These tanks have copper bottoms. In many of the mills the work is done by steam, and in such cases there must be a furnace and boiler, and a coil of steam pipes is laid in the bottom of each tank. With tank, pipe, boiler, a few glass jars, and a good supply of fresh, cold water, the manufacturer is ready for business.

The farmers are paid three dollars a ton for birch brush that must not be more than 2½ inches in diameter, and the only variety of birch used is the black, mountain or sugar birch. From the yellow and white birch no oil can be extracted.

If the farmer does not live more than six miles from the mill he can, by working early and late, manage to cut and haul to the mill one ton a day. This to the average New England farmer is very profitable work, and the building of birch mills in their midst has been of great benefit to a large number of them. Many of these men who have birch to sell are not so favourably located as others. There are many men who drive a slow-going ox team to the mill with but half a ton of brush, and the distance that they travel going and coming is more than twenty miles. Their compensation for the day's labour of three yoke of oxen and themselves is one dollar and fifty cents, but these men are satisfied with that, and in most cases their farms are clear of mortgage and they are not indebted to the village shopkeeper.

The brush is chopped into pieces of from 1½ inches to 5 inches long, by a heavy machine built with heavy knives, on the principle of a hay cutter. One ton of brush can be run through a cutter in an hour if kept steadily running.

These short pieces are thrown into the tanks, in which about 1½ feet of water has been placed, the fire is then built or the steam turned on and the water set a-boiling. While the water is being heated, the covers of the tanks are shut and "plastered" or sealed around the edges with rye flour paste. This is to prevent the steam from escaping.

The water in each tank is kept at a boiling point six hours, at the end of which time the life of the birch is extracted.

Entering each tank near the top is an iron pipe, through which the steam escapes and passes through a coil placed in a barrel that is kept full of running water. In this manner the steam is condensed and drops into a glass jar, placed under a pipe, at the bottom of the coil for its reception.

Birch oil in a pure state is much heavier than water. Thirteen fluid ounces weigh a pound, and instead of rising to the top of the condensed steam, it settles to the bottom of the jar, where, in its action when the jar is moved, it very much resembles quicksilver.

In its crude state the oil is of a copper hue. If boiled in tanks with copper bottom, or if cooked over a steam coil, it is of the darker hue of iron. The most popular and the cheapest method of clarifying the oil is as follows:—

The oil in its crude state is poured upon a woollen blanket that is then laid upon the top of the brush in a tank. The covers are "plastered" down and the water set a boiling. The steam passes through the blanket, which absorbs the particles of copper and iron, and the oil drops into the receptacle at the bottom of the worm of a hue that is a very light green or like the essence of lemon. Clarifying the oil by the use of chemicals is much more expensive and generally less satisfactory.

A tank 6 feet square will hold a ton of brush, and each ton yields 4 pounds of oil. The mills are run during the season night and day, and each tank is filled three times. The daily product of a six-tank mill is about 75 pounds of oil per day. Five years ago the oil brought three dollars and 15 cents. a pound readily, but now the price is one dollar and a half a pound, but even at this reduced figure the birch oil manufacturer is able to pay his running expenses and make a neat income besides.

The product of the eight mills in Connecticut is handled by one firm in Essex, Connecticut. The mills do not run during the summer, because of the trouble of preparing the brush for the cutter, it being necessary to remove the foliage. The season opens about October 1 and the mills run until the last of April.

The oil of birch in an adulterated form is used in tanning leather to imitate Russia leather, which has a very peculiar odour. For a long time tanners were at a loss how to give American hides this odour. They finally discovered that birch oil would do it, and now a great deal of it is used for that purpose.

VOLATILE OIL OF ARISTOLOCHIA RETICULATA, NUTTALL.*

BY JOSIAH COMEGYS PEACOCK, PH.G.

The rhizome and rootlets were used as obtained through reliable channels of the drug market. The amount of the material used was about 45 kilograms.

Distillation.—The contused drug, in quantities of about 2 kilograms, was macerated over night with about 6 litres of water, and then distilled, the volume of water being maintained by additions from time to time through the tubulure of the still. It was found when four litres of distillate had been collected that the drug was exhausted of oil. The distillate was collected in quantities of 1 litre, and the oil which separated from each portion was specifically lighter than that respective part of the distillate.

The oil which separated with some difficulty in very small quantities from the first litre was colourless. The second litre yielded a transparent lemon-yellow oily layer, constituting about one-half of the whole yield. From the third litre a greenish layer of oil was obtained in about one-fourth of the entire amount. Green oil in about the same amount was separated from the fourth litre. In the subsequent distillations the process of cohobation was employed.

The watery distillates were neutral to litmus. The oil was dried by means of neutral calcium chloride.

The yield of oil from three commercial lots of the rhizome (lot III amounting to about 25 kilograms), was as follows: (I) ·94 per cent., (II) ·73 per cent. and (III) ·61 per cent.; the average being ·76 per cent. The oil from lot III was used for most of this work.

Properties of the Volatile Oil.—In bulk the oil was of an amber or golden yellow colour, in thin layers greenish yellow; odour camphoraceous and mildly valerianic; taste, camphor-like, with but little sensation of cold when air was drawn into the mouth; reaction, neutral or indistinctly acid. On exposure, in thin layers, the oil dried slowly to a varnish film.

All the different lots of oil agreed closely with this description, and all failed to separate solids at a prolonged exposure to—17° to—15° in a freezing mixture

---

* From the *American Journal of Pharmacy*, June.

of salt and ice, or in a snow-bank over night; the only change noticed was the usual one of increased viscosity.

The specific gravity of the oil from lot I was ·9785 at 15·5°, and ·9758 at 20° C.; and from lot III ·9745 and ·9719 respectively.

The rise in the boiling point was noted as follows:

No. Oil.	Commenced.	Increased.	Brisk.	Full and constant.	Barom. Press.
I. .	163°	172°	204°	207–210°	757·7 mm.
III. .	165°	179°	205°	213–214°	767·3 „

The rotary power was ascertained to be—4·0 in a 100 mm. tube; temperature of the oil 20·5°.

The oil is readily soluble in, or miscible with, an equal volume of ether, chloroform, benzol, benzin (boiling point 45–80°), methyl alcohol, carbon disulphide, turpentine, glacial acetic acid, bromethane, ethylene dibromide, nitro-benzol, ethyl benzoate, aniline, toluol and olive oil; not so freely soluble in ethyl acetate: sparingly soluble in water; almost insoluble in acetic aldehyde and in glycerin (sp. gr. 1·25); apparently miscible in all proportions with alcohol (sp. gr. ·820).

When heated with finely powdered copper nitroprusside, no change in colour was noticed. Fröhde's reagent in equal quantity gave rapidly a black colour which was produced slowly by sulphuric acid alone. An equal amount of 5 per cent. alcoholic solution of ferric chloride, at first, gave a greenish colour (due to reduction of the ferric compound); the mixture gradually became dark red brown, almost black, and resinous in about an hour. The odour and taste seemed to be unchanged.

Neither alcoholic solution of ammonium sulphide nor saturated aqueous solution of sodium acid sulphite gave indications of aldehydes or of ketones. With the last reagent a cherry-red colour was slowly developed, but after separating and washing the oil the taste and odour were found unchanged.

Rectification.—This was effected by a simple distillation of the oil, under reduced pressure on an oil bath, the process being continued as long as the oil distilled without decomposition. The same colours were noticed in the distillate thus obtained as in the distillation from the rhizome.

The residue in the flask at the end of the operation was red brown, resinous, acid in reaction, and solidified upon cooling. Further distillation of this residue gave only decomposition products, as the distillates so obtained boiled in air at much lower temperatures than those required for their production under the diminished pressure.

The rectified oil, consisting of the mixed distillates obtained previous to threatened decomposition, was of a greenish yellow colour; camphoraceous in odour and taste, and neutral in reaction.

The specific gravity at 15·5° was (I) ·955, (III), ·9675, and at 20° C. ·953 and ·9648 respectively.

The rectified oil commenced to boil at 165°; boiling increased at 177°; was brisk at 195–200°, and constant between 207 and 208·5; barom. pressure 756·7 mm.

The rotary power of the rectified oil (temperature 25°, 100 mm. tube) was —16·5.

Rectification did not change the behaviour toward the solvents mentioned before, but the rotary power indicated that the decomposition in the highest boiling portions took place at the expense of dextrorotatory substances.

Fractional Distillation.—This operation was conducted on an oil bath, and by its means the rectified oil was separated into the fractions mentioned below. The many repetitions of the operation are omitted, and only those temperatures which refer to final distillates are given.

Fraction.	Boiling Point.	Pressure.	Approx. Amount.
A . . .	74–75°	43 mm.	10 p. c.
B . . .	122–124°	43 „	60 „
C . . .	147–150°	47·7 „	20 „
D, green and bluish fluorescent oils, and decomposition resins,			10 „

The fractions when subjected to low temperatures, as was the original oil, all behaved as the latter. All were readily soluble in glacial acetic acid, and these solutions reacted with sulphuric acid, as follows:

A, pink, becoming brownish.
B, pink, becoming brown.
C, red, deepening.

This reaction of A is that given by some of the pinene groups of terpenes, according to Wallach (Liebig's 'Annalen,' 239, p. 1; also *Amer. Journ. Pharm.*, 1887, p. 619).

Fraction A.—Boiling point in air 157°, barom. pressure 769·6 mm. Pale greenish (in time becoming colourless, but other physical properties remaining unchanged) liquid of a peculiar penetrating, irritating, terebinthinate odour; a peculiar, characteristic taste, and an acid reaction. When blue litmus paper was held above the liquid it became red quite rapidly. Satisfactory tests were not obtained with either wet or dry starch and potassium iodide paper, for ozone. Water agitated with the compound was subsequently found to contain acetic acid. It absorbed bromine with avidity. Specific gravity at 15·5° C., ·865. It was obtained by fractional distillation alone, and without the use of metallic sodium or zinc.

The average of two closely agreeing results of combustions made of this fraction was:

	Found.	Calculated for $C_{10}H_{16}$.
C	88·225	88·23
H	11·835	11·77
	100·060	100·00

Vapour density: Found 4·82, 4·84; calculated for $C_{10}H_{16}$, 4·71.

Fraction B.—Boiling point in air 211°, barom. pressure 763·6 mm. Pale greenish, almost colourless, liquid, having an odour and a taste similar to those of the oil, and a neutral reaction. Sp. gr. at 15·5°, ·9849.

The average of five closely agreeing combustions was:

	Found.	Calculated for $C_{15}H_{25}O_2$.
C	75·94	75·95
H	10·64	10·55
O	13·42	13·50
	100·00	100·00

Vapour density: Found 8·28, 8·27; calculated for $C_{15}H_{25}O_2$, 8·20.

Fraction C.—Boiling point in air 239–240°, barom. pressure 762·1 mm. This was a yellowish green liquid, of a buchu-like odour; warm, mildly camphoraceous taste; and a neutral reaction. Sp. gr. at 15·5°, ·9888.

The average of three closely agreeing combustions was:

	Found.	Calculated for $C_{18}H_{29}O$.
C	82·69	82·76
H	11·07	11·11
O	6·24	6·13
	100·00	100·00

Vapour density: Found 8·89; calculated for $C_{18}H_{29}O$, 9·04.

Fraction D.—This consisted of the green and bluish-green fluorescent oils, but as they were easily converted into the resinous decomposition compounds always obtained in the distillation of this oil, it was not found possible to separate them by means of distillation, in a state of purity essential for ultimate analysis, nor could they be obtained in this condition

by collecting the oil of the fourth litre of distillate and distilling it. In the several lots so treated only a very small amount of distillate from each was obtained above the boiling point of fraction C, and these varied in colour, reaction to litmus, and to reagents—all, however, were empyreumatic, camphoraceous and specifically lighter than water.

Saponification of Fraction B.—The formula of this fraction suggesting it to be an ester, the action of alkali was tried upon it. For this purpose a portion of the fraction was heated with half its weight of potassium hydrate, in aqueous solution, in a flask attached to an upright condenser, on a water-bath at the boiling point for about two hours, frequently shaking the mixture. The contents of the flask, which consisted of two layers, were now diluted with water, and the mixture distilled, when a distillate was obtained in which was a white crystalline camphor like body. The distillation was continued until the water coming over was perfectly clear, and free from odour and taste.

The contents of the flask were now one layer only; this was carefully acidified with dilute sulphuric acid, the distilling flask again attached to a condenser and the process continued, when another crystalline substance was obtained along with the watery distillate. This last substance was redistilled with water vapour, when it again appeared, as before, in a crystalline form of white dazzling scales (much like benzoic acid) floating on the distillate.

This distillate possessed an acidulous but not pleasant taste and a peculiar, somewhat sour odour, which was not like that of valerianic acid.

The crystals and also the distillate were strongly acid, and decomposed sodium and calcium carbonates giving double salts. The ammonium salt was also soluble. When converted into these salts the odour disappeared, but was again produced by acidifying these compounds with dilute sulphuric acid. The aqueous solution of the free acid gave with ferric chloride a bulky, flesh-coloured precipitate. The solution of its neutral salts acted in the same way, but the filtrate (containing the excess of the iron compound) from the precipitate was not red. The crystalline acid substance melted to a yellowish liquid, at a temperature below the boiling point of water, probably at about 65°.

In a second attempt to prepare more of the above acid from some of the fraction containing a small amount of the terpene, the acid separated as an oily liquid, but possessed the other physical properties of the solid acid, and gave the same reaction with ferric chloride, except that the filtrate in the case of its salts was red and upon boiling gave a red-brown precipitate, the cause of which (as was proved by mercuric chloride and by the acetic ether tests) was due to acetic acid.

Another experiment with the pure fraction gave a solid acid, but the small quantity operated on did not yield sufficient to permit it being collected as a solid; no oily layer separated in this case; the distillate was found to be free from acetic acid, and in all physical properties was the same as the distillate obtained with the first crystalline acid.

It might be said by way of parenthesis that an accident prevented the preparation of the acid in sufficient quantity to ascertain its ultimate composition.

Alcoholic Base of Fraction B.—This was the white crystalline camphor-like body distilled from the saponified fraction. It was recrystallized from stronger ether until the melting point was constant. From this solvent it crystallized in transparent plates, which melted between 199·5–200°. It was sublimable, apparently, without decomposition, condensing in feathery forms in stellate groups. It burnt with a luminous, sooty flame, and was soluble in alcohol.

The crystals were submitted to combustion, the average of two closely agreeing results was—

	Found.	Calculated for $C_{10}H_{18}O$. Borneol.
C	77·84	77·92
H	11·69	11·69
O	10·47	10·39
	100·00	100·00

Vapour density: Found 5·18; calculated for borneol, 5·33.

Acid Radicle of Fraction B.—From the formula of the ester, indicated by combustion and vapour density, this crystalline acid would have the composition $C_5H_9O_2$. From the experiments it appears to be monobasic and quite freely soluble in water.

Recapitulation.—It appears from the above observations that this oil consists of

(I) A terpene, $C_{10}H_{16}$, boiling at 157°; of sp. gr. ·865; having a strong affinity for bromine: characters which ally it to the pinene group of Wallach's classification.

(II) A fraction, boiling at 211°; of sp. gr. ·9849; having the composition $C_{15}H_{25}O_2$; and which by saponification with potassium hydrate gives a camphor-like body melting at 199·5–200°; having the composition $C_{10}H_{18}O$, and other properties of borneol; and a peculiar acid substance. This fraction comprises about 60 per cent. of the oil, and it in turn consists of about two-thirds borneol.

(III) A fraction boiling between 239–240°, of sp. gr. ·9888, having the composition $C_{18}H_{29}O$; and being, apparently, a neutral or indifferent substance.

(IV) Some green or bluish green fluorescent oil, in small quantity, which readily decomposes at the temperature necessary for its distillation under reduced pressure.

PREPARATION OF HYDROBROMIC ACID.*

W. Feit and K. Kubierschky have made experiments with different methods of preparing hydrobromic acid, and have at last concluded that the process involving the use of potassium bromide and sulphuric acid is the most advantageous. They have evidently remained in ignorance of the papers published on the subject by Dr. Squibb, and for this reason had to go over the whole ground anew. Hence, their results are also somewhat different from those of Dr. Squibb, and for this reason should be put on record.

They found the best proportion to be as follows:—100 gm. of potassium bromide and 150 c.c. of sulphuric acid of the specific gravity 1·410. This represents a molecular proportion of 1 part of the former to 2·6 parts of the latter.

The potassium bromide is introduced, coarsely powdered, into a retort, the acid added, and the whole slowly warmed, under repeated agitation, until the salt is dissolved. Distillation is then commenced. The liquid in the retort has a faint yellowish colour, which is not, however, due to free bromine, but is, perhaps, caused by organic impurities. At 126° to 127° C. the liquid begins to boil; afterwards the boiling point rises gradually to 150° C. During this time almost the whole of the hydrobromic acid passes over. From 150° up to 200° C. the boiling point rises rapidly and but little liquid distils over. This portion contains a trace of sulphuric acid which is carried over mechanically. Between 200° and 250° C. only very little hydrobromic acid passes over, and that which passes contains more sulphuric acid than the preceding fraction.

Distilled in the described manner, 100 gm. of potassium bromide yielded 199 c.c. of hydrobromic acid of the specific gravity 1·385, or 165 gm. of acid con-

* *American Druggist*, from the *Chem. Zeit.*, 1891, 444.

taining 40·5 per cent. of absolute acid. That is, the 100 gm. of KBr yielded actually 66·8 gm. of absolute acid instead of the theoretical 68·1 gm. No separation of potassium sulphate takes place during the whole operation. The residue in the retort still contains about 1 gm. of potassium bromide.

In order to free the hydrobromic acid thus obtained from the small amount of accompanying sulphuric acid, and to concentrate it at the same time, it is subjected to fractional distillation. At first a dilute acid passes over, and afterwards an acid having the permanent boiling point of 126° C. This contains 48 per cent. of absolute hydrobromic acid, and has the specific gravity 1·490. It is absolutely colourless, and free from sulphuric or sulphurous acid, as well as from free bromine.

If the potassium bromide used in this process contained any bromate, bromine is at first liberated and passes over. In this case the receiver is changed as soon as a colourless distillate passes. The acid is then treated with solution of sodium hyposulphite in drops until it is colourless, and finally rectified like the other.

PRESENTATION OF A PORTRAIT OF MR. BOTTLE.

A meeting of the subscribers to a fund which has recently been raised by some of Mr. Alex. Bottle's friends for the purpose of presenting his portrait to the Council of the Pharmaceutical Society, was held on Wednesday in the Council Room of the Society at 3 o'clock. Mr. Michael Carteighe, President, took the chair, and at once called on Mr. Hampson, Treasurer of the Fund, to address the meeting.

Mr. Hampson said he considered himself extremely fortunate in having this opportunity of saying a few words with regard to his old friend, Mr. Bottle. He had to hand over to the President of the Society this portrait, on behalf of those who had initiated the movement and who were now assembled to support him. There was nothing so suitable as a collection of portraits to adorn the walls of any institution, which, like theirs, professed to lead in thought or action. In Germany and on the Continent generally you found collections of portraits in connection with the various learned societies, and nothing was more delightful to look on those portraits, not only of those who were still living, but of those who had passed away; they were constant sources of pleasure, not merely from their artistic merit, but from their perpetuating the remembrance of those who had gone, after having fought the good fight in various ways. This portrait of Mr. Bottle was not only a successful portrait, which would add grace to the Council chamber, but it would remind those who occupied it in days to come of his presence there. If he were asked why should they give Mr. Bottle a portrait, the question was very easily answered. Mr. Bottle was the father of the Council, to whom they had looked up for many years, and whose advice was sought because there was no man so well acquainted with the law of the Society, and he could generally say whether they were going right or wrong. When the Society had its birth he was one of the first who came forward to support it. Not living in London, but in the country, he saw the necessity that the craft should be organized, and for fifty years he had been a devoted friend to the Society and a hearty worker for its welfare; and for about thirty years he had filled a seat on the Council. Those were sufficient reasons; but there were others. Mr. Bottle, as they all knew, was a very single-hearted and faithful friend, and there was not a member of the Council who did not consider it a privilege to call him so. He (Mr. Hampson) had by degrees acquired his friendship, and he hoped he should always retain it. On behalf of those who had arranged this matter, he had much pleasure in presenting the portrait to the President for the Society, and he had no doubt it would be treasured, as a work of art, as an incentive to others, and as a memento of Mr. Bottle's long services as Vice-President

The President said he was authorized to say on be half of the Council of the Society that it accepted this portrait with the greatest possible pleasure and gratitude. While he was yet a pupil in the school, Mr. Bottle was a member of the Council, but since then he had been associated with him in pharmaceutical work as much as most of his colleagues. During the last few years he had had the special advantage of his assistance in what might be called the directorial work of the Society, in the examinations and in Committee work, and his respect for him was such that he almost envied the Society the possession of this picture. That portrait was not only a great treasure in itself, but it was a worthy companion to those of other distinguished men which adorned their walls, most if not all of whom, except Mr. John Mackay, had been residents in London. It would be extremely pleasant to him to see on the wall the portrait of a gentleman who lived almost as far from Edinburgh as it was possible to do, so that Edinburgh, London and Dover were in that sense united. A good gallery of portraits was as nice a thing to hand on to their successors as they could desire, and on the part of the Council he begged to thank the donors and to promise them that the portrait should have the position which its merits and those of their dear old friend himself entitled it to.

Mr. Hampson said he had much pleasure in also handing Mr. Bottle a small personal memento in remembrance of this happy event.

Mr. Bottle said he was not prepared with a speech on this occasion, but he could not let it pass without a few words of grateful thanks for all the kindness he had received from time to time within those walls. When he first joined the Society, nearly fifty years ago, some of the old familiar faces which adorned the walls, William Allen, Jacob Bell, George Sandford and others were amongst them. It had been his privilege for thirty years to hold a seat on the Council, and during that time he had made many friends and he ventured to hope he had never made an enemy. It was exceedingly kind of his friends to join together and present this portrait to the Society, and he hoped and believed that in time to come it would hold a place on the walls in company with those of other men more honoured and more deserving, who had gone before him. But none had been more zealous or more desirous of serving the Society than he had been. The time was coming when in the ordinary course of events he must cease to occupy an official position, but he should regret to lose it so long as he retained his health and intellect; and when he failed in that, and had to retire into private life, he should carrry with him very pleasant recollections of the friendship and good feeling which he had always met with from members of the Society. He thanked all present for their many kindnesses, and in particular for this last manifestation of their goodwill.

The President then moved a vote of thanks to the Committee, to Mr. Richard Bremridge and to the Treasurer. Though a member of the Committee himself he had really done very little work, and therefore might be allowed to propose this resolution, and to mention especially Mr. Hampson, Mr. Butt and Mr. Hills, who formed the Sub-Committee.

Mr. Bottle said he thought he was entitled, as Vice-President, to second the resolution, and he begged to tender his own thanks to the members of the Committee for the very satisfactory way in which they had carried out the arrangements.

The resolution was carried unanimously and the proceedings terminated.

The portrait, which is by Mr. Elmslie, was the subject of general admiration by those present.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, JULY 4, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE COUNCIL MEETING.

AT the Council meeting last Wednesday letters from Mr. STOREY and Mr. STONES were read, thanking the Council for the resolutions passed at the last meeting, in reference to the late Mr. W. L. BIRD and the late Mr. WM. SCOTT BROWN. Four persons were elected members of the Society. Seventeen persons were elected associates and seventeen persons were elected students of the Society. Professors ATTFIELD, DUNSTAN and GREEN were again appointed to the chairs of practical chemistry, chemistry and botany. Mr. JOSEPH INCE and Mr. H. G. GREENISH were appointed to conduct the lectures on pharmacy and materia medica; and Mr. DYMOND was appointed assistant lecturer on chemistry. On the motion of the PRESIDENT, seconded by Mr. HAMPSON, it was decided to invite Dr. INGLIS CLARK and Mr. MABEN to undertake the duty of conducting the examinations for the Council prizes and the Pereira Medal. In moving the adoption of the Report of the Finance Committee, the PRESIDENT mentioned that several penalties had been recovered and a good many examination fees received. The donation account of the Benevolent Fund having been increased by the receipt of a legacy of £500 left by the late Mr. H. B. BRADY, and by a donation from M. CHAMONIN, the Secretary of the Syndicat Pharmaceutique of Boulogne, it was recommended that £600 should be invested in Government Stock. Before the adoption of the report some discussion took place upon a suggestion made by Mr. STORRAR, that the Committee should consider and report upon the financial position of the Society in regard to its ordinary income and expenditure. Mr. HARRISON thought this suggestion should be adopted, for though many of the points which had been referred to could be answered at once, an official report from the Committee, after due deliberation, would be more satisfactory. It was therefore resolved that the Finance Committee with Mr. STORRAR should take the matter in hand.

On the recommendation of the Benevolent Fund Committee, four grants of ten pounds each were authorized on the motion of the VICE-PRESIDENT, seconded by Mr. ATKINS, who spoke of the work of the Benevolent Fund as furnishing in itself a sufficient answer to the question sometimes asked as to what the Society does for the trade. The report of the Library, etc., Committee stated the particulars of attendance of readers in the Library and of visitors to the Museum, the circulation of books on loan, and the donations to the Library and Museum during the past month. On behalf of the Research Committee the PRESIDENT reported that the Secretary of the Royal Society had notified the voting of a sum of one hundred and fifty pounds from the Government grant for research purposes to the Committee for an investigation of the chemistry of the aconite alkaloids, referring to this recognition on the part of an important Society representing the Government as being ground for congratulation.

In reference to the Pharmacy Acts Amendment Bill the PRESIDENT reported that since the Government proposed to take all the remaining time for the Session, it had been deemed undesirable to put the Bill down any further before Parliament was prorogued. Mr. SCHACHT spoke of the failure to obtain amended legislation as being extremely aggravating to those who realized the benefits that would have resulted from the passing of the Bill, and he raised the question whether it would not be possible for them to take counsel together in order to establish before next session an organization capable of exerting greater influence upon members of Parliament in favour of the Bill or of another one that might be introduced hereafter. Mr. ATKINS suggested that the chief, if not the sole reason of the failure to get the Bill before the House was the condition of public business. He was disposed to think the personal influence of the man who took a special interest in any particular matter was more valuable than that of any committee or syndicate, and he should therefore deprecate any step which might lessen the personal influence of the PRESIDENT in regard to pharmaceutical legislation. This view of the matter was supported by Mr. EVANS, Mr. GOSTLING and Mr. STORRAR. The want of interest on the part of the trade was regarded by Mr. HARRISON as the main cause of the failure, since it left the opponents of the Bill masters of the situation. The great necessity was to rouse some enthusiasm among those who ought to support the Bill. Mr. RICHARDSON agreed in thinking organizations for that purpose should be formed throughout the Kingdom. He also thought the opposition to the Bill was entirely selfish. Mr. HILLS supported the opinion that want of hearty support by the trade was the great drawback, and Mr. ALLEN suggested that however good a Bill might be sent into Parliament by the Council, it would be sure to excite the suspicion of

some part of the trade. The general tendency of the discussion was to recognize in the discordant condition of the trade the chief obstacle to useful legislation for the advancement of pharmaceutical interests. So long as there is no common agreement among the members of the trade it will be possible for individual members of Parliament to prevent a Bill from coming on for discussion, and render petitions in favour of it absolutely useless. The great difficulty to be dealt with in this respect is, as Mr. ATKINS and Mr. CROSS pointed out, a serious one. Important as pharmaceutical interests may be to those whom they concern, there are many others of equal or greater importance, upon which the sympathies and favourable opinions of members of Parliament may be more easily secured. As a result of the discussion Mr. SCHACHT moved that the re-introduction of the Pharmacy Acts Amendment Bill should be considered by the Law and Parliamentary Committee. This was seconded by Mr. RICHARDSON and agreed to unanimously.

The report of the General Purposes Committee stated the progress made in cases of prosecution. Several offenders against the Act have paid penalties, and in four cases penalties have been recovered in court. The details of the report having been considered it was unanimously adopted.

Our readers who are acquainted with the services rendered to the Society for many years past by Mr. Bottle will be pleased to learn that a number of his personal friends have presented his portrait to the Council. The presentation took place after the Council meeting on Wednesday, and a report of the proceedings will be found at page 8. Mr. Bottle's portrait will be an appropriate addition to those of a number of workers who have distinguished themselves in promoting the objects of the Society, and of whom the Council chamber of the Society contains pleasing permanent records.

* * *

The *Lancet*, in referring to the recent proceedings against unqualified persons for selling poison, remarks that "a few such prosecutions and judgments ought to do much to diminish the dangers of drug stores and to check the employment of the unqualified assistant."

* * *

A notice has been issued by the authorities of the University of Cambridge that on and after the 1st of October, 1892, two additional certificates will be required of all candidates for the second part of the third M.B. examination. The first of these is a certificate of having during three months studied practical pharmacy and dispensing at a recognized school of medicine or hospital, or with a registered medical practitioner or a duly qualified pharmaceutical chemist. The second relates to experience in a fever ward.

* * *

At the meeting of the executive committee of the British Pharmaceutical Conference, of which a report is given at page 16, the arrangements for the meeting at Cardiff were considered, and we hope soon to be in a position to furnish further information as to the several details.

* * *

At a recent meeting of the Société de Thérapeutique, M. Adrian presented a report upon the subject of the medicinal strength of preparations of very active official plants, and the desirability of their standardization, which had been referred to him by the Society for consideration. In this report, after demonstrating by the results of analyses that official preparations of the Codex and of other pharmacopœias are inconstant in alkaloidal strength and therefore uncertain in therapeutic effect, M. Adrian proceeds to discuss the relative merits of three ways of possibly remedying the defect: (1) by abandoning the use of plants and their galenical preparations; (2) by adopting a process in the making of official preparations that will ensure uniformity in strength; (3) by the titration of the drugs before use and the rejection of all that do not come up to the official standard of active principle. Of these, M. Adrian considers that under existing circumstances, the last-mentioned plan is the best, and recommends that the Society should, after discussion, pass a resolution to that effect.

* * *

In reference to Mr. Dott's letter (see page 20) objecting to the statement in last week's Journal that the British Pharmacopœia directs chloroform as well as ether to be made from rectified spirit, we would suggest that since the Pharmacopœia specifies one out of several ways of making chloroform the particular way specified may well be understood to be the one that is intended to be followed.

* * *

According to the *British Medical Journal*, the Austrian Minister of the Interior has recently issued an ordonnance that burgomasters of communes shall exercise a strict supervision in respect to the legibility of prescriptions written by medical men practising within their jurisdiction. They are charged to see that every prescription is clearly and legibly written in all its parts, so that there may be no doubt as to the remedy, the dose or the signature. Our contemporary pertinently remarks that if the average handwriting of Austrian medical practitioners be as cryptic in its character as that of many of their brothers in this country, it is to be feared that many of them will have to go to school again until they have at least learned to sign their own names so that they can be read without the aid of divination.

* * *

Intelligence has been received of the death on the 24th ult., at Göttingen, of Professor Dr. Wilhelm Eduard Weber, the distinguished physicist, aged 87 years.

* * *

On Wednesday next the Society of Chemical Industry will commence its annual general meeting in Dublin, under the presidency of Mr. E. Rider Cook, and a programme of excursions, etc., has been issued extending over Thursday and Friday. It is announced that Professor J. Emerson Reynolds, F.R.S., has been nominated for the office of President during the coming year.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, July 1, 1891.

Present—

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Messrs. Allen, Atkins, Cross, Evans, Gostling, Greenish, Hampson, Harrison, Hills, Martindale, Newsholme, Richardson, Schacht, and Storrar.

The minutes of the previous meeting were read and confirmed, the name of Mr. Evans being added to the Library and Museum Committee.

Letters of Thanks.

The PRESIDENT read a letter which had been received from Mr. Storey, thanking the Council for the resolution of condolence passed at the last meeting, with reference to the death of Mr. W. L. Bird.

Also a similar letter from Mr. Stones, gratefully acknowledging the resolution passed with reference to his late uncle, Mr. Wm. Scott Brown.

The clerks in the office had also sent a letter of thanks for the gratuity of £50 voted them at the last meeting.

Diplomas.

The undermentioned, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Green, Edward Joseph.
Hayton, Thomas Irwin.
Kemp, Cecil Tabor.
Linstead, Edward Flatman.
Morley, Charles.
Wynne, William Arthur.

Elections.

MEMBERS.

The following, have passed the Major examination, and tendered their subscriptions for the current year, were elected "Members" of the Society.

Green, Edward Joseph .....Harrogate.
Hayton, Thomas Irwin .....Wigton.
Kemp, Cecil Tabor.....Romsey.
Wynne, William Arthur.....Mold.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Elliott, Henry Alfred.....Bedford.
Parry, John .....London.

Modified.

Ellis, Alexander..... ..Skelton-in-Cleveland.

ASSOCIATES.

The following, having passed the Minor examination, and tendered (or paid as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Allenby, Henry Edmund .....St. Albans.
Ashton, Henry Maitland .....London.
Barnes, Ivor Puxon .....London.
Cattell, Charles .....Ely.
Davis, George Ernest.....London.
Farrants, Francis Samuel.....Bury St. Edmunds.
Felce, Albert ... .Norwich.
Gale, Richard Percy .....Hull.
Hatton, Foster James .....Weymouth.
Hill, John.....Birmingham.
Hinde, Albert Henry.....Lowestoft.
Inman, Thomas Leonard .....Batley.
Parsons, Ernest Alsager .....Wolston.
Tiltman, William John.....Launceston.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination, and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Angel, Edward Charles... .....London.
Baxendale, George..,.....Congleton.
Bindloss, Herbert Meynell ...London.
Bowdler, Ernest Harper .....Albrighton.
Broadhurst, Fred. .....Stockport.
Burrell, Benjamin Lawson ...Leeds.
Haigh, William .....Stocksbridge.
Hetherington, John .....Moffat.
Marsh, Albert .....Crewkerne.
Paton, Robert Alexander .....Irvine.
Pinckney, Charles Edward ...Peterborough.
Smith, Alfred .....Forest Hill.
Stockdale, William James ...Thirsk.
Strong, Alfred Ernest .....Newcastle-on-Tyne.
Swinton, Thomas Henry .....Crewe.
Turney, Herbert Blandford ...Plymouth.
Varnam, Charles.....Appleby Magna.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a fine.

Appointment of the School Staff.

Professor ATTFIELD was appointed Professor of Practical Chemistry for the ensuing year.

Professor DUNSTAN was appointed Professor of Chemistry for the ensuing year.

Professor GREEN was appointed Professor of Botany for the ensuing year.

Mr. JOSEPH INCE was appointed to conduct the lectures and demonstrations in pharmacy and practical pharmacy for the ensuing year.

Mr. HENRY GEORGE GREENISH was appointed to conduct the lectures in materia medica for the ensuing year.

Mr. DYMOND was appointed Assistant Lecturer in Chemistry for the ensuing year.

Examiners for the Council Prizes.

The PRESIDENT said it was necessary to appoint gentlemen to conduct the examinations for the Council Prizes, including the Pereira Medal. It was customary to occasionally invite the assistance of the friends in the north in this work, and he would therefore move that Dr. Inglis Clark and Mr. Maben be asked to undertake this duty. He had not consulted these gentlemen, but he felt certain that if officially invited they would cordially accept the responsibility.

Mr. HAMPSON seconded the motion, which was carried unanimously.

Report of the Finance Committee.

The report of this Committee was of the ordinary character, and included a recommendation that sundry accounts be paid, and that £600 worth of stock be purchased on account of the Benevolent Fund.

The PRESIDENT, as Chairman of the Committee, moved the adoption of the report. The receipts showed several penalties recovered, and there were a good many examination fees, but as usual at this time of the year there were not many subscriptions. On the Benevolent Fund account there had not been many subscriptions, but there had been a considerable receipt on the donation account, which led to the recommendation that £600 should be invested. A legacy of £500 had been received from the executors of the late Mr. H. B. Brady, which was a fitting sequel

to what he had done intellectually, and showed that he considered the interests of every member of the trade. There was also a small donation, which was very gratifying, from M. Chamonin, Secretary of the Syndicat Pharmaceutique of Boulogne, who sent the congratulations of his Society on the success of the Pharmaceutical Society's Jubilee, and asked to be allowed to send a small contribution to the Benevolent Fund. It was proposed to invest £600 in Government stock, which, when the amount was large enough, would be re-invested in ground rents.

Mr. STORRAR said he was not present at the last meeting, and therefore asked leave to say a few words on the financial position of the Society, which he suggested should be taken into serious consideration by the Finance Committee. He referred not to the extraordinary expenditure of the last few years, which had been sanctioned by the Council, but to the increasing ordinary expenditure. He had made a careful and he believed accurate analysis of last year's financial statement, and had divided the income and expenditure into two heads, ordinary and extraordinary. He found the ordinary yearly income amounted to about £16,000, and the expenditure to £15,942, leaving only a balance of £85 of income over the expenditure, though he had included in the extraordinary expenditure a sum of £275 expended on the Conversazione, and also the whole of the fire insurance, amounting to £272. These might fairly have been charged to the ordinary expenditure, and if so the expenditure would have exceeded the income by over £400. The subscriptions, fees, etc., came to something like £2444, and they ought to meet the House and School expenses, but they did not do so by nearly £1000. Then coming to the Journal account, it showed a balance of about £1000 to make up. Of course it must be remembered that there was a large free circulation to all members and associates, and a fair sum being credited to the Journal for this might be said to square the account, but that would simply mean deducting so much from the ordinary income, which would make that account so much worse. On those two heads, therefore, they were nearly £2500 to the bad, and that was only made up by the fees derived from the examinations. Last year these amounted to £6295, and the expenses only amounted to £3140, showing a gross profit of nearly £3000. He did not think they could rely on so large an income from this source for a series of years, but it might continue for a year or two. He therefore wished to ask that the Committee should turn its attention to this point. There were only two ways of putting the matter right, either by increasing the income or decreasing the expenditure. Next year there would be a little additional revenue from the rent of the house next door, but that would be almost balanced by a reduction in the income from investments. There was no need for any special anxiety, for the Society had no doubt gone on prosperously enough, but he thought the attention of the Committee might well be directed to the question of whether the expenditure could not be decreased without interfering with the efficiency of either the School, the House, or the Journal.

Mr. RICHARDSON said this was a very important subject, and he thought some notice should have been given before it was discussed.

Mr. HARRISON thought the better way would be to adopt Mr. Storrar's suggestion, and ask the Finance Committee to go into the question. Many of the points could be answered at once, but an official answer from the Committee after due deliberation would be more satisfactory. He was glad to hear Mr. Storrar say there was no cause for anxiety, and if the Committee would direct its attention to the several points indicated, it could present a report, and an intelligent discussion might ensue on this important matter, which the Council was obliged to Mr. Storrar for bringing forward.

The PRESIDENT also thought this would be the most satisfactory way of dealing with the subject.

Mr. EVANS inquired if the amount of penalties recovered, which were unusually large during the last month, were more than sufficient to pay the expense of the prosecutions.

The PRESIDENT said, speaking broadly, until the last year or two the law costs in recovering penalties had exceeded the actual penalties recovered, but during the last two years a good many penalties had been obtained without going into court, and in those cases the costs were much less. There was no definite ratio. It often cost a great deal to recover one penalty of £5 if the case went into court, and was a troublesome one; whilst in another case several penalties might be recovered, without going into court, at a much less expense.

Mr. EVANS suggested that the Finance Committee might make a return as to this point for the last twelve months.

The PRESIDENT said it would be quite easy to do that. In the last financial statement would be found the amount of penalties recovered, and the law costs, which were substantially all incurred for this purpose. Sometimes they included other things, but practically last year they were of that nature. He ought to have said in moving the adoption of the report that a notification had been received from Mr. Hill, the Assistant Secretary, of the election of the Executive in Scotland, also a communication from Mr. Ewing that he had taken over a balance of £76 1s, 6d. from Mr. Gilmour.

The report and recommendations of the Committee were unanimously adopted.

It was also resolved:

"That the Finance Committee, with Mr. Storrar, be instructed to prepare a report upon the financial position of the Society and submit the same to an early meeting of the Council."

REPORT OF THE BENEVOLENT FUND COMMITTEE.

The report of this Committee included a recommendation of the following grants:—

£10 to the widow (age 71) of a former member, London.

£10 to a former member, age 63, and a subscriber to the Fund. Applicant carried on business for thirty years, but owing to ill-health it fell off, and in March, 1890, he had to dispose of it, and has since lived on the proceeds. Has four children, two only of whom are able to assist him. Birmingham.

£10 to a registered chemist and druggist, age 78, who was in business for twenty-two years, but had finally to abandon it. Has one daughter, who is permanently afflicted, mentally and bodily. Manchester.

£10 towards the apprenticeship of one of the orphans of a former member.

One case had been deferred for further information, and two were not entertained.

The VICE-PRESIDENT (as Chairman of the Committee) moved the adoption of the report and recommendations.

Mr. ATKINS seconded the motion, and wished to add a word to what had been said by the President with regard to the legacy left by Mr. Brady. He felt that the Benevolent Fund was doing a vastly greater work than was always acknowledged. When he was asked, as he sometimes was, what the Society did for the trade, he often said that if it only had the administration of the Benevolent Fund to look to that was quite a sufficient answer. At the last meeting of the Committee he reported that he had within a day or two availed himself of the opportunity of paying an old lady her quarterly annuity, and he only

wished the Committee could have heard her warm-hearted testimony to the value of that annuity of £35 a year in smoothing the last years of her life. He thoroughly appreciated the kindness of Mr. Brady, whose memory was sacred to them all, in leaving this legacy, and he could bear testimony to the manner in which this Fund was appreciated by those who benefited by it.

The motion was then put and carried unanimously.

REPORT OF THE LIBRARY, MUSEUM, LABORATORY AND HOUSE COMMITTEE.

Library.

The report of the Librarian had been received, including the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
May	Day . .	441	26	9	18
	Evening .	172	16	4	9

Circulation of books.	Total.	Town.	Country.	Carriage paid.
May . . .	187	82	105	£1 4*s.* 2½*d.*

The undermentioned donations had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

For the Library in London—

Helfenberger Annalen, 1886–90. From Herr E. DIETERICH.

Paschkis (H.) und A. Smita, Über das Lobelin, 1890.

Paschkis (H.) und F. Obermayer, Weitere Beiträge zur Hautresorption, 1891. From Dr. PASCHKIS.

Martenson (J.), Peptone Cornélis, 1890. From the AUTHOR.

Prota-Giurleo (N.), Trattato di farmacia, e nozioni di medicina pratica, 1888. From the AUTHOR.

Nieuw Tijdschrift voor de Pharmacie in Nederland, Juli—December, 1888.

Pharmaceutisch Weekblad voor Nederland, Juni, 1888—Mei, 1891. From Dr. JUL. MOREL.

Botanical Society of Edinburgh, Transactions and Proceedings, vol. 18; vol. 19, pp. 1-88. From the SOCIETY.

University of Edinburgh, Calendar, 1891. From the UNIVERSITY.

University of London, Calendars, 1888-91. From H. M. STATIONERY OFFICE.

University of Wisconsin, Ninth Annual Announcement of the Department of Pharmacy, 1891. From the UNIVERSITY.

Thomson (A. T.), Lectures on the Elements of Botany, part 1, vol. 1, 1822. From Mr. H. O. HUSKISSON.

School of Pharmacy Students' Association of the Pharmaceutical Society of Great Britain, Papers, vol. 16, session 1889-90. From the ASSOCIATION.

Museum.

The Curator's report had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
May	Morning	351	25	3	14
	Evening	100	12	1	4

The following donations had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Three cases of blistering insects. From Dr. M. C. COOKE.

Two specimens of hydrochlorate of quinine, two of the bi-hydrochlorate, one of phenol-quinine hydrochlorate, one of quinine-hydrochinone hydrochlorate and one of the bi-hydrochlorate; one of cocamine containing homococamine and a specimen of the leaves from which it was obtained. From Dr. O. HESSE.

A specimen of Cyprus berries and pistachio nuts. From Messrs. HEARON, SQUIRE and FRANCIS.

Specimens of *Lavandula Stœchas*, *Helichrysum Stœchas* and *Folia Mari*. From Messrs. POTTER and CLARKE.

The staff of the Society's School had attended and reported on the various classes.

The Committee recommended that an addition be made to the Librarian's salary. Also that the usual annual cleaning, etc., be proceeded with during the vacation.

The PRESIDENT (as Chairman of the Committee) moved the adoption of the report and recommendations.

Mr. RICHARDSON asked if it was intended to introduce the electric light.

The PRESIDENT said the new premises were fitted up for it, but it was not yet obtainable at a sufficiently low price.

The motion was carried unanimously.

THE RESEARCH COMMITTEE.

The PRESIDENT reported on behalf of the Research Committee that a notification had been received from the Secretary of the Royal Society that a sum of £150 had been voted to the Research Committee of the Pharmaceutical Society of Great Britain, from the Government grant for research purposes, for an investigation into the constitution, properties, and mode of extraction of the aconite alkaloids. Such a recognition on the part of an important Society, representing the Government in this matter, was a ground for congratulation. Every one present knew the extreme difficulty attending this investigation, and that it not only involved great expense, but was a work which could not be carried out by an individual.

THE PHARMACY ACTS AMENDMENT BILL.

The PRESIDENT said he had to report in reference to this Bill that in the view of the members of Parliament who had been good enough to back it, it was not desirable to put it down on the paper any further, inasmuch as the leader of the House had given notice that the Government proposed to take all the time that remained of the session. At one time it was hoped that if the Government got through its work sooner than was expected private members would have a chance, but this was now quite out of the question, as it was intended to prorogue Parliament as soon as Government business was finished. He was sorry to say, therefore, that for this session it was impossible to proceed any further. This recommendation was made by those who had charge of the Bill in the House, and it was not for him or the Council to object, especially as there was an understanding that blocked Bills which had no chance of coming on should not be put down merely for the purpose of exasperating those who had blocked them.

Mr. EVANS asked if it would not be possible to introduce the Bill in the House of Lords.

The PRESIDENT said it was possible, but he had been instructed by the Committee to introduce it in the Commons this year. When a Bill came from the House of Lords, there was no father to it in the House of Commons; it simply had "Lords" written on the back, and there was no one to apply to by those who wanted information about it, either for the purpose of opposition or support. When a Bill went from one House to the other it was within the power of any member to move the first, second, or third reading, or that it should go into Committee.

Mr. SCHACHT said it might seem unwise to spend time in expressing vain regrets, but possibly a little conversation on this point, if it did not take the line simply of repetition or regret at another failure, might be

of use. It might lead to a wiser course of action for the future. Many of them had been quite content to leave the management and conduct of this Bill in Parliament entirely to the President, and he for one had been of opinion that it was wisest to leave the matter in his hands, and what he now said was not intended to convey the slightest reflection upon him or his management, but singularly enough it had resulted in absolute failure; a repetition of failure which was extremely aggravating to those who realized the benefits which would result from the passing of the Bill. The question was, could they not take counsel together, and before next session establish such an organization that if the same Bill, or another one, were introduced, a great deal more force might be brought to bear on members of Parliament in its favour. It was deplorable that a small measure like that should year after year be crowded out, apparently simply for want of care and anxiety on the part of a few members of Parliament to urge it on. Surely if it was as important as they believed there ought to be some pressure brought to bear to prevent this wretched recurrence of failure after failure. He spoke entirely without premeditation, but he ventured to think it might be possible to devise some means which would give more hopes of a good result in future.

Mr. ATKINS thought the chief, if not the sole reason for the failure to get this Bill launched and discussed had been the condition of public business. He was interested in another Bill, which to him was almost as important as this one, and that was in just the same position. He should be extremely sorry if the action of what might be called a combination or a syndicate, or a committee, should deprive them of the valuable personal services of the President in this matter. From what he could gather, action in the lobby of the House and on public men was very largely dependent on the personal influence of one man who took a special interest in a subject. A very large amount of time, active service, and enthusiastic work had been devoted to this Bill by the President, and if its conduct were transferred to a number of his colleagues there would be a diffusion of energy, and a loss of force, which would be very serious. In the first place failure was due to the block of public business, and secondly he should deprecate anything which would lessen the personal influence of the President.

Mr. EVANS was quite sure that no one was more disappointed than the President at the result of the session; but the same result had attended other efforts, and he was quite sure that everything possible had been done. Still he thought, with Mr. Schacht, that in a future session the hands of the President might be strengthened. He did not know much about the forms of the House, but he believed it was possible for several members to ballot for the same measure, and if this were done early in the session, there might be some chance of its being put forward. Certain Bills were written up very strongly in the daily papers and had popular opinion evoked in their favour, and if something could be done in that way it would be very advantageous. He hoped the difficulty experienced in getting this measure through would convince some of his friends of the necessity for decentralization, so that there would be more time for carrying through necessary legislation.

Mr. GOSTLING said he should be sorry for the influence of the President to be in any way lessened or divided, but it might, on the contrary, be increased if he were placed in a different position. He should like to see him a member of the House of Commons, and if he would allow himself to be nominated he had no doubt a great deal of influence would be brought to bear in favour of his election. If he were once in the House they knew his ability and persistence, and there would be a far better chance of passing the Bill.

Mr. STORRAR said the reason of the failure was simply the pressure of business in the House, and the fact that the Bill was an opposed one.

The PRESIDENT said that was true. No amount of pressure from outside would take off the block from the Bill.

Mr. STORRAR: So long as it was a private Bill they could not expect it would have any better chance of passing. The only prospect of success was either to get it made a Government Bill or to make it so popular as to please the whole trade, which was impossible.

Mr. EVANS said whether it was blocked or not the pressure of other business was too great.

The PRESIDENT said the power of a single member in opposing a Bill was enormous. The Government got over the difficulty in the case of their own measures by moving the suspension of the rules, so that whether a Bill were opposed or not it might be proceeded with at a late hour, but with regard to private Bills the rule was absolute. There was a strong feeling, which Mr. Gainsford Bruce expressed at the dinner, that there were far too many Bills introduced, and unless the promoters succeeded in getting an early day in the ballot, the chances were very remote of any private Bill which was opposed being passed. There was nothing to prevent half a dozen members balloting for one Bill.

Mr. HARRISON thought Mr. Evans had touched the vital point; the main cause of the failure was that their own members had not shown that interest in the measure and that great desire to see it passed that they should. The interests attacked by the Bill had made themselves heard and had put on the block which prevented it coming on; but he did not think their own members had approached their representatives as they might, and urged them to give their attention to this matter. Nothing remained but to take up the question again. They might on going through the Bill find some portion which might be amended; but in any case it ought to be taken up soon, and information sent to their constituents so that demonstrations in its favour might be organized throughout the country. It was no use indulging in vain regrets; the great thing was to arouse the enthusiasm of their own members.

Mr. RICHARDSON thought Mr. Schacht had been misunderstood. He was sure he did not wish to interfere with the President's influence in the House of Commons. There was no doubt that the next session would be the last of the present Parliament, and if the Government brought in a Local Government Bill for Ireland it would be a very busy and contentious one, and the sooner therefore the Council set about preparing for the introduction of the Pharmacy Bill the better. He agreed with Mr. Harrison that organizations should be formed in every centre in the whole kingdom. The chemists had shown some indications that they approved the Bill, but no enthusiasm had been aroused. Meetings had been held in the large towns, and resolutions had been passed, but the trade had not gone beyond that. The Council had been waiting for the President to pull the strings, and if this could be done at once, without in the least degree taking the conduct of the matter out of his hands, he believed it would be a great assistance. It was an entirely selfish opposition, and means should be taken to arouse the enthusiasm of all those who knew that it was for the good of every member of the trade.

Mr. HILLS said Mr. Evans had so much experience of public business that any suggestion which fell from him was worthy of attention, but he did not quite see how such a Bill as this was to be pressed on the attention of the public in the press. Pharmacy did not commend itself very much to the public taste, and it would require very special qualifications to write

articles on it which would have any effect on the public mind. He only wished there was a little more enthusiasm on this matter in their own press, and that it would accept with unanimity a Bill which if it did not meet the requirements of every chemist on the Register, had been devised, after a great deal of consideration, with a view to the advancement of pharmacy. After all, the great drawback was that the Bill was not heartily supported by the whole of the trade, and there was no enthusiasm about it.

The PRESIDENT said it must not be forgotten that the Council had never yet succeeded in going to Parliament with a measure which commanded anything like universal assent. The apathy of the calling was such that men would not meet together and discuss what was best to be done; they remained behind their counters, read a draft Bill, or an article in a newspaper, and immediately thinking they were going to be injured, wrote to their member about it.

Mr. SCHACHT said there might be want of enthusiasm, and there might be a captious spirit; he agreed there had been both; but there had also been in many quarters a disposition to back up the action of the Council and inquiries had been made as to how and when action should be taken. But they had been rather restrained and told that it was not yet time. It was not altogether hopeless to expect a flood of petitions if the signal were given.

Mr. ALLEN asked if it would have any effect if cartloads or vanloads of petitions were sent in until the Bill came in some manner before the House. It never had done so yet, but many other Bills were in the same position, and whilst he had a severe feeling of disappointment at finding session after session that the Bill could not be got before the members, he felt that it would be necessary to wait, and probably for some time. Any Bill sent up with a consensus of opinion from the Council and the Society in its favour, was sure to be a good one, but still, unfortunately, there were a great number of registered men who always looked with suspicion on any measure coming from the Council, and they would always oppose it. Such opposition must be counted on, and therefore it seemed to him impossible to get such a Bill through until matters were much clearer in Parliament. Petitions sent in at such a stage would have very little weight.

The PRESIDENT said the important point was that the chemists and druggists were not really a united body, and his experience in the country had shown him that there were a good many people interested in one way or another in preventing that unity which was so much to be desired. If Mr. Schacht could tell the Council how to influence the members of the trade in Glasgow, for instance, and get them to persuade their representatives to remove their blocks, that would be very useful. But the people of Glasgow for various reasons disapproved of one or two clauses in the measure, and the Society had not enough influence to counteract that opposition except on the floor of the house. If the chemsts and druggists were a well organized body throughout the country, the great majority of the trade enrolled in one Society, with an organization in every town and city, and with a reasonable amount of loyalty to the governing body, a great deal could be done, but at the present time the actions of the Council were viewed with suspicion even by members of the trade, and when an intelligent member of the House of Commons had a string of grievances brought to him by a prominent chemist and druggist from his own town he naturally suggested that the Council should come to terms with the objector so that the block might be withdrawn. It was becoming the firm opinion amongst members of Parliament that no opposed private Bills were likely to pass for some years to come, and consequently they advised persons to try to come to terms with their opponents. Now the Council could not come to terms with those who opposed the very principle on which it was working, it could only fight the matter out on the floor of the House when the Bill got there. There was plenty of enthusiasm in some quarters, but the influence of men in the south of England on their members would not induce the members for Glasgow or any place in the north to remove their blocks or modify their opposition. Even on the matter of the curriculum he was told by members of Parliament that they had not time to look into the matter, and that they did not understand it, but some of their constituents disapproved of what was proposed, and he was asked if he could not get these people to agree, because until they did they must continue the block. If the promoters of the Bill once got an opportunity of explanation or discussion, it would be all right; but the mode of opposition now was to prevent any chance of a measure being discussed.

Mr. SCHACHT said the result seemed to be that it would not be the least use attempting to bring in a Bill next session; it was a hopeless task, according to the President's statement, and if that were so there was no use in going on with it. But he did not believe it, and that was why he had raised the question. He said there were blocks; then next session let them anticipate the blocks. If five hundred chemists in Glasgow petitioned their members not to block the Bill, one or two men asking them to do so would not have much effect; but if the one went before the five hundred the mischief was done. At any rate let some new method be tried, not go on session after session with the certainty of being beaten.

Mr. NEWSHOLME suggested that the matter should be referred to the Law and Parliamentary Committee for consideration. He quite understood the position the President took up, and he did not quite see how the enthusiasm Mr. Schacht spoke of could be worked up. If he could suggest anything he was sure the Committee would be perfectly ready to consider it.

Mr. MARTINDALE said there was no doubt the Bill would promote the best interests of pharmacy, but a certain number were opposed to it, and he did not see how their prejudices were to be got over. If these gentlemen could only be persuaded to unite with the Society there might be some hope, but it was a very difficult position.

Mr. EVANS thought something might be done by enlisting the services of the Local Secretaries, at any rate he did not think the efforts of one man, however able, exhausted the subject, and perhaps some scheme could be devised by which the President's hands might be strengthened. A circular might be sent out asking their friends to see their representatives on the matter. He would undertake to see twenty members in a couple of months, and if others would do the same some effect might be produced.

Mr. ATKINS said this point of pressing members of Parliament was one of extreme difficulty. A session or two ago he obtained the hearty assent of both the country and borough members, and though the latter was a political opponent, he was extremely courteous about it; but he should not like to ask those gentlemen to do again what they did for him time after time, at any rate until the friends of the Bill were ready for immediate action. The Bill had to take the chances of a ballot, and though this matter was of paramount interest to chemists and druggists, there were other interests quite as important to other people, and the disadvantage was that this was a technical question and not a national one. It was of the utmost importance in their eyes, but it was not one of those great organic measures which arose now and then in the history of a nation or a body, and about which there was no difficulty in creating enthusiasm. The

details were important, but dry, and it was very difficult to enlist the sympathies of outsiders about them. When the Bill was really in the House of Commons he would repeat his efforts with the two gentlemen he had named, if they were still in the House, but he dare not ask them to wait night after night on the mere chance of supporting the Bill.

Mr. CROSS agreed with Mr. Atkins. A member of Parliament told him last session that the Pharmacy Bill was the biggest bugbear he had to contend with, for it was on the paper night after night, and he was most anxious to be present if there was any chance of it being reached. At last he told him not to be so assiduous, as he feared there was little chance of it coming on, and therefore he need not inconvenience himself if it were a good way down the list. His friend told him, however, that there was such glorious uncertainty about these things that a Bill might be very low down and yet be suddenly sprung upon them, and he would not be away when it came on after waiting so long for it for anything. He thought the Committee should take the matter into consideration as soon as possible, in order that the Council might take time by the forelock next session.

Mr. SCHACHT said if there was no objection he would move—

"That the subject of the re-introduction of the Amended Pharmacy Bill be referred to the Law and Parliamentary Committee for early consideration."

This was seconded by Mr. RICHARDSON, and unanimously agreed to.

REPORT OF THE GENERAL PURPOSES COMMITTEE.

The report of this Committee included the usual letter from the solicitor, stating the progress made with cases placed in his hands. Several offenders had paid penalties, and in four cases penalties had been recovered in court.

One new case of alleged infringement had been reported to the Committee, and proceedings were recommended.

This report was as usual considered in Committee.

On resuming, the report and recommendations were unanimously adopted.

REPORT OF EXAMINATIONS.—*June*, 1891.

ENGLAND AND WALES.

	Candidates.		
	Examined.	Passed.	Failed.
Major (17th)	6	4	2
„ (18th)	4	2	2
	— 10	— 6	— 4
Minor (17th)	28	9	19
„ (18th)	27	10	17
	— 55	— 19	— 36
	65	25	40

Preliminary Examination.

18*th*.—Seventeen certificates by approved examining bodies were received in lieu of the Society's examination.

Pharmaceutical Society of Ireland.

SPECIAL MEETING OF THE COUNCIL.

A special meeting of the Council was held on Wednesday, June 24.

Present: The President (Mr. Hayes), the Vice-President (Mr. W. F. Wells), the Hon. Treasurer (Mr. Hodgson), Dr. Burnes, Messrs. Boyd, Simpson, Merrin and Johnston.

The Hon. Treasurer having reported the purchase on behalf of the Society, subject to the approval of the Council, and to certain conditions being fulfilled, of the house, No. 67, Lower Mount Street, by the House Committee, it was proposed by Mr. Boyd, seconded by Mr. Simpson, and resolved: "That the purchase of No. 67, Lower Mount Street, by the House Committee for the sum of six hundred and seventy-five pounds (£675), subject to the rent of £9 17*s*. 4*d*. per annum, subject also to a sanitary certificate by Mr. W. Kaye Parry, C.E., and approval of title by Messrs. Casey and Clay, be confirmed by this Council and that said Committee be free from any liability in the matter."

Proceedings of Societies in London.

BRITISH PHARMACEUTICAL CONFERENCE.

A meeting of the Executive Committee was held at 17, Bloomsbury Square, on Thursday, June 25. Present—Mr. Martindale (President) in the chair, Dr. Attfield, Messrs. Branson, Carteighe, Gerrard, Holmes, Alderman Yorath, Mr. Davies (Hon. Treasurer), Messrs. Naylor and Ransom (Hon. Gen. Secs.), and Mr. Thompson (Assistant Secretary).

The minutes of the previous meeting were read and confirmed. A communication was read from the Secretary of the Pharmaceutical Society acknowledging the address which had been presented by the British Pharmaceutical Conference on the occasion of the celebration of the Society's Jubilee.

Mr. Branson, on behalf of the Leeds Chemists' Association, thanked the Conference for the copies of the 'Year-Book' which had been presented to their library.

Alderman Yorath and Mr. Munday attended as a deputation from the Local Committee at Cardiff, and supplied information as to the arrangements which were being made for the meeting of the Conference there in August. Mr. Coleman, the Honorary Local Secretary, was unable to be present owing to domestic bereavement. The headquarters of the Conference will be at the Angel Hotel. The usual reception by the President and officers of the Conference will be held on the evening of Monday, August 17, at the University College, and will be followed by a conversazione. The President will deliver his address and the papers will be read in the lecture theatre of the same College on the two following days. After the sitting on Tuesday afternoon a trip is arranged by steamer to Penarth and Barry Docks. After the business on Wednesday it is intended to drive to Llandaff Cathedral. Another party will be formed to visit the Dowlais-Cardiff Iron Works and other places of interest. The smoking concert will be held at the Angel Hotel in the evening. The following day will be devoted to an excursion either to Brecon and Caerphilly or to Margam Park and the Vale of Neath.

It was proposed by Dr. Attfield, and seconded by Mr. Davies, that the thanks of the Committee be given to Mr. Munday and Alderman Yorath for their kindness in attending and giving information of the local arrangements, and that the Executive expresses its sympathy with Mr. Coleman in his bereavement.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

The final meeting for the present session was held on Thursday, June 25, Professor Attfield, F.R.S., President, in the chair. The following report on the work of the session was presented:—

ANNUAL REPORT OF EXECUTIVE COMMITTEE.

The Executive Committee of the School of Pharmacy Students' Association have held three meetings for the transaction of the business of the session. At a meeting held November 20, 1890, the following members were appointed as a Committee of Reporters

on the Sciences allied to Pharmacy:—Pharmacy, Mr. F. A. Hocking; Botany, Mr. H. H. Sturch; Materia Medica, Mr. H. W. K. Pears; Physics, Mr. P. J. Robbins; Organic Chemistry, Mr. C. E. Boucher; Inorganic Chemistry, Mr. A. J. Simons; Analytical Chemistry, Mr. W. F. J. Shepheard.

An amendment to the rules of the Association making provision for the admission of life members was drafted by the Committee, and afterwards submitted to a general meeting of the Association, by which it was adopted. Having received the sanction of the Council of the Pharmaceutical Society, it now forms part of the rules, and provides that the subscription for life membership shall be ten shillings and sixpence. Three members have already availed themselves of this clause by paying the composition fee.

At a meeting held April 30, a grant of 5*s.* 6*d.* from the Research Fund was made to Messrs. Riches and Dunning to defray the expenses of their paper on "Saffron," and another grant of 5*s.* 6*d.* to Mr. Harrison for the expenses of his "Notes on Commercial Benzole," and "The Melting-point of Citric Acid."

At a meeting held June 25, the Secretary reported that the papers and Reports of the Session 1889–90 had been copied in type-writing, bound, and presented to the Library of the Pharmaceutical Society.

The following statement of the Committee of Reporters was read by the Secretary on behalf of the Committee:—"The Committee of Reporters on Science met on December 4, 1890, and arranged the order of reports for the ensuing session; the following are the reports that have been given:—Inorganic Chemistry, "The Chemistry of Photography," by Mr. A. J. Simons; Botany, "Cross Fertilization," by Mr. H. H. Sturch; Organic Chemistry, "General Report," by Mr. C. E. Boucher; Pharmacy, "Emulsions," by Mr. F. A. Hocking; Analytical Chemistry, "General Report," by Mr. W. F. J. Shepheard; Materia Medica, "General Report," by Mr. H. W. K. Pears; Physics, "General Report," by Mr. P. J. Robbins; Analytical Chemistry, "Second Report," by Mr. W. F. J. Shepheard; Organic Chemistry, "Modern Ideas on the Constitution of Chemical Compounds," by Mr. C. E. Boucher.

This statement was approved by your Committee and ordered to be incorporated in their report. The general progress of the Association has been satisfactory, there being a slight increase over the previous session both in the number of members and in the attendance at the meetings. The number of members on the books is now seventy-four, including three life members, the number of meetings held has been twelve, and the total attendance 247, or an average of between twenty and twenty-one at each meeting.

The number of communications read at the meetings amounts to twenty-one, consisting of the nine reports already mentioned, and the following papers: "Introductory Address," by Mr. N. H. Martin; "Lac Sulphuris and Sulphur Præcipitatum," by Mr. W. Wilson; "Saffron and its Adulterants," by Messrs. F. F. Riches and J. Dunning; "The Separation of Calcium and Strontium," by Mr. W. B. Hoile; "Vegetable Mimetism," by Mr. T. J. Roberts; "Explosives," by Mr. S. A. Fox; "Field Botany," by Mr. H. Garnett; "Leeches," by Mr. T. M. Taylor; "The Pharmacopœia Addendum," by Mr. F. Browne; "Commercial Benzoles," by Mr. E. F. Harrison; "The Melting-point of Citric Acid," by Mr. E. F. Harrison; "May Wild Flowers," by Messrs. J. Plowright and R. S. Donington.

The Treasurer's accounts, to be presently audited, show that the receipts from annual subscriptions, life-members, composition fees, and interest on capital, amount to £11, while the working expenses have amounted to £8 6*s.* 1*d.*, leaving a balance of £2 13*s.* 11*d.* to be added to the Research Fund. Grants to the amount of 11*s.* have been made from this fund, so that it has received a net increase of £2 2*s.* 11*d.*, and now stands at £21 17*s.* 3½*d.*

Messrs. F. A. Hocking and E. F. Harrison were then appointed as auditors to audit the treasurer's accounts, which they reported to be correct. The adoption of the report was thereupon moved by the President, seconded by Mr. F. Browne, and unanimously agreed to.

The proceedings terminated with a vote of thanks to the President, proposed by Mr. Harrison and seconded by Mr. Dunning, and a vote of thanks to the officers and committees, proposed by Mr. Roberts.

Parliamentary and Law Proceedings.

Apothecaries' Society *v.* Bright.

This was an action before his honour, Judge Stonor, at the Marylebone County Court, on Tuesday, the 30th ult., in which the plaintiffs, the Masters and Wardens of the Society of the Art and Mystery of Apothecaries, sought to recover from the defendant, Mr. Thomas Bright, a chemist and druggist of Willesden, a fixed sum for having contravened an Act of Parliament by acting as an apothecary.

Mr. Lemon appeared to prosecute on behalf of the Apothecaries' Society; Mr. Colam, barrister (instructed by Mr. Daphne, solicitor, of Basinghall Street), appeared for Mr. Bright.

Mr. Lemon opened the case. Having handed to his honour the Act of Parliament which he alleged the defendant had infringed, he said that this was an ordinary matter of fact which the jury would decide on the evidence adduced. As regarded the acting as an apothecary, the business of a chemist was that of a chemist, and a chemist was one who sold medicines which were asked for; the customer asked for this, that, and the other, and the chemist provided it, or the customer brought in a doctor's prescription and the chemist made it up. But if the chemist went further and asked the customer what was the matter, or the customer went and complained of this, that, and the other, and the chemist took upon himself to make up what he considered a good mixture for that complaint, then he had stepped outside his province of a chemist and had taken upon himself to prescribe. The law on that point was strict and well ascertained. Of course, all he said as to the law was subject to what his honour might rule. It had been laid down in the Courts that a chemist was one who sold medicines asked for, whereas—if they believed the evidence—the present defendant not only sold medicines asked for, but determined on which he ought to give.

His Honour was not quite clear whether he had jurisdiction to try the case.

Mr. Lemon said that had been decided. Stated shortly the evidence he should call before them would be this. A Mr. Pound went to defendant and asked for a bottle of medicine for his daughter, who had a cold, and thereupon the defendant gave him a bottle of mixture, which the witness had. Subsequently one of the daughters of Mr. Pound went across and saw the defendant, and asked if her sister's medicine were ready. The defendant said it was not, as he had been very busy, but if this witness would look in again he would at once make it. There was no pretence here of anything like a prescription having been given to the defendant; all this making up of medicine was out of the defendant's own head. The next case was that of the Rev. F. North, whose evidence would be to the effect that he went and saw the defendant and complained of having a cold, and asked, "Can you give me any stuff for it?" Some stuff was made up and the defendant was paid. Still another case was that of Mrs. Swallow, a baker and confectioner, living somewhere in the neighbourhood. This lady called on Mr. Bright

and said, "I am feeling ill with a pain in the side." Some conversation took place, which need not be detailed, with the result that Mr. Bright asked to look at her tongue, if she suffered from costiveness, headaches, etc., and ultimately pronounced the case as very serious. Thereupon he made up some medicine from various bottles and shelves in the shop. He thought Mr. Bright had clearly gone beyond the province of a chemist, and had brought himself into the position of an apothecary. An apothecary was one who professed to judge of internal disease by symptoms, and who applied himself to the cure of that disease by medicine. He should like to know what else this defendant did. He submitted that the defendant in this case set himself to work to cure Mrs. Swallow by his medicines. It was for the jury to say what the fact was.

Mr. Joseph Pound, having been sworn, said that he was the manager of a colour warehouse. He lived at Willesden, and knew the defendant very well. About December 27 last he asked the defendant to make up a mixture for his daughter, who had a bad cold. The defendant said he would do so, but did not give him anything then and there. He paid the defendant afterwards. His wife sent to the defendant.

Cross-examined by Mr. Colam, witness said he spoke to the defendant over the counter, and paid him 1*s.* for the mixture. He considered that a very fair price for the mixture, and did not think he was paying the defendant for advice. There was a Dr. Buckle in that neighbourhood.

Mr. Lemon objected.

Mr. Colam said the action was a penal action brought against his client for a penalty for infringing an old statute, under which the information must be laid by the commission of the Wardens.

Mr. Lemon said it was laid by them, and nobody else was his client.

Mr. Colam said he might show that this was an action in which the penalty went half to the informer and half to the Wardens; therefore he wanted to know who the informer was who was going to get half this penalty. He was going to show that the Wardens never brought these actions.

Mr. Lemon: I say I am acting only for the Apothecaries' Society.

Mr. Colam said there would have to be evidence of that. His Honour would find that prosecutions of this sort were only to be instituted by express commission of the Wardens.

In continued cross-examination witness said that his wife went with her daughter the next day to Dr. Buckle's, and then it came out that she had had a bottle of medicine from the defendant. Dr. Buckle asked for the bottle, and had kept it.

Miss Kate Pound, daughter of the last witness, said she was unwell in December last. In connection with her being unwell she had not seen anything of Mr. Bright. She had never been about any medical matter to Mr. Bright's shop.

Rev. Francis Edgar North, curate of St. Mary's, Willesden, said that in January last he called on Mr. Bright and said he wanted some stuff for a bronchial cold he believed he had. The defendant made something up which he paid for and took away.

In cross-examination witness said he believed he paid about 1*s.* for the mixture, which did him a great deal of good. Subsequently he had the measles, and called in Dr. Buckle.

I think you won't call him in again?—No, indeed I won't.

When Dr. Buckle was sniffing about in your room he discovered this empty bottle of cough mixture?—He asked me to show it.

Did he beg of you to let him take it away?—He sniffed it first, and then begged me to let him take it away.

Mary Anne Swallow, a baker and confectioner at Willesden, deposed that in March last she called on Mr. Bright, being unwell, and told him several symptoms in reply to his questions, such as whether she had a pain in the side, etc. She told him she was subject to fainting fits. He gave her a mixture, which was made up in her presence from materials out of the shop. The defendant put several things into the mixture. She had a bad fainting fit that evening, and called in Dr. Buckle.

Cross-examined by Mr. Colam: Her little boy fetched medicine for Dr. Buckle, and she took in messages that were left at her shop for him. She lived about twenty or twenty-five minutes' walk from Mr. Bright's shop, and had never been there before the occasion to which she was speaking. She had never seen Dr. Buckle but three times whilst she had taken messages for him, but she frequently saw Mr. Lupton, his assistant. It was not at the suggestion of Dr. Buckle or Mr. Lupton that she went to Mr. Bright's; neither of them spoke to her until she had been. She gave a wrong name because she was told Mr. Bright talked about what he was treating people for. She gave a friend's name. She had less pain after one dose of Mr. Bright's mixture. She had the other dose in court, but she did not know that all he gave her was an indigestion mixture. Mr. Bright did not touch her across the counter. He advised her to see a medical man at once. She could not be sure whether he charged her 1*s.* 3*d.* or 1*s.* 4*d.*; it was one or the other.

Re-examined: Mr Bright looked at her tongue across the counter and felt her pulse. She never had any instructions from Dr. Buckle before she made this visit.

In further cross-examination, witness said she was quite sure the defendant felt her pulse.

Mr. Lemon: That is our case.

Mr. Colam: I do not know whether I need call evidence.

His Honour: You had better call evidence about the last case.

Mr. Colam said he must call for his learned friend's authority to prosecute in this case. Under the statute, section 26, the prosecution could only be instituted by the Wardens or by their express sanction, and his learned friend must prove that they were parties to the action.

His Honour said the name of any party was quite sufficient.

Mr. Colam said that was not so, because the statute said the prosecution must be authorised by them, and by them only. The Society might know nothing about this case. He was in the constant habit of prosecuting for the Veterinary College, and the objection had been taken over and over again, and had been upheld on appeal, that they had not shown the authority of the Council to prosecute, and therefore they always had to be prepared with the authority of the Council to prosecute. As that was so where the penalty was recoverable at Petty Sessions, he did not see why it should not be so here. As a matter of fact, the Society of Apothecaries never did prosecute in these cases; they nominated the informant to prosecute, and gave him specific authority.

His Honour: They cannot do that; they must prosecute themselves.

Mr. Colam said the statute said the action must be brought in their name. Mr. Upton was the Society's solicitor, but he did not bring these actions. Somebody else was generally nominated, but it might be that nomination had not been carried out in this case. He wanted to know who that somebody was instructed to appear for.

Mr. Lemon said he had nothing to do with Dr. Buckle, except as a witness.

Mr. Colam: Have you the authority of the Master and Wardens?

Mr. Lemon said he had a communication with the office, which came to him without solicitation from him. The presumption was that all things were rightly done, and it was for his learned friend to satisfy the court in that respect.

Mr. Colam maintained that he had a right to know who the informant was, if half the penalty went to the informant, because there might be subsequent proceedings. However, as he had a strong case on the merits, he would waive that point. In the case of the Apothecaries' Society *v.* Lotinga, which his learned friend had cited, they would find that so far from Mr. Lotinga contenting himself with standing behind the counter, and complying when a person came in and said, "I have a cold; give me some mixture," that gentleman actually went and visited patients in their houses for consumption, and it was upon that that the penalties were held to be recoverable. There were other cases, including the well-known case of the Queen *v.* Shepperley, which was a case on all fours with this case of a man who, standing behind his counter, felt a person's pulse and looked at his tongue. There Mr. Baron Pollock——

Mr. Lemon asked where the case was reported.

Mr. Colam said he was citing an absolutely verbatim report of the proceedings from the Divisional Court to Nisi Prius and back to the Divisional Court. It was reported in the Pharmaceutical Society's *Journal and Transactions* verbatim. Was his learned friend going to suggest that his client was not to have the benefit of that report?

Mr. Lemon said his Honour knew what was usual in citing a case.

Mr. Colam said it was also reported in the *Chemist and Druggist*, but he thought his Honour would accept the *Pharmaceutical Journal's* report. If not, he must tell them through his Honour what happened in that case.

Mr. Lemon protested against his learned friend referring to the facts of any case in which he was not personally concerned, except cases in the judicial reports.

Mr. Colam tendered the report, *verbatim et literatim*, of the *Pharmaceutical Journal*, saying that surely his Honour could not reject it. What happened in that case was this. It was a similar case to this, just as paltry. That case was tried before Mr. Baron Pollock, and Mr. Baron Pollock told the jury to consider whether they thought this man had practised as an apothecary within the meaning of this section, and the jury properly decided on these facts that he did not. The reason he made that point was this, that his learned friend had tried to coerce his Honour and the jury into accepting as stereotyped certain phrases used by a judge many years ago, in 1843, absolutely disregarding the facts of the case as to where those words were uttered, the fact being that in that case the man did not stay in his shop and administer cough mixture to visiting persons for consumption at their houses; and he had asked them to apply one or two expressions used in that case to this case, and deal with it as if it were conclusive of the whole matter. His Honour had said that he was going to leave to the jury the question whether, under the circumstances, Mr. Bright acted in these matters as an apothecary. It might not be known to the jury, but it was a fact that the Act upon which this prosecution was founded was as old as 1815.

His Honour: They are bound to show he is not an apothecary.

Mr. Colam said he was afraid the burden of proving that was on him, but he was perfectly willing to accept it. Mr. Bright was a chemist, not an apothecary. Mr. Bright was a chemist and druggist. There was no magic about those words, they were terms well known in the English language, and persons knew what a chemist and what an apothecary meant. At the time this statute was passed there were four distinct branches of the medical profession. The chemist and druggist was a person whose duty it was to stay in his shop and mix up prescriptions sent to him, and administer simple drugs across the counter to persons who asked for them, who said, "I want a cough mixture," or something of that sort. Then there were the apothecaries, whose duty it was to make up the prescriptions sent to them for that purpose by the physicians, and they also had the liberty and right to charge for their personal services just the same as surgeons and physicians, that was to say, they might visit people. To this present day most medical men also took up the degree of apothecary, because it justified them not only in cutting off limbs and acting as surgeons, but also gave them the right to make up medicines. But the system of things had altered itself entirely. From 1815 down to twenty years ago all medical practitioners mixed up their own medicines in their own surgery. He dare say the jury had read 'Middlemarch,' and would remember the stir that was created when for the first time it was suggested that medical men should not have a shop, but should send their medicine to be made up by a chemist, which was a novel thing at that time. It was then the practice for ordinary medical men to mix their medicines themselves. But from that time they found the chemist did it better, so they sent their prescriptions to the chemist to be mixed up, and they confined themselves to visiting people's houses, seeing the patients, seeing the medicines applied, and giving advice, for which they charged. From that time the apothecary, more or less, had dropped out. Practically there was now no new field opposed to the old apothecary. We had only three classes opposed to the position which was held by the old apothecary —the consulting physician, the general practitioner, and the chemist and druggist. For that reason prosecutions for infringing the absolute rights granted by this statute to the apothecaries, as they were known in 1815, had practically died out. There were no such things practically as apothecaries now; people did not make a distinct profession of that. As they all knew, it was the commonest possible thing for a chemist,—not to go and see patients, or to deal with serious cases,—but if a person went to his shop and said, "I have a toothache; what is the best thing for it?" to give some simple remedy. Would it be said by the Apothecaries' Society that in that case the chemist was infringing the old statute of 1815 and rendering himself liable to penalties of £20 every time some miserable doctor chose to lay an information. The time had gone for that. Since 1815 we had changed our manners a good deal. He did not know that there was not a penal statute with reference to wearing brass buttons, but who on earth would think of putting such a penal statute in force! How could it be said in the case of Miss Pound that his client, Mr. Bright, "attended and administered" drugs, and all that sort of thing? Of course it was absurd. In the case of the Rev. Mr. North, after this exhibition of Dr. Buckle sniffing his bottle and finding a chemist's name on it and then running off to the Apothecaries' Society to get £20, the same remark would apply. The rev. gentleman had said—and he was very glad of it—that he would never go back to Dr. Buckle. Mr. North said he had a sore throat or cold, and Mr. Bright gave him something for it. Mr. Bright would tell them that what he gave was a mixture of which he generally kept a gallon at a time in his shop, but that on this occasion he did not happen to have any of it. With regard to the case of Mrs. Swallow, it certainly was a very extraordinary coincidence that after Dr. Buckle had sniffed out two bottles he should happen to hit upon a person who took messages for him, and who after this went for the first time in her life to the

defendant in order to get something which would give her relief. They found, however, after she had been treated, that she got something which was nothing more than indigestion mixture, something very much like Epsom salts. It was the fact, Mr. Bright would tell them, that he gave her nothing more serious than Epsom salts, thinking from what she told him that she had indigestion. What then? Was this practising as an apothecary, to tell a person to go to a doctor!

His Honour: He recommended her to go to a medical man.

Mr. Colam said she went to Dr. Buckle, and then the secret came out. The statute said "whoever shall act and practise." The courts had held that "practising" did not mean an isolated instance. If a person on one occasion gave advice which just overstepped the bounds, surely that did not mean "practising." It would be practising if a man said "Come to me, and I will give you stuff for less than what the doctor will;" but when a man just looked at a woman's tongue could it be said that that was practising as a doctor? He submitted that it was absurd to say that Mr. Bright had practised as a doctor, and he confidently asked the jury by their verdict to say so.

Mr. Bright, the defendant, then deposed that he was a duly qualified and certificated chemist and druggist of twenty years' standing, and had practised in London and the country. He had never held himself out to be an apothecary, or practised as such. It was his constant habit to send people to doctors, except when they asked for a simple thing like cough mixture, or something of that kind. He did not look at Mrs. Swallow's tongue. So far as he could recollect, she gave the name of Simons or Simmonds. She told him she had come to him with a little indigestion, or something of that kind, so simple that it was not at all necessary to go to a medical man. The only question he asked her was whether she wished for something to act on her bowels. What he gave her was a mixture of bicarbonate of soda, bicarbonate of potash, Epsom salts, and a little gentian—a very ordinary mixture. If she said anything about fainting fits, it was after she had the bottle of mixture. He asked her why she did not go to a medical man. He never felt her pulse. She was on one side the counter and he was on the other. It would have been a physical impossibility for him to have felt her pulse without going round the shop.

Cross-examined by Mr. Lemon: People had been to him before and complained of aches and pains. On these occasions he invariably told them to go to a doctor. In the case of Miss Pound, he told her father that if the mixture did not produce the desired effect she had better see a doctor. Mr. North asked him for something for a cold, and was given a mixture which he prepared himself and kept ready mixed. In Mrs. Swallow's case he made the mixture because the bottle was empty. He asked why she came to him, and she said her ailment was too simple to go to a doctor with, she only required a simple mixture. She paid him 1*s.* 3*d.* for the mixture, which was a fair value for the medicine.

This closed the evidence.

Mr. Lemon, replying on the whole case, asked the jury to disabuse their minds of any sort of prejudice created by his learned friend's reference to the old Act of Parliament on which the prosecution was founded. There the Act of Parliament was, and no power on earth short of the Legislature could do away with it. That Act enacted a certain result for people who "acted and practised" as apothecaries without being such. The Act having imposed that penalty, it was not for the jury to trouble whether it was £20 or anything else. As to the cases of Mr. Pound and the Rev. F. North, he should ask them to consider whether what was done by the defendant amounted to practising as an apothecary, but he would deal only with the case of Mrs. Swallow. It was quite true there was a certain amount of conflict between Mr. Bright and the lady, but why the jury should not believe Mrs. Swallow, where her testimony conflicted with the defendant's, he could not see. There was nothing to show that she was not an absolutely independent and unbiassed witness, therefore she was entitled to be so treated, and he called upon them to treat her testimony as more reliable than that of the defendant. On the evidence there was no doubt that the defendant went through the very things a medical man would be expected to do if one called upon him. The small amount charged did not affect the matter. The feature in this case was that the defendant had taken upon himself to see whether this, that and the other was the right mixture to make up, and had thereupon made it up. He submitted that by so doing the defendant had brought his own medical knowledge to bear on his conclusion that so-and-so was the proper remedy, thereby infringing the Act and rendering himself liable to the penalty.

His Honour said the only thing for the jury to say was whether the defendant practised as an apothecary with regard to any of the three cases. As to the first two, they would not have any doubt that he did not. With regard to the last, there was a conflict of evidence, and it was a question which they believed. It was for them to say whether on the whole evidence they considered the defendant had practised as an apothecary.

Without leaving the box the jury returned an immediate and unanimous verdict of "Not Guilty."

His Honour entered judgment in accordance with the finding, and gave the defendant costs on the B (£20) scale.

Alleged Sale of Wine Without a Licence.

At a Justice of Peace Court held in Edinburgh County Buildings, on Monday last, Mr. John Merson Grant, chemist, Lothian Road, was charged at the instance of the Inland Revenue with having on February 3 sold a bottle of Liebig and malt extract, a bottle of coca wine and a bottle of St. Raphael wine without a licence.

Defender pleaded not guilty, and Mr. Pithie, for the Inland Revenue, asked an adjournment till July 14, in order that a skilled witness might be brought from the Somerset House Laboratory, London.

The adjournment was allowed for that purpose.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Chloroform.

Sir,—The Journal of June 27 contains the statement (p. 1179), "Independently of any excise regulation, the Pharmacopœia directs that both chloroform and ether shall be made from rectified spirit." I think the statement is erroneous. The Pharmacopœia presently in force uses the words "It may be made as follows," etc. There is no instruction that chloroform must be made from rectified spirit, whence it may be inferred that chloroform howsoever prepared, if it is sufficiently pure, is chloroform within the meaning of the British Pharmacopœia.

As regards Pictet's process of purification, it may be well in the meantime to suspend judgment on assertions arriving from Berlin, which are evidently inspired by persons having an interest in that particular process.

Edinburgh. D. B. Dott.

Communications, Letters, etc., have been received from Smith, Johnstone, Blount, Mair, Hill, Liebermann.

THE MICROSCOPE FOR STUDENTS.

BY JOHN HUMPHREY.

(*Continued from Vol. XXI., page* 1018.)

Section Cutting.—To enable us to study the minute structure of plants it becomes necessary to cut thin sections of the part under investigation. This may generally be accomplished satisfactorily by free-hand cutting, but in some special cases, and particularly when a series of sections is desired, a simple form of microtome is necessary. For the present, the specimens, described in these articles may be obtained by the former method, which will now be explained as an introduction to a scheme of practical work with the microscope.

In the first place it is essential, if good and perfect sections are to be obtained, to have the material in the best possible condition for cutting. Fresh plants may very often be cut in their natural state as soon as collected, but frequently they are too soft to offer the proper resistance to the knife. This may be remedied by immersing them for a few days in ordinary methylated alcohol (about three or four times their bulk), which has the effect of hardening the tissues. They may be kept in this medium for any length of time and excessive hardening reduced previous to cutting by removing to a mixture of equal parts of glycerine and alcohol for a few hours. On the other hand, woody parts of plants, or dried specimens, will need softening before they can profitably be operated upon. To accomplish this soak them as long as may be necessary in a mixture containing equal parts of glycerine, water, and alcohol. When once softened they may be preserved indefinitely in the same mixture and will be ready for use at any time. An alternative solution, recommended by Strasburger, is prepared by dissolving one part caustic potash in five parts water, and adding five and a half parts glycerine, but it is inadvisable to use this with specimens intended for free-hand cutting.

A fresh carrot may be taken as a good example of material in the right condition for cutting, and students will find it advantageous to practice upon this root, as directed in the following instructions by Professor Hillhouse :—"The object to be cut should be held pretty firmly between the thumb and index finger of the left hand, the index finger being held as nearly as possible horizontally, and slightly bent, the thumb likewise very slightly bent, and with the joint depressed below the level of the finger, in order to secure its safety should the razor slip. In holding the object to be cut the side of the tip of the index finger should be rather higher than that of the tip of the thumb. The razor being then grasped firmly, but not stiffly, the blade held quite flat and horizontal, the edge towards the body ; the index finger of the left hand will serve as a table, on which the blade will lie and thus be greatly steadied. The section should be cut by a single forward and *lateral* movement of the blade." Keep the razor blade wet with the fluid in which the object has been immersed, take care that the object itself is kept moist, and by means of a camel-hair brush remove sections from the blade as soon as cut into a watch-glass or saucer containing the same fluid. Neglect of these precautions will ensure the presence of air-bubbles in the cells and vessels, particularly in longitudinal sections, and these are often difficult to remove.

Sections may be cut in various directions, but for the complete study of any mass of tissue, it is sufficient to cut carefully in three different planes at right angles to one another. A *transverse* section is obtained by cutting the root straight across ; a *radial longitudinal* (briefly, longitudinal) one is the result when we cut through the middle of the root in the direction of its length ; a *tangential longitudinal* (or, tangential) section is cut in the same direction as the latter, but through some point between the centre and the outside circumference of the root. In this case only the middle part of the section is useful for examination, as at the sides the tissues will be cut more or less obliquely, and oblique sections are apt to increase the difficulty of understanding the structure. It is, therefore, wise to confine one's attention to such sections as have been cut in the pre-determined directions.

A slightly hollow-ground razor will be found most useful for free-hand cutting, and one with the blade ground flat on one side for work with the microtome. They should be kept very sharp, and it is advisable to strop them after every few cuts. Dip them into water or spirit and wipe dry before proceeding with the examination of the newly-cut sections.

Proceeding now to actual work procure first some dried dates and remove the seed ("stone") from one. The brown outer coat is next scraped away from this by means of a penknife or scalpel. Now cut some very small sections from the exposed endosperm in a direction parallel with the outer surface (*i.e.*, tangentially). Let the sections be as thin as possible to avoid damaging the razor edge, and use that part of the latter nearest the heel of the blade. By this means you will preserve intact for future operations the part of the edge generally used. Moisten the razor with water whilst cutting and transfer the cut sections to a watch glass containing the same fluid.

The microscope may now be adjusted for use by fixing it upright in such a position that the source of light is at the left hand, if the left eye be mostly used for observing, and *vice versâ*. Whichever eye is used, always keep the disengaged eye *open*. Attention to this small point will be found to remove the chief factor inducing fatigue in prolonged observations. If daylight be available, that reflected from the northern sky will be found most suitable, though as long as bright sunlight is avoided, this is not essential. For the most part, however, pharmaceutical students must be content to work at night with the aid of artificial light. Gas is unsuitable, except with an argand burner, as the flame is too unsteady for comfort. A cheap paraffin lamp with flat wick will answer every purpose, has a steady flame, and gives a fairly white light. The yellow tint may be quite eliminated by fixing a piece of faintly tinted blue glass between the lamp and mirror. Attach the objective of lowest power (1 inch or $\frac{3}{4}$ inch) to the microscope, place the longest eyepiece in position, and turn the surface of the plane mirror towards the light. If now, upon looking into the instrument, the field of view does not appear illuminated equally and brightly, carefully move the mirror about with the right hand until this result is obtained. Any specks appearing in view will probably be due to dust upon the lenses of the eyepiece and will be seen to rotate if this be slowly turned. Remove and

wipe the lenses gently with a soft handkerchief. A glass slide and thin cover must now be carefully cleaned, a small drop of pure glycerine is placed in the middle of the former and the thinnest section of date stone you can find placed upon the latter, which is then inverted and lowered upon the glycerine. The section is now mounted and ready for examination if the space beneath the cover is quite occupied with fluid. If not, put a drop of glycerine at the edge and it will be drawn under by capillary attraction. If possible avoid the inclusion of air-bubbles. Acquaint yourself with the appearance of these under the microscope. They are rounded and have a small bright centre surrounded by a broad dark margin.

Placing the mounted slide upon the stage with the sections as near as possible to the centre of the aperture, slide the tube downwards until the objective almost touches the cover glass. Then, whilst looking into the eyepiece, slowly move the tube upwards again in a spiral fashion. If the instrument has rackwork adjustment, of course you make use of this. Continue the movement until the image of the object comes dimly into view, then use the screw of the fine adjustment until the exact focus is obtained and the object appears clear and distinct.

If now the section has been cut in the right direction and is sufficiently thin, it will be found to resemble the illustration (Fig. 1). The cells have

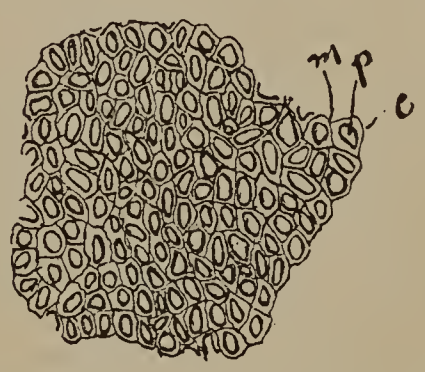


Fig. 1.—Date stone, L.S. Thickened cellulose cell-walls, as seen in transverse section; *c*, cell-wall; *m*, middle lamella; *p*, protoplasmic cell contents. (×90).

narrow circular cavities and thick walls. The former are filled with protoplasm and the latter are highly refractive. By taking advantage of this property of the dense cellulose we can readily distinguish the middle lamella, which does not refract the light so strongly. Having examined the section with the low power, next repeat the observations with a $\frac{1}{4}$ inch or $\frac{1}{6}$ inch objective, reflecting light from the concave mirror. The protoplasm may now be seen to be granular, the middle lamella appears more distinctly, and thin spots (pits) can be distinguished in parts of the cell-walls. It will be necessary to move the slide about with the right hand during the examination, and, whilst working with the higher power, the screw of the fine adjustment should be turned continually with the left hand. By this means all the details can be successively brought into view. Be careful, whilst working with lenses of very short focus, to avoid getting any of the mounting fluid upon them. Should this happen, wash off with clean water immediately and wipe with a soft cambric handkerchief kept for the purpose in a *dust-proof* box. Now, replacing the low power objective, proceed to ascertain the properties of the cellulose walls. Soak two thin sections in iodine solution for a few minutes, using a watch glass or white paint saucer for this purpose. Mount both on slides in the same solution and to one add a small drop of 50 per cent. sulphuric acid. Let a third section be mounted in chlorzinc iodine, and a fourth in acid solution of aniline chloride or sulphate.

Examine in order and note that the section treated with iodine alone has the cell-walls stained slightly yellow, whilst the protoplasm is of a yellowish-brown. That treated with sulphuric acid in addition has its cell-walls swollen so much that their sharp outline disappears whilst they assume a blue colour. The middle lamella colours less readily than the rest of the walls. With the chlorzinc iodine the colour is more violet, though the shade varies, and the protoplasm is again stained yellow. Aniline has no effect.

Repeat all these experiments with small quantities of ordinary cotton wool, which is almost pure cellulose, and note that the reactions are similar.

It will be worth while also to cut the date seed, so as to get transverse and radial longitudinal sections. These will show the elongated cells to be of an irregularly oval shape and the pits will be seen distinctly.

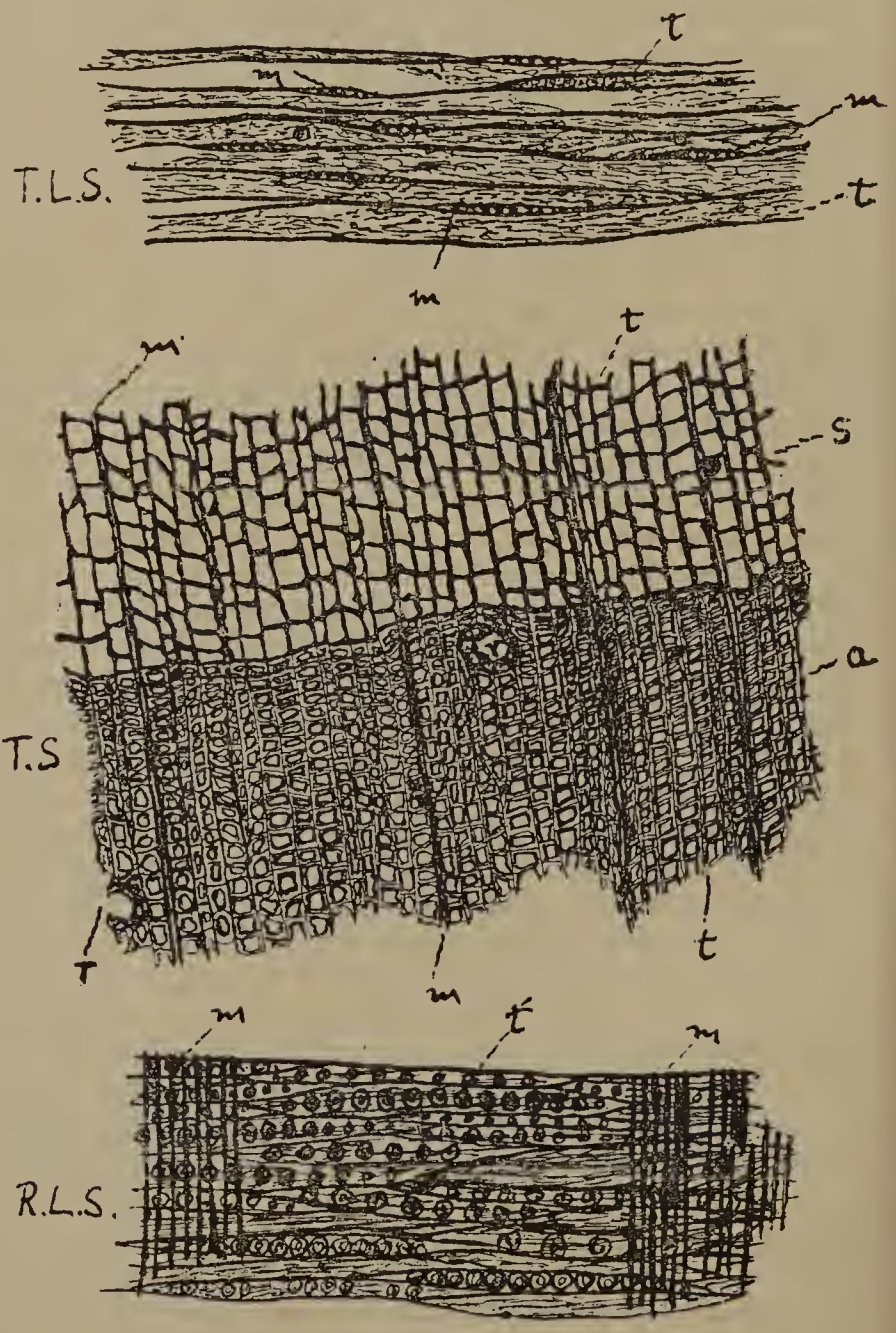


Fig. 2.—Wood of pine. Lignified cell-walls; *m*, medullary rays: *r*, resin canals; *t*, tracheides; *t'*, tracheides, showing bordered pits; *a*, autumn wood; *s*, spring wood. (×50).

Lignified walls may be obtained from any kind of wood, but that of the pine is peculiarly instruc-

tive in many ways. Take an ordinary wooden match, cut very thin transverse sections, and place these in alcohol to remove air bubbles. Longitudinal sections may be prepared and treated in the same manner. Mount four of the former in the same media as before, and note that iodine alone simply intensifies the natural faint yellow coloration of the walls; with sulphuric acid added swelling takes place and the colour changes to brown. Schulze's solution gives yellowish-brown with no trace of blue, and aniline stains a very decided yellow. We have thus found the means of distinguishing lignin from cellulose proper.

Bordered pits may be found in the transverse sections, but to understand their structure properly both radial and tangential sections are also necessary. In a match it is not easy for a beginner to decide how these may best be obtained, but a pine twig is not difficult to procure. If, however, restricted to the more homely material, cut a number of longitudinal sections at random from several matches previously soaked in spirit and glycerine and mount in pure glycerine.

Note how the tracheïdes overlap and that they are practically destitute of protoplasmic contents (Fig. 2).

If the microscope is fitted with a polariscope this will be a good opportunity for testing its value in botanical work. The polarizing prism is fixed beneath the stage and the analyser either above the objective or eyepiece. Use the plane mirror and rotate the polarizer until the field appears as with ordinary reflected light. Focussing a pine section you will now see it as before, but upon giving a half turn to the lower prism, the field will become quite dark, whilst the refractive cell-walls will shine brightly. The date endosperm will act similarly and the stratification of the walls will be evident in both instances, the successive concentric layers showing clearly under a high power.

Suberin reactions may be studied in sections from a soft bottle cork. Cut the thinnest possible sections and mount one in glycerine after removing air by alcohol. Observe (Fig. 3) the thin, sharply

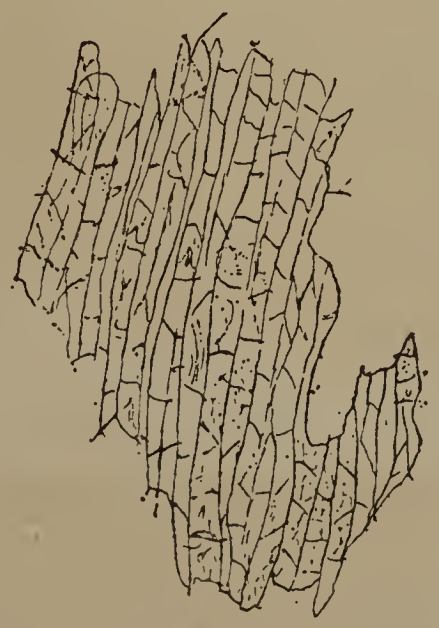


Fig. 3.—Cork, T.S. Cuticularized cell-walls as seen at edge of section. (×90).

defined cell-walls which enclose no protoplasm. Whilst tracheïdes act as carriers of water these contain only air. The edges of sections will usually be thinnest and, on treating with the foregoing reagents, the walls will be found to differ from those of wood chiefly in retaining their sharp outline when treated with sulphuric acid and iodine, no swelling being perceptible. By warming a section with some Schulze's macerating fluid (saturated solution pot. chlor. in acid nitric) the walls are converted into ceric acid, which is found on the slide in drops and may be dissolved in warm alcohol. Solution of potash turns cork cells yellow and the colour is intensified upon warming slide.

Mucilaginous walls are found in the testa or outer coat of linseed. To hold the seed whilst cutting make a slit half way through a soft cork, place the seed in this, clamp with the fingers and cut both seed and cork together. A transverse or longitudinal (Fig. 4) section cut with a dry razor will show this

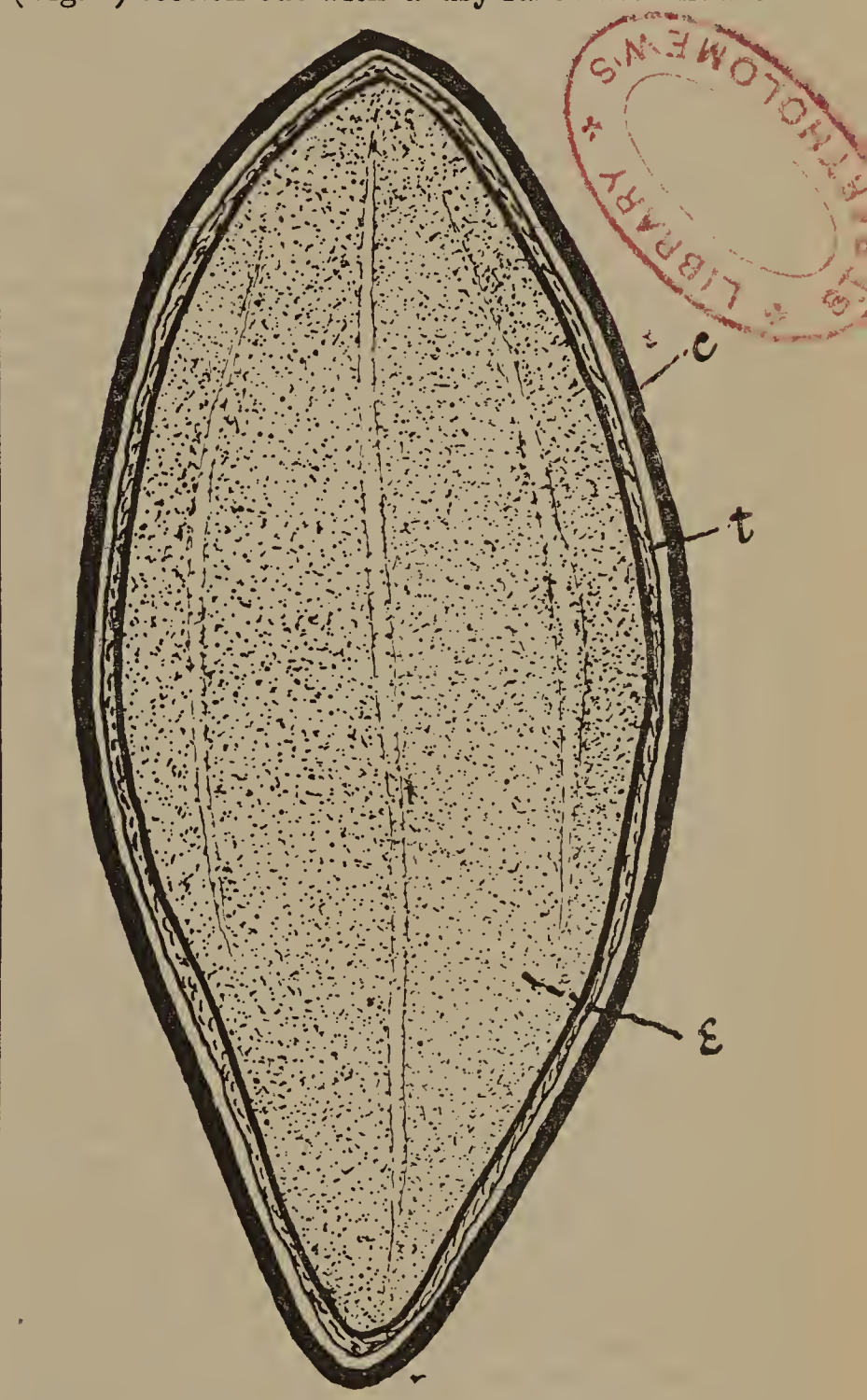


Fig. 4.—Linseed, T.S. Mucilaginous cell-walls of testa; *c*, cuticle; *t*, testa; *e*, endosperm. (×50).

superficial layer of cells to have a thick and highly refractive stratified cuticle and a less refractive middle lamella. If the section be mounted in glycerine and water gradually added the walls will be seen to swell slowly, ultimately rupturing the cuticle and allowing the mucilage to protrude Iodine stains this mucilage but slightly. A better effect is produced by dissolving a little corallin in 30 per cent. solution of carbonate of soda and treating a section with this. The mucilage or vegetable slime is stained a clear coral red, this being a specific property of corallin. *Gums* are not affected by it nor do they present a more or less distinct bluish tinge, as does the mucilage when treated with iodine and sulphuric acid.

Table I.—Cellulose Reactions. (After Behrens).

	Solution of Iodine.	Iodine and H_2SO_4.	Zinc Chlor. Iodine.	Aniline Sulphate.	Schulze's Mixture.	Cupr.-Ammonia.	H_2SO_4 (conc.)	KHO (conc.)
1 Cellulose, cell substance	Yellow to brownish	Blue	Violet	*Nil*	Dissolves	Dissolves	Dissolves	Swells
2 Lignin, wood substance	Yellow	Yellow to brownish	Yellow	Yellow	Readily dissolves	*Nil*	Dissolves	Dissolves
3 Middle lamella, intercellular substance	Yellow	Yellow	Yellow	Yellow	Readily dissolves	*Nil*	Insoluble or soluble	Insoluble or soluble
4 Suberin, cork substance	Yellow or brownish	Brown	Yellow or Brown	*Nil*	Ceric acid reaction	*Nil*	Insoluble	Comes out in drops on boiling

ON ELECTRICAL EVAPORATION.*

BY WILLIAM CROOKES, F.R.S.

It is well known that when a vacuum tube is furnished with internal platinum electrodes, the adjacent glass, especially near the negative pole, speedily becomes blackened, owing to the deposition of metallic platinum. The passage of the induction current greatly stimulates the motion of the residual gaseous molecules; those condensed upon and in the immediate neighbourhood of the negative pole are shot away at an immense speed in almost straight lines, the speed varying with the degree of exhaustion and with the intensity of the induced current. Platinum being used for the negative pole, not only are the gaseous molecules shot away from the electrode, but the passage of the current so affects the normal molecular motions of the metal as to remove some of the molecules from the sphere of attraction of the mass, causing them to fly off with the stream of gaseous molecules proceeding from the negative pole, and to adhere to any object near it. This property was, I believe, first pointed out by Dr. Wright, of Yale College, and some interesting experiments are described by him in the *American Journal of Science and Arts*.† The process has been much used for the production of small mirrors for physical apparatus.

This electrical volatilization or evaporation is very similar to ordinary evaporation by the agency of heat. Cohesion in solids varies according to physical and chemical constitution; thus every kind of solid matter requires to be raised to a certain temperature before the molecules lose their fixity of position and are rendered liquid, a result which is reached at widely different temperatures. If we consider a liquid at atmospheric pressure—say, for instance, a basin of water in an open room—at molecular distances the boundary surface between the liquid and the superincumbent gas will not be a plane, but turbulent like a stormy ocean. The molecules at the surface of the liquid dart to and fro, rebound from their neighbours, and fly off in every direction. Their initial velocity may be either accelerated or retarded, according to the direction of impact. The result of a collision may drive a molecule in such a direction that it remains part and parcel of the liquid; on the other hand it may be sent upwards without any diminution of speed, and it will then be carried beyond the range of attraction of neighbouring molecules and fly off into and mingle with the superincumbent gas. If a molecule of the liquid has been driven at an angle with a velocity not sufficient to carry it beyond the range of molecular attraction of the liquid it may still escape, since, in its excursion upwards, a gaseous molecule may strike it in the right direction, and its temporary visit may be converted into permanent residence.

The intrinsic velocity of the molecules is intensified by heat and diminished by cold. If, therefore, we raise the temperature of the water without materially increasing that of the surrounding air, the excursions of the molecules of the liquid are rendered longer and the force of impact greater, and thus the escape of molecules into the upper region of gas is increased, and we say that evaporation is augmented.

If the initial velocities of the liquid molecules can be increased by any other means than by raising the temperature, so that their escape into the gas is rendered more rapid, the result may be called "evaporation" just as well as if heat had been applied.

Hitherto I have spoken of a liquid evaporating into a gas; but the same reasoning applies equally to a solid body. But whilst a solid body like platinum requires an intense heat to enable its upper stratum of molecules to pass beyond the sphere of attraction of the neighbouring molecules, experiment shows that a very moderate amount of negative electrification superadds sufficient energy to enable the upper stratum of metallic molecules to fly beyond the attractive power of the rest of the metal.

If a gaseous medium exists above the liquid or solid, it prevents to some degree the molecules from flying off. Thus both ordinary and electrical evaporation are more rapid in a vacuum than at the ordinary atmospheric pressure.

I have recently made some experiments upon the evaporation of different substances under the electric stress.

Evaporation of Water.—A delicate balance was taken, and two very shallow porcelain dishes were filled with acidulated water and balanced on the pans. Dipping into each dish—touching the liquid but not the dish—was a platinum wire, one connected with the induction coil and the other insulated. The balance was left free to move, but was not swinging, the pointer resting at the centre of the scale. The water in connection with the coil was first made positive. After one and three quarter hours there was scarcely any difference between the weight of the insulated water and that which had been exposed to the positive current. Equilibrium being restored, the current was reversed, the negative current being kept on the dish for two hours. At the end of this time the electrified water was decidedly lighter. After having again restored equilibrium, the electrification of the dishes was reversed, *i.e.*, the one that had before been insulated was made negative and the other one was insulated. In an hour the electrified water had become decidedly lighter than the insulated water. The experiment was performed in a room of uniform temperature, and any draught was prevented by the glass case of the balance. In a subsequent experiment in which the quantities were weighed, it was found that negatively electrified water lost in one and a half hours $\frac{1}{1000}$th part of its weight more than did insulated water.

* A paper read before the Royal Society, June 11, 1891.

† Third series, vol. xii., p. 49, January, 1877; and vol. xiv., p. 169, September, 1877.

This experiment shows that the disturbing influence which assists evaporation is peculiar to the negative pole even at atmospheric pressures.

The metal cadmium was next experimented upon.

A U-shaped tube was made, having a platinum pole sealed in each end. Six grains of pure cadmium were put in each limb and fused round the platinum wire. The ends of the tube were then put into an air-bath, and kept at a temperature of 200° C. during the continuance of the experiment.* The exhaustion remained at 0·00076 m.m., or 1 m. The induction current was kept going for thirty-five minutes. At the end of this time it was seen that most of the cadmium had disappeared from the negative pole, leaving the platinum wire clean, no metal being deposited near it, and the molecules appearing to have been shot off to a distance of about three quarters of an inch. The appearance of the positive pole was very different; scarcely any of the cadmium had been volatilized, and the condensed metal came almost close to the pole. The tube was open, and the remaining wires and metal were weighed. The cadmium was then dissolved off the poles in dilute acid; the residue was washed, dried, and weighed.

	Positive pole.	Negative pole.
Original weight of cadmium	6·00 grs.	6·00 grs.
Cadmium remaining on the pole	3·65 ,,	0·25 ,,
Cadmium volatilized in 35 mins.	2·35 ,,	5·75 ,,

The difference between the amount of cadmium driven from the two poles having proved to be so decided, another experiment was tried in a tube so arranged that the metal could be more easily weighed before and after the experiment. For this purpose a tube was blown U-shaped, having a bulb in each limb. The platinum poles were, as before, at the extremities of each limb, and in each bulb was suspended from a small platinum hook a small lump of cadmium, the metal having been cast on to the wire. The wires were each weighed with and without the cadmium. The tube was exhausted, and the lower half of the tube was enclosed in a metal pot containing paraffin wax, the temperature being kept at 230° C. during the continuance of the experiment. A deposit around the negative pole took place almost immediately, and in five minutes the bulb surrounding it was opaque with deposited metal. The positive pole with its surrounding luminosity could be easily seen the whole time. In thirty minutes the experiment was stopped, and after all was cold the tube was opened and the wires weighed again. The results were as follows:—

	Positive pole.	Negative pole.
Original weight of cadmium .	9·34 grs.	9·38 grs.
Weight after experiment . .	9·25 ,,	1·86 ,,
Cadmium volatilized in 30 mins.	0·09	7·52

Finding that cadmium volatilized so readily under the action of the induction current a large quantity, about 350 grs., of the pure metal was sealed up in a tube, and the end of the tube containing the metal was heated to a little above the melting point; the molten metal being made the negative pole, in a few hours the whole quantity had volatilized and condensed in a thick layer on the far end of the tube, near, but not touching, the positive pole.

Volatilization of Silver.—Silver was the next metal experimented upon. The apparatus was similar to that used for the cadmium experiments. Small lumps of pure silver were cast on the ends of platinum wires, and suspended to the inner ends of platinum terminals passing through the glass bulb. The platinum wires were protected by glass, so that only the silver balls were exposed. The whole apparatus was enclosed in a metal box lined with mica, and the temperature was kept as high as the glass would allow without softening. The apparatus was exhausted to a dark space of 3 mm., and the current was kept on for one and a half hours. The weights of silver before and after the experiment, were as follows:—

	Positive pole.	Negative pole.
Original weight of silver . .	18·14 grs.	24·63 grs.
Weight after the experiment	18·13 ,,	24·44 ,,
Silver volatilized in 1½ hours .	0·01	0·19

It having been found that silver volatilized readily from the negative pole in a good vacuum, experiments were instituted to ascertain whether the molecules of metal shot off from the pole were instrumental in producing phosphorescence. A glass apparatus was made as follows:—A pear-shaped bulb of German glass has, near the small end, an inner concave negative pole, of pure silver, so mounted that its inverted image is thrown upon the opposite end of the tube. In front of the pole is a screen of mica, having a small hole in the centre, so that only a narrow pencil of rays from the silver pole can pass through, forming a bright spot of phosphorescence at the far end of the bulb. The exhaustion was pushed to a high point, 0·00068 mm., or 0·9 m. The current from an induction coil was allowed to pass continuously for some hours, the silver pole being kept negative, so as to drive off a certain portion of the silver electrode. On subsequent examination it was found that the silver had all been deposited in the immediate neighbourhood of the pole, whilst at the far end of the tube the spot that had been continuously glowing with phosphorescent light was practically free from silver.

An egg-shaped tube was next made, having two negative poles connected together, so placed as to project two luminous spots on the phosphorescent glass of the tube. One of the electrodes was of silver, a volatile metal; the other was of aluminium, practically non-volatile. On connecting the two negative poles with one terminal of the coil, and the positive pole with the other terminal, it was seen in the course of half an hour that a considerable quantity of metal had been projected from the silver negative pole, blackening the tube in its neighbourhood, while no projection of metallic particles took place from the aluminium positive pole. During the whole time of the experiment, however, the two patches of phosphorescent light opposite the two negative poles had been glowing with exactly the same intensity, showing that the active agent in effecting phosphorescence was not the molecules of the solid projected from the poles, but the residual gaseous particles, or "radiant matter."

In the tubes hitherto made containing silver, it had not been easy to observe the spectrum of the negative pole, owing to the rapid manner in which the deposit obscured the glass. A special tube was therefore devised, of the following character:—A silver rod was attached to the platinum pole at one end of the tube, and the aluminium positive pole was at the side. The end of the tube opposite the silver pole was rounded, and the spectroscope was arranged to observe the light of the volatilizing silver "end on." In this way the deposit of silver offered no obstruction to the light, as none was deposited except on the sides of the tube surrounding the silver. At a vacuum giving a dark space of about 3 mm. from the silver, a greenish-white glow was seen to surround the metal. This glow gave a very brilliant spectrum. The spark from silver poles in air was brought into the same field of view as the

* Cadmium melts at 320° and boils at 860°.

vacuum glow, by means of a right-angled prism attached to the spectroscope, and the two spectra were compared. The two strong green lines of silver were visible in each spectrum; the measurements taken of their wave-lengths were 3344 and 3675, numbers which are so close to Thalén's numbers as to leave no doubt that they are the silver lines. At a pressure giving a dark space of 2 mm. the spectrum was very bright, and consisted chiefly of the two green lines and the red and green hydrogen lines. The intercalation of a Leyden jar into the circuit does not materially increase the brilliancy of the lines, but it brings out the well-known air lines. At this pressure not much silver flies off from the pole. At a higher vacuum the luminosity round the silver pole gets less and the green lines vanish. At an exhaustion of about one-millionth of an atmosphere the luminosity is feeble, the silver pole has exactly the appearance of being red hot, and the volatilization of the metal proceeds rapidly.*

If, for the negative electrode, instead of a pure meta such as cadmium or silver, an alloy was used, the different components might be shot off to different distances, and in this way make an electrical separation—a sort of fractional distillation. A negative terminal was formed of clean brass, and submitted to the electrical discharge *in vacuo*; the deposit obtained was of the colour of brass throughout, and on treating the deposit chemically I could detect no separation of its component metals, copper and zinc.

A remarkable alloy of gold and aluminium, of a rich purple colour, has been kindly sent me by Professor Roberts-Austen. Gold being very volatile in the vacuum tube, and aluminium almost fixed, this alloy was likely to give different results from those yielded by brass, where both constituents fly off with almost equal readiness. The Au-Al alloy had been cast in a clay tube, in the form of a rod 2 cm. long and about 2 mm. in diameter. It was sealed in a vacuum tube as the negative pole, an aluminium pole being at the other side. Part of the alloy, where it joined the platinum wire passing through the glass, was closely surrounded with a narrow glass tube. A clean glass plate was supported about 3 m.m. from the rod of alloy. After good exhaustion the induction current was passed the alloy being kept negative. Volatilization was very slight, but at the end of half an hour a faint purple deposit was seen both on the glass plate and on the walls of the tube. On removing the rod from the apparatus it was seen that the portion which had been covered by the small glass tube retained its original purple appearance, while the part that had been exposed to electrical action had changed to the dull white colour of aluminium. Examined under the microscope, the whitened surface of the Austen alloy was seen to be pitted irregularly, with no trace of crystalline appearance.

This experiment shows that, from an alloy of gold and aluminium, the gold is the first to volatilize under electrical influence, the aluminium being left behind. The purple colour of the deposit on glass is probably due to finely-divided metallic gold. The first deposit from a negative pole of pure gold is pink; this changes to purple as the thickness increases. The purple then turns to green, which gets darker and darker until the metallic lustre of polished gold appears.

Returning to the analogy of liquid evaporation, if we take several liquids of different boiling-points, put them under the same pressure, and apply the same amount of heat to each, the quantity passing from the liquid to the gaseous state will differ widely in each case.

It was interesting to try a parallel experiment with metals, to find their comparative volatility under the same conditions of temperature, pressure, and electrical influence. It was necessary to fix upon one metal as a standard of comparison, and for this purpose I selected gold, its electrical volatility being great, and it being easy to prepare in a pure state.

An apparatus was made that was practically a vacuum tube with four negative poles at one end and one positive pole at the other. By a revolving commutator I was able to make electrical connection with each of the four negative poles in succession for exactly the same length of time (about six seconds); by this means the variations in the strength of the current, the experiment lasting some hours, affected each metal alike.

The exposed surface of the various metals used as negative poles was kept uniform by taking them in the form of wires that had all been drawn through the same standard hole in the drawplate, and cutting them by gauge to a uniform length; the actual size used was 0·8 mm. in diameter and 20 mm. long.

The comparison metal gold had to be used in each experiment; the apparatus thus enabled me to compare three different metals each time. The length of time that the current was kept on the revolving commutator in each experiment was eight hours, making two hours of electrification for each of the four negative electrodes; the pressure was such as to give a dark space of 6 mm.

The fusible metals, tin, cadmium, and lead, when put into the apparatus in the form of wires, very quickly melted. To avoid this difficulty a special form of pole was devised. Some small circular porcelain basins were made, 9 mm. diameter; through a small hole in the bottom a short length of iron wire, 0·8 mm. in diameter, was passed, projecting downwards about 5 mm.; the basin was then filled to the brim with the metal to be tested, and was fitted into the apparatus exactly in the same way as the wires; the internal diameter of the basins at the brim was 7 mm., and the negative metal filed flat was thus formed of a circular disc 7 mm. diameter. The standard gold pole being treated in the same way, the numbers obtained for the fusible metals can be compared with gold, and take their place in the table.

The following table of the comparative volatilities was in this obtained, taking gold as = 100:—

Palladium	108·00
Gold	100·00
Silver	62·68
Lead	75·04
Tin	56·96
Brass	51·58
Platinum	44·00
Copper	40·24
Cadmium	31·99
Nickel	10·99
Iridium	10·49
Iron	5·40

* Like the action producing volatilization, the "red heat" is confined to the superficial layers of molecules only. The metal instantly assumes, or loses, the appearance of red heat the moment the current is turned on or off, showing that, if the appearance is really due to a rise of temperature, it does not penetrate much below the surface. The extra activity of the metallic molecules necessary to volatilize them, is in these experiments confined to the surface only, or the whole mass would evaporate at once, as when a metallic wire is deflagrated by the discharge of a powerful Leyden jar. When this extra activity is produced by artificial heat one of the effects is the emission of red light; so it is not unreasonable to imagine that when the extra activity is produced by electricity the emission of red light should also accompany the separation of molecules from the mass. In comparison with electricity, heat is a wasteful agent for promoting volatilization, as the whole mass must be raised to the requisite temperature to produce a surface action merely; whereas the action of electrification does not appear to penetrate much below the surface.

In this experiment equal surfaces of each metal were exposed to the current. By dividing the numbers so obtained by the specific gravity of the metal the following order is found :—

Palladium	9·00
Silver	7·88
Tin	7·76
Lead	6·61
Gold	5·18
Cadmium	3·72
Copper	2·52
Platinum	2·02
Nickel	1·29
Iron	0·71
Iridium	0·47

Aluminium and magnesium appear to be practically non-volatile under these circumstances.

The order of metals in the table shows at once that the electrical volatility in the solid state does not correspond with the order of melting points, of atomic weights, or of any other well-known constant. The experiment with some of the typical metals was repeated, and the numbers obtained did not vary materially from those given above, showing that the order is not likely to be far wrong.

It is seen in the above table that the electrical volatility of silver is high, while that of cadmium is low. In the two earlier experiments, where cadmium and silver were taken, the cadmium negative electrode in 30 minutes lost 7·52 grs., whilst the silver negative electrode in 1½ hours only lost 0·19 gr. This apparent discrepancy is easily explained by the fact (already noted in the case of cadmium) that the maximum evaporation effect, due to electrical disturbance, takes place when the metal is at or near the point of liquefaction. If it were possible to form a negative pole *in vacuo* of molten silver, then the quantity volatilized in a given time would be probably much more than that of cadmium.

Gold having proved to be readily volatile under the electric current, an experiment was tried with a view to producing a larger quantity of the volatilized metal. A tube was made having at one end a negative pole composed of a weighed brush of fine wires of pure gold, and an aluminium pole at the other end.

The tube was exhausted and the current from the induction coil put on, making the gold brush negative; the resistance of the tube was found to increase considerably as the walls became coated with metal, so much so that to enable the current to pass through air had to be let in after a while, depressing the gauge ½ mm.

The weight of the brush before experiment was 35·4940 grs. The induction current was kept on the tube for 14½ hours; at the end of this time the tube was opened and the brush removed. It now weighed 32·5613, showing a loss of 2·9327 grs. When heated below redness the deposited film of gold was easily removed from the walls of the tube in the form of very brilliant foil.

After having been subjected to electrical volatilization, the appearance of the residual piece of gold under the microscope, using a ¼-inch object-glass, was very like that of electrolytically deposited metal, pitted all over with minute hollows.

This experiment on the volatilization of gold having produced good coherent films of that metal, a similar experiment was tried, using a brush of platinum as a negative electrode. On referring to the table it will be seen that the electrical volatility of platinum is much lower than that of gold, but it was thought that by taking longer time a sufficient quantity might be volatilized to enable it to be removed from the tube.

The vacuum tube was exhausted to such a point as to give a dark space of 6 mm., and it was found, as in the case of gold, that as a coating of metal was deposited upon the glass the resistance rapidly increased, but in a much more marked degree, the residual gas in the tube apparently becoming absorbed as the deposition proceeded. It was necessary to let a little air into the tube about every 30 minutes, to reduce the vacuum. This appears to show that the platinum was being deposited in a porous spongy form, with great power of occluding the residual gas.

Heating the tube when it had become this way non-conducting, liberated sufficient gas to depress the gauge of the pump 1 mm., and to reduce the vacuum so as to give a dark space of about 3 mm. This gas was not re-absorbed on cooling, but on passing the current for ten minutes the tube again refused to conduct, owing to absorption. The tube was again heated, with another liberation of gas, but much less than before, and this time the whole was re-absorbed on cooling.

The current was kept on this tube for 25 hours; it was then opened, but I could not remove the deposited metal except in small pieces, as it was brittle and porous. Weighing the brush that had formed the negative pole gave the following results :—

	Grains.
Weight of platinum before experiment	10·1940
,, ,, after experiment	8·1570
Loss by volatilization in 25 hours	2·0370

Another experiment was made similar to that with gold and platinum, but using silver as the negative pole, the pure metal being formed into a brush of fine wires. Less gas was occluded during the progress of this experiment than in the case of platinum. The silver behaved the same as gold, the metal deposited freely, and the vacuum was easily kept at a dark space of 6 mm. by the very occasional admission of a trace of air. In 20 hours nearly 3 grs. of silver were volatilized. The deposit of silver was detached without difficulty from the glass in the form of brilliant foil.

MODERN IDEAS ON THE CONSTITUTION OF CHEMICAL COMPOUNDS.*

BY C. E. BOUCHER.

The first research into the domain of chemical constitution was made by Dalton, but his brilliant investigations only furnished chemists with the empirical formulæ of compounds. To furnish a theory of constitution Berzelius suggested his "Dualistic Theory," which held for some years, but was eventually given up on account of its inability to give a reason for the existence of isomers.

Next in chronological order came the Theory of Types, which was worked on by Gerhardt (1851), Williamson, Hofmann and Wurtz. Gerhardt held that there were three types, viz : $\left.\begin{matrix}H\\H\end{matrix}\right\}$ $\left.\begin{matrix}H\\Cl\end{matrix}\right\}$ $\left.\begin{matrix}H\\H\end{matrix}\right\}$ O $\left.\begin{matrix}H\\H\\H\end{matrix}\right\}$ N.

To these Kekulé added a fourth : $\left.\begin{matrix}H\\H\\H\\H\end{matrix}\right\}$ C. Finally Couper and Kekulé pointed out the tetravalent character of carbon.

This evening let us consider what are the modern views concerning the three branches of chemistry.

(1) The nature of the attraction between the atoms, *i.e.*, valency.

(2) The shape of the carbon atom and the arrangement in space of its compounds.

* Read at a meeting of the School of Pharmacy Students' Association.

(3) The condition of affairs holding in dilute electrolytes.

I. Out of the foregoing considerations the theory of valency emerged, and it soon attained a degree of trust which was not justified either by the known facts or any theoretical that were adduced in its favour. We know now that the valency of an atom may be variable; this is exceedingly well seen in the oxides of nitrogen and vanadium. Similarly with phosphorus, the group $P(CH_3)_4$ is strongly positively monovalent, and the group $P(CH_3)_3$ is a strongly positive divalent, the metalloid character of phosphorus being changed into one more metallic by the advent of alkyl groups.

Valency must be regarded as a property of the atoms which underlies all chemical reactions, but a property, the extent and nature of which we are only very slightly acquainted with.

Van t'Hoff in 1878 brought forward the hypothesis that the attraction between the atoms in chemical compounds is of the nature of gravitation. If the shape of the atom be not spherical it has certain maxima depending on its form, and the position of the atom with regard to other atoms. If the motion of the atom caused by heat is great only the strongest maxima will be able to retain their atoms and the element will lose the atoms attracted by the minima. We should therefore expect the valency of the atom to diminish with the increase in temperature. This we know to be the case. This suggestion has not to my knowledge been further developed, but it appears to be a very good starting place for investigation, as it only assumes the atoms having a definite form.

Lecoq de Boisbaudran has suggested a theory of the formation of spectra by the elements, based on the shape of the atoms.

Professor Armstrong has extended a view of Helmholz that the valency of an atom corresponds to the number of electric changes with which it is associated, by supposing that molecular compounds are due to the same cause. For example, in aniline the basic properties are almost annulled by the entry of halogen into the phenyl group. Some hydrazines are monobasic, some dibasic, although they all contain two triad nitrogen atoms; these are termed molecular compounds. To explain these combinations the charge of electricity is supposed to penetrate the atom and to have varying degrees of freedom of motion. In some combinations, as H_2, the charges approach one another, and there is no residual affinity, in others, as in HCl, the charges of some of the atoms do not move towards those of their neighbours, and there is a residual affinity, as the influence of the atoms is not entirely neutralized.

The question as to the relative values of the maxima is a most interesting one. There seems to be no doubt that in the case of the carbon atom these values are equal, but the cases of sulphur and nitrogen have not been sufficiently investigated to give an opinion.

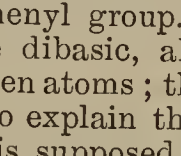
There is, however, no satisfactory explanation of valency, and we can only look on it as a general principle rather than a definite law.

II. Let us now turn to the arrangement of the atoms in space.

The theories of types and valency served to allow of formulæ being written to denote the constitution of many organic compounds, but the formulæ so drawn up, though extremely useful, do not satisfy all the known facts.

In 1874 Le Bel and Van t'Hoff showed, almost simultaneously, that all optically active bodies which can rotate the ray of polarized light contain an asymmetric carbon atom, *i.e.*, a carbon atom which is joined by its four affinities to four different elements or groups.

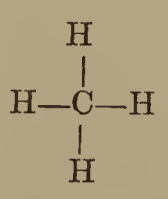
Now no optically active substance has been found which does not contain an asymmetric carbon atom. We know numerous cases where bodies containing an asymmetric carbon atom do not rotate the ray. This is, however, easily to be explained. If we imagine the carbon atom to occupy the centre of a regular tetrahedron and its affinities to tend to the angles of that tetrahedron, we can write down two compounds, whose properties will be almost identical, and which in the arrangement of its constituents will differ from each other only in the way in which one of them differs from its reflection in a mirror. If a compound contains an asymmetric carbon atom there are two possible arrangements, corresponding one to a righthanded and the other to a lefthanded tetrahedron. If a substance containing an asymmetric carbon atom is produced in a reaction, the number of lævorotatory molecules formed is the same as the number of dextrorotatory. In a mixture they counterbalance one another and we get no optical disturbance. According to our theory there should exist for each compound containing an asymmetric carbon atom two forms, one of which affects the ray of polarized light in an opposite way to the other. Pasteur found this to be the case in tartaric acid, in malic and mandelic acids, etc. The optically opposed forms differ only in their optical properties and crystallographic form, and equal quantities of them, when mixed, form new compounds with properties differing from those of their components. Lævorotatory and dextrorotatory tartaric acids differ only in their optical properties and in their crystalline form, showing hemihedral faces oppositely situated one to the other. When mixed in equal proportions the solution becomes warmed and racemic acid results; it crystallizes in efflorescent rhombs and precipitates a solution of calcium sulphate, a thing which neither of its components can do; it is also optically inactive. A fourth tartaric acid, meso-tartaric acid, exists, which is inactive to polarized light, but which differs from the preceding in not breaking down into lævorotatory and dextrorotatory components. The existence of this form Van t'Hoff explains thus: Tartaric acid



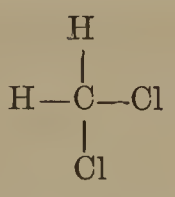
contains two asymmetric carbon atoms. When the ray of polarized light is rotated by both in the direction of the hands of a watch dextrorotatory tartaric acid ensues; when the ray is rotated by both in the opposite direction, lævorotatory tartaric acid is formed. But it is possible that one of the asymmetric carbon atoms is right handed and the other left handed in the same molecule. Then the molecule is optically inactive and cannot be split up into active components.

A striking instance of Van t'Hoff's explanation was seen in the synthesis of coniine. Quite recently Ladenburg, on reducing γ-allyl pyridine by means of sodium, obtained a compound identical with natural conine, save that the artificial body was inactive to polarized light, while natural coniine is dextrorotatory. On converting the inactive compound into the tartrate and evaporating, two isomeric tartrates crystallized out, which gave when separated from one another a dextrorotatory base identical with natural conine and a lævorotatory conine which was not known before.

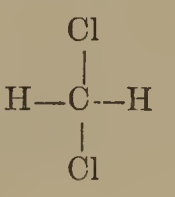
The next step was made by Van t'Hoff in 1877. If the plane formula—



is correct we ought to get two methylene chlorides, one with the chlorine atoms vicinal—



and the other with them symmetric—



Only one methylene chloride is known, and there is nothing to lead us to imagine the existence of two of them. Van t'Hoff suggests that the carbon atom occupies the centre and the valencies tend to the angles of a regular tetrahedron. On this assumption only one methylene chloride is possible, and the conditions of optical activity are in accordance with it.

Wislicenus has very much expanded this idea of Van t'Hoff's, in this way: when two carbon atoms are associated together in a paraffinoid form the tetrahedra can revolve round a common axis, passing through their centres. Supposing all four of the affinities are unequal we should get six isomers present, when two pairs are unequal two isomers, and three isomerides when two affinities are equal and two unequal. Let us look at the conversion of maleic into fumaric acid by means of hydrobromic acid.

Maleic acid has the formula $\begin{matrix}CH\cdot COOH\\ \|\\ CH\cdot COOH\end{matrix}$ as it forms an anhydride. Fumaric acid may be $\begin{matrix}COOHCH\\ \|\\ CH\cdot COOH\end{matrix}$ In maleic acid it may be supposed that there are two tetrahedra, connected with each other by two affinities, whilst the four remaining corners are occupied by two hydrogen atoms and two carboxyl groups (COOH) respectively. On the addition of hydrobromic acid to the molecule rotation of the tetrahedra on the common axis may take place until a position is reached that best satisfies the affinities at work. As the two H atoms may be assumed to mutually repel one another, rotation of the two tetrahedra would take place until the hydrogen atoms are as far apart as possible, and by subsequent separation of the hydrobromic acid the atoms may be left in the position corresponding to the above formula for fumaric acid. This explanation gives a very plausible reason as to the mode of conversion. A number of similar cases can be explained, thus, *e.g.*, the two tolane dichlorides.

Tolane tetrachloride, at the moment of losing chlorine, responds to the formula $C(C_6H_5ClCl)C(ClC_6H_5Cl)$ where two atoms chlorine are supposed to be *vis à vis*, while the other atoms are removed as far as possible from phenyl group. The action of the zinc, on the contrary, leads to $C(C_6H_5Cl)C(ClC_6H_5)$, while the dichloride produced from tolane is $C(C_6H_5Cl)C(C_6H_5Cl)$. Similarly with regard to the two crotonic and isocrotonic acids, coumaric and orthocoumaric acid. Cinnamic acid should exist in two forms, but only one of them is known at present. Wislicenus would explain a very large number of chemical reactions in a similar manner. In a recent number of the *Berichte* Bischoff deals with attraction and repulsion between certain groups such as H, CH_3, etc., and he has brought valuable evidence to bear on the subject. Hantzsch and Werner have suggested that the nitrogen atom occupies the corner, and its valencies tend to the other angles of an irregular tetrahedron.

III. Before turning to the conditions holding in dilute electrolytes let us look at the subject of osmotic pressure, which has an important bearing on the case. If we form a cell of copper ferrocyanide, fill it with a solution of sugar and connect it with a manometer, on placing the cell in water a considerable pressure on the mercury is exerted, as investigations with different percentage solutions of sugar show.

(*a*) The pressure exerted by the solution varies with the concentration.

(*b*) The pressure increases with increase of temperature.

These laws hold good for all dissolved substances. We find that in a solution the sugar exerts the same pressure that it would if it were a gas. As in a gas so in a liquid, $PV = bT$, and we find that the constant b is the same for a gas as for a solution.

Raoult has also found quite empirically that the relative lowering of the vapour pressure of a solution depends on the ratio of the number of dissolved molecules to the total number of molecules in the solution. Moreover, a relation has been determined between the osmotic pressure and the vapour pressure, both from theoretical considerations and empirically by Raoult. He has also investigated the depression of the freezing point, and finds that the depression $= r\frac{n}{g}$ where n is the number of molecular weights of the substance dissolved, and g the total number of molecular weights in grams of solvent, or is a constant which depends only on the solvent. By knowing the expressions for the osmotic pressure, the alteration of vapour pressure and the depression of the freezing point, we can obtain the number of molecules present.

Now when an electric current is passed through a liquid it is either allowed to pass or is prevented. The first liquid is called a conductor, the second a non-conductor. The passage of a current through a liquid is almost always attended with its decomposition. We also find that an impure liquid (as a solution) conducts electricity well, and within certain limits the conduction depends on the amount of dissolved substance. We have reason to believe that absolutely pure liquids do not conduct electricity. When a liquid is decomposed into its ions, as they are termed, the whole of the electropositive molecules move to the kathode and the whole of the electronegative molecules to the anode. The kations and anions are charged respectively, positively and negatively with electricity, and they carry a definite quantity of electricity, which molecules as such cannot do.

Electricity, however, moves in electrolytes with the same freedom as in metals. So that if electricity were the agent which decomposes the dissolved substances in a solution (as in the electrolyses of a solution of potassium chloride) we should have work being done without the expenditure of energy, which is inadmissible. Clausius and Williamson brought forward the idea that in a solution there is a partial dissociation of the molecules of the dissolved salt into its ions, caused by the collisions of the molecules, and it is the dissociated ions which carry the electricity. To determine the number of the dissociated ions we make use of the influence exerted by the dissolved substance on the osmotic pressure, vapour pressure and freezing point. A solution of one gram molecule of sugar in 1000 c.c. of water solidifies at 1·89° C., while a solution of one gram molecule of potassium chloride depresses the freezing point 3·5° C. From our equation the number of molecules of potassium chloride should be twice as great as those of sugar; this cannot be, and we can only suppose that almost all the potassium chloride is dissociated into potassium and chlorine. Similar abnormalities are shown by other electrolytes, as regards the osmotic pressure and depression of the freezing point.

Arrhenius in 1887 first drew the conclusion that a solution usually consists of the dissolved salt only present as such in small quantity, together with its dissociated ions in much larger amount; the amount of

dissociation increases with the dilution until in an infinitely dilute solution all the molecules are dissociated into their ions. He has obtained the following expression $i=1+(k-1)\alpha$ where i is the sum of the inactive molecules and the dissociated ions, divided by the whole number of inactive and active molecules, and k is the number of ions into which each molecule is dissociated.

The molecules decomposed into ions he calls "active" molecules and those not decomposed "inactive." The ratio between them is the actively coefficient α. i may also be got from Raoult's molecular depression of the freezing point by dividing by Van t'Hoff's constant 18·5. The separate values of i got in these two ways for a large number of different bodies shows a general agreement for all the value.

These results appear strange to a casual observer or thinker, especially to imagine, for example, that in a solution of potassium chloride, metallic potassium and free chlorine exist as such, and yet none of the known properties of potassium or chlorine are evident. But what actually is thought to be the state of affairs is that free potassium atoms are present, charged with a very high electrical charge, and we know that the chemical properties of metallic potassium when charged with a very high amount of electricity are very much altered. But what we term the metal potassium is an agglutination together of a vast number of atoms not possessing any electrical charge, and in electrolytes when the potassium atoms give up their electricity to the alkaloids they reassume the properties of metallic potassium. Let us look at the following example. Take two vessels filled with a solution of potassium chloride, insulate them and connect them by a syphon. On bringing a negatively charged rod in proximity to one vessel we shall, if our supposition be correct, have all the positively charged atoms attracted to the vessel near the rod and all the negatively charged atoms repelled to the farther vessel. So that in one vessel we shall have positively charged atoms and in the other atoms negatively charged. These states will continue permanent on removing the syphon. On connecting up say the nearer vessel to earth, we shall get, if our ideas are correct, the charge on the potassium conducted away, and the potassium will assume its usual form, and it should decompose the water in the vessel. This we find to be the case similarly with regard to the vessel containing the chlorine atoms.

Under the older ideas of solution it is difficult to explain why, for example, a solution of silver nitrate gives a precipitate with a solution of potassium chloride and not with one of potassium chlorate or monochloracetic acid. From the considerations adduced by Arrhenius we can explain the anomaly. Silver nitrate is a reagent for free chlorine, not for hydrochloric acid; a solution of potassium chloride contains potassium and free chlorine, hence a precipitate. On the other hand, a solution of potassium chlorate contains K and ClO_3; no chlorine is free, therefore there is no precipitate. Similarly with monochloracetic acid. Again, ammonium sulphide gives a precipitate with ferric chloride and not with potassium ferrocyanide. The theory of electrolytic decomposition explains this also. If we mix a solution of potassium chloride and sodium sulphate together no heat is evolved. This is easy to understand. In a solution of KCl potassium and chlorine exist free; in one of Na_2SO_4, Na and SO_4. After mixing K, Na, Cl and SO_4 exist just as before, therefore there is no evolution of heat.

The alteration of the phenomena of specific heats, refractive indices, change of volume of mixtures, etc., can be explained on these assumptions.

We notice a great similarity between the conditions of salts in solution, and the dissociation of some salts when heated. A solution of potassium chloride contains KCl, K and Cl. On heating chalk we get $CaCO_3$ CaO and CO_2 and so on.

The theory has met with a vast amount of discussion and can hardly be said to be settled yet. In conclusion, if any of you are desirous of extending your reading in the subjects of which this brief paper treats, the following works will help him, 'Dix Années dans l'histoire d'une Théorie' and the 'Chemistry in Space,' by Van t'Hoff, will give him an account of geometrical formulæ, the asymmetrical carbon atom, etc. Abstracts of the papers of Wislicenus and Arrhenius will be found in the *Journal of the Chemical Society*, 1888 to 1891.

MICROSCOPIC EXAMINATION OF COTTON.

The department for geology and botany of the Polytechnic Institute for the State of Alabama has published a report by Dr. P. H. Mell, the State botanist, of a microscopic examination of about twenty-five different varieties of cotton grown on the State Agricultural Experiment Station. Dr. Mell states that only three species of *Gossypium* are of special commercial importance, viz.:—*G. bahma*, or Egyptian cotton, *G. carbadense* or *G. nigrum*, Sea Island, or longstaple or black seed cotton; and *G. herbaceum*, or *G. album*, short staple or upland, or green seed cotton. These three species have been multiplied into twenty or thirty so-called varieties by certain kinds of cultivation and careful selecting in the hands of progressive planters. Some of these varieties are very good and worthy of consideration, while others have no right to a new name. *Gossypium bahma* originated in Egypt some years since, and is supposed to be a hybrid between a species of *Hibiscus* and the native Egyptian cotton plant. The fibre of this plant is inferior in several respects to that produced by *G. herbaceum*, which furnishes more than nine-tenths of the staple of commerce. The Sea Island, or as it was formerly called in Georgia, "Persian" cotton, requires a salt atmosphere; and is, therefore, confined to limited areas. Its largest production is along the coasts of Sh. Carolina, Georgia and Florida. The staple is also limited in its application, being used mainly in the manufacture of lace.

A detailed report is appended of the results of the examination of the different fibres, on the following points:—Length and diameter of the fibre, twist, resistance to rupture and weight; and the paper is illustrated by some photographic reproductions.

PRESENCE OF A DIASTATIC ENZYME IN PLANTS

Professor J. Wortmann argues, in the *Botanische Zeitung*, against the invariable presence of a diastatic ferment in plants, essential to the decomposition of starch. He maintains that not only can starch be absorbed without the assistance of diastase, but that diastase may occur where it can have no physiological function in connection with the absorption of starch.

For the demonstration of the presence of diastase, Wortmann recommends that the part of the plant in question be extracted, after being thoroughly crushed, with an equal volume of water, and that, except where large quantities of starch, mucilage, or albuminoids are present, the extraction should not last for more than from two to three hours in the cold. The presence of diastase is then shown by its action on starch.

From a very large number of experiments made for the purpose, Dr. Wortmann finds the general result that in reserve receptacles where large quantities of starch are stored up, such as seeds, tubers and rhizomes, diastase is also present in considerable quantities; while, on the other hand, it is not found in assimilating leaves, where also much starch is present, the disappearance of starch from these organs not being dependent in any way on the action of diastase.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, JULY 11, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE PRELIMINARY EXAMINATION.

WHEN the subject of the Preliminary examination was being discussed in this Journal, some three months ago, as a result of the suggestion by Mr. SAUL that the standard should be raised, a letter appeared from Mr. JOHN MOSS, in which the question was raised whether Mr. SAUL'S suggestion was logical. It was argued that although the raising of the standard of the Preliminary would in all probability prevent any but more intellectually robust candidates from being admitted into the pharmaceutical fold, that result would not certainly be followed by a reduction in the proportion of failures in the subsequent qualifying examination. The present large proportion of these failures was the point to which Mr. SAUL'S attention was directed, and, speaking with the practical experience of an examiner, he had come to the conclusion that the failure of candidates in the qualifying examination is to a large extent due to defective scholastic education and mental training. His suggestion that the standard of the Preliminary examination should be raised was based upon the principle of curing an evil by removing its cause, and so far as concerns the knowledge and mental training of which the Preliminary examination is the test, it seems reasonable to expect that by raising the standard of that examination and making it a more efficient test, the candidates who pass it will be better able to acquire the technical knowledge that is afterwards necessary to enable them to pass the qualifying examination. This argument appears to be perfectly logical so far as it applies, that is to say, in regard to the Preliminary examination. It was, we imagine, no part of Mr. SAUL'S intention to suggest that by passing a higher Preliminary examination students would necessarily be enabled to pass the qualifying examination, unless they applied themselves to the study of the technical subjects with which it deals. But they would have greater capacity for the study of those subjects, and to that extent there would be a probability of reduction in the proportion of failures in the qualifying examination.

In commenting upon Mr. SAUL'S suggestion doubt was expressed by Mr. Moss as to whether the anticipated result would follow. In support of his opinion he had recourse to the report of the Privy Council Visitor, and argued that the greater proportion of failures in dispensing, as compared with those in botany, chemistry and materia medica, was sufficient to show that a regular curriculum of study was of little or no value for enabling candidates to pass the qualifying examination. This argument has really little to do with the question of raising the standard of the Preliminary, but as applying to a regular curriculum it appeared to be so remarkably fallacious as to call for the remarks that were made at the time. Mr. Moss now writes in reply, and his letter will be found on page 19, but we cannot adopt the view he expresses that the criticism of his former letter was based on misconception. Indeed, it appears to us that it would scarcely be possible to say anything more damaging to the value of a regular curriculum than to speak of the three years' engagement, of which certificates have now to be produced, as being anything at all approaching to the nature of a curriculum. In many instances those certificates are no evidence either of having been taught or of having had practical experience in the art of dispensing, and the large proportion of failures in that subject is significant, because the deficiency cannot be made up, as it may be in the subjects of chemistry, botany and materia medica, in the same way that a parrot learns to talk. It was to this point that our remarks upon the letter of Mr. Moss were directed, and we venture to think that on reflection he will perceive that his original letter, whether intentionally or not, bears the construction that was put upon it, without any desire to question the interest that Mr. Moss professes, and may well be expected to take, in the raising of the Preliminary examination standard.

PURE WATER SUPPLY FOR LONDON.

THE question how to obtain an adequate supply of wholesome water for London is rapidly becoming more urgent as the extension of the sewerage system advances and as the river from which a large part of the metropolitan water supply is derived approximates more and more to the condition of the main drain of the entire river basin. Any project that presents reasonable probability of being sufficient to solve this important problem or even to contribute towards that result is therefore worthy of careful consideration, and a recently published report by Mr. CLAUD MONCKTON upon a proposed supply of pure spring water for London is eminently deserving of attention from that point of view. The locality from which this supply is to be obtained is Springwell near Harefield in the valley of the river Colne. Well sinking operations have been

carried on there since 1884, under the advice of Mr. EDWARD EASTON the engineer, who was of opinion that if the boring in the chalk were carried deep enough a plentiful supply of water would be obtained. Mr. MONCKTON held the same opinion, and under his direction a well has been sunk to a point where it was expected the water bearing strata would be reached. The result having been such as to justify his anticipations, it was decided to embark upon the enterprise of searching for water on a scale that would be adapted for ultimately supplying the metropolis. With that object a number of wells have been sunk and trial boring made in the neighbourhood of Rickmansworth. A reservoir capable of holding five million gallons has been constructed, and provision has been made for laying mains up to London. In regard to the extent of the water supply obtainable from this source, it appears from practical pumping tests made under the direction of Mr. MONCKTON and extending over several consecutive days, that the present available amount of water is estimated at no less than ten million gallons in the twenty-four hours. It is also considered that by a further sinking the supply could be increased twofold. The quality of the water obtainable from this source is stated by Dr. PERCY FRANKLAND to be excellent, and as the hardness due to dissolved material is of the nature known as "temporary," the water can be readily softened by the application of CLARK'S process, and thus rendered suitable for all kinds of domestic use as well as having the purity characteristic of most of the water obtained from the chalk. The great desire that now prevails for having a supply of pure water in the metropolis is proved by the evidence given before the Committee of Investigation appointed by the Corporation of London, and in view of that fact it is of especial interest to know that within a short distance there is now an immediately available supply of very considerable extent with all requisite arrangements made for its delivery in London. At present it appears that the Waterworks Company to which this water has been offered has been compelled to decline taking it, as the Company has not the statutory powers necessary for doing so.

Our correspondence columns contains another letter from Mr. Dott in which he supplements the statement that in regard to the making of chloroform our original reference to the direction of the Pharmacopœia was erroneous by the intimation that he cannot agree with our interpretation of the words used in the Pharmacopœia. We do not pretend to have supposed that he would do so; though from his particular point of view we venture to think that he might have remained discreetly content with the admission that some persons consider chloroform made from methylated spirit to be as good as that made from rectified spirit. Of course the main point of the inquiry to which the note at page 1179 relates is concerning the purity of chloroform rather than the process by which or the material from which it is manufactured. Unfortunately the means of ascertaining the purity of chloroform are exceedingly meagre, and the tests that are given in the Pharmacopœia do not give much information. So long as this continues to be the case there seems to be little room for comparing the products from different materials, or for dispute as to the relative advantage of different methods of preparation, so far as purity is concerned. We are acquainted with some pharmacists who are not content to use any chloroform but that made from chloral, notwithstanding its costliness. It is questionable whether opportunity exists for a more clear definition by the Medical Council, until more is known of the specific chemical and physiological characteristics of pure chloroform and of the adventitious substances with which it is liable to be contaminated. These are the points upon which very little is known and in regard to which additional information is required.

* * *

Six years have now elapsed since the last International Congress of pharmacists was held in Brussels, and after repeated disappointment it must now be regarded as certain that the meeting then projected to take place at Milan will not be held. In America some mention has been made of holding an International Congress in connection with the Exhibition or World's Fair that is now being prepared for at Chicago, but no definite steps have been taken to obtain the concurrence of the pharmacists of other countries. Quite recently we learn that the question as to the desirability of holding another International Congress has been raised in France, and a circular letter has been addressed to the Presidents of various pharmaceutical societies by M. Bocquillon-Limousin, asking for opinions as to the desirability of such a meeting for the consideration of questions interesting to pharmacists, formulating resolutions as to their requirements, and for continuing the work that has already been initiated at previous meetings. In the event of such an arrangement being approved of, a further question is raised as to the European capital in which the meeting should be held, and it is suggested that Madrid or Copenhagen might appropriately be selected for the purpose. The idea of an International Congress in the United States of America does not seem to have yet been considered by the writer of the circular.

* * *

We are informed by the Exhibition Committee of the Photographic Society of Great Britain, that that Society will hold its annual exhibition in the Gallery of the Royal Society of Painters in Water Colours, Pall Mall East, from the 28th of September until the 12th of November, and that negatives and transparencies, photo-mechanical prints, photographs of purely scientific interest, photographs coloured by scientific or mechanical means other than by hand, and apparatus and appliances will be admitted for exhibition. Photographic lantern-slides also will be shown on the evenings during the exhibition by means of the Society's optical lantern, free of cost to the exhibitor, and the Committee invites the loan of slides, especially such as are illustrative of life and scenery in the British colonies and possessions. Further information may be obtained from the Assistant-Secretary, Mr. Lawrance, 50, Great Russell Street, W.C.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

On Wednesday, the 1st instant, the monthly meeting of the Council of this Society was held at No. 11, Harcourt Street, Dublin, at 3 o'clock, the Vice-President, Mr. William Wells, in the chair.

The other members of the Council present were Dr. Burnes, Messrs. Grindley, Rankin, Hodgson (Treasurer), Beggs, Simpson, Johnston and Robinson.

The Registrar, Mr. Ferrall, read a letter from the Privy Council, dated June 8, stating that the Lords Justices had had before them a resolution passed by the Council on June 3 in reference to the time for receiving applications under the 7th section of the Pharmacy (Ireland) Amendment Act, and were advised that there was no power to alter the dates fixed by the 7th section of that Act.

The Vice-President: This letter makes the resolution which we passed of no effect. The object of the resolution was to extend the time within which assistants who had been in business before 1875 could come in for a modified examination at a reduced fee from June 1 until August 18. The regulation permitting that modified examination and reduced fee was only passed by the Privy Council a few days before June 1; and the last day for applying to come in under it was June 1. This letter also decides another thing, namely, that any who did not apply before June 2 to be registered as druggists under that section cannot now do so. We have no power to accept any certificate that is not dated prior to June 2.

Mr. Hodgson: I thought you had up to August 18 for persons who were in business before 1875?

The Vice-President: Druggists who were in business prior to 1875 have up to August 18.

Mr. Grindley: We thought to extend that to the men who went into business in the interval between that date and the present, and to the assistants, and the Privy Council has refused both.

The Registrar read a letter dated June 6 from Dr. Heard, Secretary to the Irish Branch Medical Council, in which the writer said that as regarded the inquiry of the Pharmaceutical Council as to "whether the Branch Medical Council had defined the additional subjects to be required in the case of applicants for registration as medical students who held the Preliminary certificate of the Society," the writer inferred from the fact of the application of Mr. Ernest Bourke for registration as a medical student on the combined certificates of the Society and of the Physicians and Surgeons of Ireland having been refused by the Branch Council, that that Council had not seen its way to accepting any of the subjects contained in the Preliminary examination of the Pharmaceutical Society of Ireland as sufficient to qualify for entrance on the study of medicine.

The Vice-President: It certainly is a very great hardship on this gentleman. He made up additional subjects on the faith of which he presented himself, and then they refused to accept him.

The Registrar: We have a letter from the Medical Council in London in which the additional subjects that were required are stated, and these were given to Mr. Bourke, and he passed in them.

Mr. Ferrall read another letter from the General Medical Council enclosing copies of a report of that Council, and resolutions passed by its Education Committee in relation to Preliminary examinations in general education which they require to be passed previous to the commencement of medical study. Mr. Ferrall stated that the effect of these resolutions was that only Preliminary examinations in Trinity College and the Royal University and under the Board of Intermediate Education would be accepted in future as qualifying for entrance upon medical study. A number of other prelimiminary examinations besides that of the Pharmaceutical Society of Ireland were being struck off.

The Vice-President: The War Office complained that several medical men were not able to spell, and the Medical Council has laid the blame on the Preliminary examination, and has decided, as the Registrar says, to strike off nearly all those that they had previously accepted, with the exception of the Universities and the intermediate examinations. The Council is even striking off the College of Surgeons and the Pharmaceutical Society of Great Britain. So that we are all in the same position. Of course it is a thing that it has a right to do; but in the case of Mr. Bourke the decision is a most unjust one. He was told that if he made up certain subjects and passed in them he would be accepted; and when he did so he was told that he could not be accepted.

Mr. Hodgson: I do not suppose it makes a great deal of difference to us?

The Vice-President: Practically, it is rather an advantage to us, for if a young man who has passed the medical Preliminary requires to come to us he has to pay us two guineas for being registered here, whilst we have not the expense of examining him; whereas if he passes our examination we have to pay his examiners. So that in the end it will be for our advantage.

Mr. Simpson: It will prevent young men from coming to our business, and after having stayed two or three years at it, leaving and going to the medical profession.

The Vice-President: I suppose we can take no action in the matter. We have nothing to do but to mark the letter read.

Mr. Rankin: Is the Pharmaceutical Society of Great Britain or any of the other societies taking action?

Mr. Grindley: It was discussed, but they are taking no action.

Mr. Hodgson: What can we do? We did take action and we have been snubbed in trying to defend the rights of this young man.

Mr. Johnston. They ignore your qualification.

The Vice-President: If the other societies do anything of course we can move in the matter too.

Mr. Hodgson: If our kindred society at the other side move in the matter they will very likely inform us of it. At all events we shall see its action in the Journal, and then there will be no objection to united action being taken.

Mr. Rankin: Would it not be well to address a letter to the English Society on the subject?

Mr. Grindley: We have always been on a friendly footing with it.

Mr. Hodgson: When we see something in the Journal it will be time enough for us to take action.

A letter was read from the Pharmaceutical Society of Great Britain returning thanks for a donation of a copy of the Society's Calendar.

The Registrar read a letter from the Organizing Committee of a proposed International Pharmaceutical Conference at Milan, intimating that that conference would not be held. The letter stated that 25,000 circulars had been sent out and only 30 replies received.

A letter was read from the Honorary Secretaries of the Reception Committee of the approaching annual meeting in Dublin of the Society of Chemical Industry, inviting contributions to the reception fund.

The Vice-President: As a Council we cannot vote funds for the object in question, but any of our members who like to subscribe can do so. Our President, Mr. Hayes, has already subscribed, and has been appointed one of the Vice-Presidents.

A letter was read from Mr. A. H. Jones, chemist and druggist, of Doneraile, stating that he was not aware that his use in connection with his establishment of the title "medical hall" was an infringement of the law, and that he had discontinued it. His letter mentioned that his use of it had never been intended to lead persons to suppose that he compounded medical prescriptions, for it was known that the contrary was the case.

The Vice-President: We registered him as a druggist, and then drew his attention to the fact that his use of the title "medical hall" was misleading. We found a good deal of this kind of thing going on, and have had to caution the parties that they were violating the law.

A letter was read from Mr. Frank T. Gordon, regisgistered druggist, 29, Richmond Hill, Cork, stating that after he had passed his examination as a registered druggist under section 8 of the Amendment Act and paid a fee of £4 4s., he had found that having been an assistant prior to 1875 he was eligible for examination on modified terms under section 7, and asking the Council to refund him £1 13s. 6d., the difference between the fees in the two cases.

Mr. Hodgson: I do not think we can do it, but we should write to him saying we are very sorry we can not.

An order was made accordingly.

A letter was read from Mr. J. T. Holmes, M.P.S., asking was it legal for an unqualified assistant to compound prescriptions either in the presence or absence of the unqualified proprietor.

On the motion of Dr. Burnes, seconded by Mr. Grindley, it was ordered that Mr. Holmes be referred to paragraph 30, page 19, and to clause 17, page 35 in the calendar, the Vice-President remarking that the Council had hitherto abstained from giving opinions on matters of law, and that if Mr. Holmes desired to test the question in a court of law he could do so.

A letter was read from Mr. A. B. C. Orchard, 12, Effra Road, Rathmines, asking to have the 100 hours' course of practical chemistry dispensed with in his case, on the following, amongst other grounds:—He had been apprentice or assistant in various pharmaceutical establishments in England and Ireland during the last twenty-two years; he had had the English qualification for the last 10 years; he had spent more than 100 hours in a private school of chemistry, and enclosed a certificate to that effect from Mr. Spencer Turner, the teacher, a member of the Pharmaceutical Society of Great Britain; and he had passed the first and second professional examinations of the Conjoint Board of the Physicians and Surgeons of London.

The Vice-President: This is one of many applications which we get, and with respect to which there is no question as to what we ought to do. Our regulations distinctly lay down that the candidate must have spent 100 hours in a recognized school of chemistry. It may be a hardship to refuse this gentleman his request, and we should be glad to accede to it if we could possibly do so, but we could not grant it without breaking the Act of Parliament.

Mr. Simpson: The schools that we can accept are named, and we cannot go outside of that.

The Vice-President: The Council decided a little time ago that it would not for the present add any more schools to those from which they accept certificates.

Mr. Robinson: I think it would be inflicting a hardship on our licentiates to let this gentleman in without his conforming to the regulations.

Reports were received from the examiners at the druggists' examinations held recently in Dublin and Belfast.

A report of the Declarations Committee showed that the following gentlemen had been accepted for registration as chemists and druggists, having been in business on or before August 11, 1875:—

Acheson, John, Portadown.
Adams, Alexander, Kilrea.
Burns, Walter, Belfast.
Byrne, Laurence, Rathdrum.
Byrne, Mary A., Ballinakill.
Caldwell, Frances S., Ballybofey.
Clear, Wm., Clara.
Collins, Joseph, Wicklow.
Crory, Arthur, Kilkeel.
Cunningham, Elizabeth M., Ballymore.
Daly, Eliza L., Ennistymon.
Donohoe, Dennis, Donegal.
Egan, Patrick, Tullamore.
Egan, Margaret A., Kilcullen.
Faris, Wm. I., Dublin.
Farrell, Michael, Edgeworthstown.
Fayle, Benjamin Wm., Parsonstown.
Graham, Benjamin, Omagh.
Laven, John, Elphin.
Lawler, Joseph, Rathwilly.
Leonard, Maria, Kells.
Madden, Thomas, Ballinlough.
May, Thomas, Belfast.
McCready, Geo. B., Donaghadee.
MacElwee, Robert Wm., Dublin.
Meares, George, Moyvore.
Morris, Rose, Crossmaglen.
O'Brien, Michael J., Roscommon.
O'Neill, Joseph, Bagnalstown.
Patterson, William, Carnmoney.
Phelan, James, Aughrim, co. Wicklow.
Porter, Geo., Oldcastle.
Richardson, John, Portadown.
Scanlon, Patrick M., Ballinasloe.
Taylor, Wentworth, Tinahely.
Tohall, Henry, Moy.
Waldron, Patrick, Claremorris.
Webb, Herbert, Baltinglass.
White, Geo. E., Tramore.
White, Wm., Waterford.
Wilson, Thomas, Armoy.

A report from the School Committee submitted a number of regulations relative to the examination for pharmaceutical chemists' assistants, for adoption by the Council previous to their being laid before the Privy Council for approval.

The Vice-President said these regulations had been under the consideration of the Committee for a full month, and they had been shown to several other members of the Council.

The regulations were approved of.

A report of the House and General Purposes Committee stated that they had authorized Mr. Hodgson (the Treasurer) to purchase the house, No. 67, Lower Mount Street, but not to exceed £750.

The Vice-President moved pursuant to notice that the Committee be empowered to expend such sums as might be necessary in fitting up the house. The Committee would, of course, incur no unnecessary expenditure.

Mr. Hodgson said he was glad to say that the house was in perfect order.

The Vice-President remarked that new benches would have to be purchased for the examination hall.

Mr. Hodgson: It is desirable that the examination hall should not be used for school purposes.

The Vice-President: The school has been a greater success than we anticipated. When Professor Tichborne went into the figures, he said that we should have about twenty students in the year to start with. Now, in a year and a half, we have had forty students.

Mr. Rankin asked when the Society would be in occupation of the new premises.

The Vice-President: We shall be there for the annual meeting in October. As soon as we get possession of the house the Registrar will move there.

The motion of the Vice-President was seconded by Mr. Grindley and unanimously agreed to.

On the motion of Dr. Burnes, seconded by Mr. Rankin, Mr. Grindley and Mr. Johnston were appointed visitors to attend the druggists' examination to be held at 11, Harcourt Street, on Wednesday and Thursday, the 8th and 9th inst.; and on the motion of Dr. Burnes, seconded by Mr. Grindley, Mr. Lyons and Mr. Rankin were appointed visitors to attend the druggists' examination to be held in Belfast. It was intimated by the Vice-President that Mr. Sunner had been requested to act as visitor at the Cork examination.

On the motion of Mr. Moore, seconded by the Vice-President, Mr. Joseph Smyth, chemist and druggist, of Wicklow, was elected an associate druggist.

Mr. T. R. Connolly, of Dundalk, was elected a member of the Society.

On the motion of Mr. Rankin, seconded by Dr. Burnes, the following registered druggists were nominated for election as associate druggists:—Messrs. Jacob Walsh, York Street, Belfast; Patrick Gribbon, Magherafelt; James Richardson, Anne Street, Belfast; Hamilton W. McMaster, 26, Glenalpine Street, Belfast; William Haslett, Sandon Terrace, Belfast; John Gray, English Street, Armagh; William Maxwell, Foyle Street, Londonderry; Thomas McDowell, 180, Mount Pottinger Road, Belfast; Samuel M. Read, 80, Albert Bridge Road, Belfast; James Grills, 3, Gloucesterville, Belfast; Robert Spence, Castleblaney; Thomas Mc Cabe, Ballybay; and Patrick Tree, Ballybay.

Some financial business having been disposed of the Council adjourned.

PHARMACEUTICAL LICENCE EXAMINATION.

The following have passed—

Mr. John Gorman, Belfast.
Mr. John Black, Dublin.
Mr. Robert R. Ritson, Belfast.
Mr. Michael S. Lalor, Athy.
Mr. Wm. R. S. Gilbert, Ballina.
Mr. Geo. W. Camlin, Belfast.
Mr. Denis P. Brosnan, Listowel.
Mr. Edward J. O'Callaghan, Dublin.
Mr. Joseph J. Broderick, Listowel.
Mr. John Thompson, Belfast.
Mr. George Strong, Kingstown.
Mr. Joseph S. Evans, Dublin.

One candidate failed to pass.

Society of Chemical Industry.

ANNUAL GENERAL MEETING.

This year the Society held its annual general meeting at Dublin, in spite of the fact that the Irish Section is at present in *embryo*. At 11 o'clock on Wednesday morning about 200 members gathered together in the Examination Hall, Trinity College, Dublin, and were welcomed on behalf of the Reception Committee by Dr. Haughton, who expressed his pleasure at seeing so many distinguished visitors. After the reading of the minutes of the last annual general meeting, Mr. C. C. Hutchinson and Professor Tichborne were appointed secretaries of the ballots for the election of officers.

The Secretary then read the following:—

Report of Council.

"We have the honour to report that the number of members on the register is 2,697, as compared with 2,595 at the last annual meeting. During the year 260 new members have been elected, and 158 have been removed by death, resignation, and other causes, showing a net gain of 102.

"Among those who have died are Prof. T. Carnelley, of the University of Aberdeen, Mr. C. H. Gimingham, at one time assistant to Mr. Crookes, and latterly manager of the Swan Light Works, Mr. J. Chambers Nicholson, of the late firm of Simpson, Maule, and Nicholson, Mr. W. Lant Carpenter, an indefatigable member of the Publication Committee; Mr. C. Marvin, the Russian traveller; Dr. M. Bechler of the Manbré Saccharine Co.; Mr. C. H. Grundtvig, killed by an accident in Greece; Mr. F. C. Blake, of Pittsburgh; and Mr. Geo. Dyson, of Hurworth-on-Tees.

"During the past session 77 papers have appeared in the Journal as against 87 the year before.

"Ten years having now passed since the foundation of the Society, a few statistics are presented showing the progress of the Journal and membership during that period. In 1882 each number of the Journal averaged 43 pages of matter: in 1884, 56; in 1886, 61; in 1888, 79; and in 1890, 104. In 1882 the membership was 1140; in 1884, 1809; in 1886, 2271; in 1888, 2395; in 1890, 2595. The invested funds of the Society amount to £3880 3*s*. 3*d*., as against £3688 15*s*. 9*d*. last year. The revenue last year, as will be seen from the Treasurer's report, exceeded the expenditure only by £107 7*s*. 11*d*., as against £607 in 1889, the increased size of the Journal being responsible for the whole outlay. If the rate of increase of the Journal is to be maintained, it is most desirable that we should have larger accessions of members.

"In November last a Committee was appointed to consider certain proposals of the Manchester Chamber of Commerce to amend the law of patents. Upon the report of that committee, the Council resolved to support the Chamber in endeavouring to limit the period during which inventors can rid their patents of rash and inconvenient claims, to two years after filing their original application. Should this alteration of the law receive the sanction of Parliament, the speculative patentee will no longer hamper the chemical industries.

"In May last a Yorkshire section of the Society was formed, with Sir James Kitson as its first chairman. This makes the seventh, and the cordiality of your welcome induces a hope of the early formation of an eighth.

"It will be remembered that we had intended to meet in Birmingham this year, but it became clear last autumn that the meeting could not be arranged. The Council, however, received a hearty invitation from a reception committee in Dublin, with the result that the Society is holding its annual meeting for 1891 within the walls of Trinity College."

On the motion of the President, seconded by Mr. Henry Brunner, M.P., Chairman of the Liverpool section of the Society, the report was adopted.

A statement of accounts showed that the revenue for the year 1890 had been £4,013 13*s*. 10*d*., and that, deducting all expenses, there was a balance of £107 7*s*.

The President said the annual meetings of the Society had been hitherto held in places where local sections of the Society existed. He hoped that though Dublin had not at present a section of the Society, it would not be long before it would be seen to be advantageous to form an Irish section having its headquarters in Dublin, and that the next time the Society should receive an invitation from Dublin it would come from such a section. Of course the Society was not political

in any sense, but in speaking of Ireland it was difficult to avoid touching on politics. Every Englishman, no matter what his political opinion might be, who had read history, and in particular Lecky's history, knew from that, as well as from other sources, that England as well as Providence had been a sort of mother-in-law to Ireland in respect of manufactures, and that acts of the English nation in the last century were deliberately planned in order to favour English industries at the expense of Irish industries. Now every reading Englishmen regretted and deplored that, and was willing and anxious in every possible way to try to make amends for the acts that were done to Ireland in those darker times. He hoped that that Society might be able in some small way to lend a hand to make up for the wrong which was done in those days. There was plenty of room in Ireland for the work of the Society of Chemical Industry, the object of which was to teach manufacturers to do better what they were already doing. Substances and forces were different from men. In social and political questions they had to do with imperfect atoms in the individual men who made up society; but in dealing with substances and forces they had to deal with things which, if only properly used, were certain in their operations. And here analytical chemistry bore upon the rough work of the factory. That Society tried to teach manufacturers not only to do what they were doing better than they did it at present, but also to do a great many things which they did not do at all at present in the way of utilizing waste. There were many things in Ireland that were capable of being submitted to those two processes. Sir Robert Kane had shown that Ireland was rich in mineral wealth; and he did not believe that nature had been so unkind to Ireland as not to supply the means of developing that mineral wealth if they could only get at the proper way of doing it. The arrangements of nature were generally perfect, and he had no doubt that if they only brought knowledge and care and attention to bear upon the natural resources of Ireland a great deal of the wealth which existed in that country might be developed for its advantage. The great establishment of Messrs Guinness in Dublin was doing what the Chemical Industry Society was trying to teach manufacturers to do. They all knew that in brewing and distilling an enormous quantity of carbonic acid gas was wasted. The Messrs. Guinness had worked out that subject; and the members of the Society would have an opportunity of inspecting their machinery by which they developed from their waste carbonic acid something like 30 tons a day of liquefied carbonic acid. What would become of that he did not know; but every saving of the kind generally became the starting-point of some fresh industry. Ireland, and especially Dublin, was rich in the means of raising scientific chemists to superintend its factories. They had in that magnificent institution under Professor Emerson Reynolds a school of chemistry which was quite equal to any on the other side of St. George's Channel. They had in the Royal College in St. Stephen's Green another admirable institution. He believed that if the result of that meeting should be to induce manufacturers and capitalists in Ireland, and even some English capitalists, to put their capital and plant under the superintendence of such scientific men as Dublin could produce, their hosts would be the first to acknowledge that they had become debtors to them for having come there.

The President's Address.

The President, Mr. Rider Cook, delivered his address. Departing from the course that might seem natural to him, he chose for his subject the question of the utilization of a waste product which had been dealt with less successfully than glycerin, the substance which would naturally present itself to the soapmaker as the material most worthy of his attention, and turned to the consideration of the sewage and the possibility of altering the present vicious system. He showed that the sum paid for manures of foreign origin might be put down as £2,000,000 to £2,500,000 per annum, and that this amount might be saved by the judicious utilization of the material which it is the custom to waste absolutely. The deodorization of London sewage had at one time been attempted to be effected by treatment with sulphuric and sodium manganate. How inadequate this treatment was had been proved by experiments of his own made in the time of the Metropolitan Board of Works, now defunct, by which he had shown that whereas for the complete deodorization of the sewage dealt with 287 tons of manganate would have been required, 18·2 tons were actually used. On reporting this fact the Board abandoned the idea of attempting to deodorize the sewage in the sewers, and in 1887 confined its operations to the effluent after the sludge had been settled from it, and the sewage when it was actually being discharged into the Thames. The gain to the ratepayers was nearly £50,000 in 1887, as the total cost of the chemicals and labour that year was only £57,760, compared with £107,063 in 1886. He considered that, if properly utilized, the sewage of a country together with the organic remains, such as the bones and food of animals which had been killed, should provide a fresh supply of food enough for the inhabitants of that country. He refused to endorse the fallacious statement that had been made some time ago in the *Times*, that the waste of the sewage which should be utilized was a loss to the earth as a whole, but it was undoubtedly a loss to this country individually. The sum paid for wheat and and flour imported into this country in the years between 1888 and 1890 inclusive averaged £31,500,000 annually, and this sum he considered might be saved were the utilization of the waste material complete. Adding to this sum the expense incurred in buying foreign fertilizers and expenditure on works for supplying us with uncontaminated water, our natural sources of supply having been rendered impure by the present system of the disposal of sewage, the grand total could not be much less than £40,000,000 per annum, a very tangible amount. It was unfortunate that many wild sewage schemes had been proposed from time to time, whose failure had tended to discredit serious attempts to deal with the problem he had sketched. The almost universal use of the system of water carriage for sewage was the real cause of the difficulties that had arisen. The fecal matter, which originally had a great manurial value, was diluted until the cost of its recovery exceeded its intrinsic worth. Of course, if the community at large were prepared to pay for this costly system of conveyance with its subsequent expense in treating the diluted sewage that resulted and handling many millions of gallons of liquid, nothing more was to be said, but if a more rational method commended itself the indirect advantages which he had indicated would accrue. One might learn something from China, which with a population almost as dense as the United Kingdom appeared to import no food stuffs, but to grow the whole of that needed by her teeming hordes. He commended to the study of the chemist, the engineering chemist, or the chemical engineer the problem he had endeavoured to present, viz., the device of some form of apparatus with or without means of separating solid from liquid matter which should be capable of ready access and cleansing and should be adapted for the use in conjunction with it of some chemical or chemicals which in moderate quantity should suffice to arrest decomposition and prevent nuisance by acting with certainty as a deodorant. He submitted in conclusion for the consideration of the Society the following pro-

positions: (1) That this is a great unsolved problem, involving the health as well as the wealth of the country, worthy of their attention. (2) That no good will be done in the direction of sewage utilization while the present system of water carriage continues. (3) That if public opinion will not admit of any interference with that system it is useless to devote time and trouble to any system other than how to get rid of sewage at the least cost to the community, and in so doing how to avoid spoiling the water supplies of our ever-growing population.

Professor Emerson Reynolds, in moving a vote of thanks to the President for his valuable address, said he desired to thank him for his very graceful allusion to very delicate subjects connected with the relation of that country to the greater island on the other side of St. George's Channel. He had skimmed delicately over very thin ice, and in the most interesting and kindly way had touched upon the unpleasant episodes of the past, and brought into prominence the pleasanter possibilities of the present and the future. But when speaking of the desire of their friends on the other side of the water to help them he omitted to mention that a return for a considerable portion of the injustice of the past had already been made by his (Dr. Reynold's) countrymen, in giving them, on the other side of the water, a very respectable amount of trouble. The President had referred to the utilization of waste products in two manufactures of chief importance in that city, whiskey and porter. Dublin whiskey was well known all over the world, and on the following day the members would have an opportunity of testing many of its properties —as well as of seeing the utilization of waste carbonic acid gas at the Guinness Brewery. It was only a matter of common justice that the credit of that utilization should be given in the right quarter. They had in Dublin a number of chemists who were in the very highest and best sense of the term industrious chemists; but the utilization of the important waste product, carbon dioxide, was mainly due—not altogether, perhaps—to the efforts of his most able fellow-townsman, Professor Tichborne. The President had, in his address, done a service to sanitary science by knocking on the head all the schemes for the utilization of sewage that were proposed under the water carriage system. He (Professor Reynolds) hoped that members of the Society would turn their attention to a consideration of the best way of getting rid of sewer gas, which was such a danger in all communities.

Mr. John Spiller, of London, in seconding the motion, said that, as a colleague of the President from the first formation of the Society he could bear testimony to the value of his services, both in the capacity of Treasurer of the Society and during the last year as its President.

The motion was unanimously passed, and—

The President briefly returned thanks.

Messrs. Theobald Brothers and Miall were appointed auditors for the ensuing year.

Place of Meeting in 1892.

Mr. Tyrer, Chairman of the London Section, invited the Society to hold its meeting for 1892 in London.

Mr. Crowda, Vice-Chairman of the London Section, seconded the motion, which was unanimously agreed to.

Officers for the Ensuing Year.

The result of the ballot for President and Council was announced as follows:—

President, J. Emerson Reynolds, M.D., D.Sc., F.R.S.; Vice-Presidents, Sir Lowthian Bell, Bart., F.R.S., James Duncan, David Howard, S. H. Johnson, Ludwig Mond, F.R.S., Dr. Hugo Muller, F.R.S., B. E. R. Newlands, J. C. Stephenson, M.P., E. Rider Cook, Dr. John Evans, F.R.S., A. Norman Tate, Sir John Turney. Ordinary members of Council: A. H. Allen, Jno. Calderwood, H. Grimshaw, Professor R. Meldola, F.R.S., E. K. Muspratt, T. L. Patterson, Jno. Spiller, T. W. Stuart, Arthur Boake, Dr. Charles Dreyfus, Boverton Redwood, William Thorp, B.Sc. Honorary Treasurer, E. Rider Cook; Hon. Foreign Secretary, Dr. F. Hurter.

The President, in the name of the Society, congratulated Professor Emerson Reynolds on his election to the office of President for 1892.

Professor Reynolds returned thanks for the great honour which had been done him, and said it would be a matter of great pride to him to preside over so important a body as that Society.

On the motion of Mr. Newlands, seconded by Mr. Mumford, Secretary of the London section, the President, Mr. E. R. Cook, was appointed to represent the Society on the Imperial Institute.

The President moved that the heartiest thanks of the authorities be accorded to the authorities of Trinity College, Dublin, for the use of the rooms which they had placed at the disposal of the Society.

The motion was seconded by Mr. Norman Tait and carried unanimously.

Provincial Transactions.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The usual weekly excursion was held on Wednesday afternoon, 24th inst., to Bullionfield Paper Works (Mr. D. M. Watson's). Twenty members attended, and were conducted over the extensive works by Mr. James Horsburgh, manager, who minutely explained the numerous interesting processes involved in the manufacture of paper. Two kinds were in process of manufacture—writing paper and ordinary demy—samples being distributed among those present. The visit proved most enjoyable and instructive, and before leaving votes of thanks were passed to Mr. Horsburgh for his kindness and to Mr. D. M. Watson for granting the privilege.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The fourth botanical excursion of the season took place on Wednesday, June 24. The company assembled at 8.45 p.m. at the ancient parish church at Duddingston. There are two interesting historic survivals at the churchyard gate—The "Loupin-on-stane," a small stone platform formerly used by horsemen in mounting their steeds in the days when it was common to ride to church; and the "Jougs," a ring or collar of iron opening by a hinge or joint so as to enclose the culprit's neck, and secured by a loop or staple and padlock. This form of pillory was employed up till about 100 years ago for both ecclesiastical and civil offences. It is fastened to the wall at the gate by an iron chain. This one is interesting as being the one figured in 'Chamber's Encyclopædia.' The weather, unfortunately, was unfavourable, there being an east wind with a dense wetting Scotch mist or "harr," and all who ventured to attend the excursion got thoroughly drenched. Nevertheless, the marshy ground to the south of Duddingston Loch was thoroughly explored, and in spite of the weather some good specimens were obtained. In addition to the plants gathered at last excursion (*Pharmaceutical*

Journal, [3], vol. xxi., p. 1047) the following were met with: *Carex paludosa*, *Alopecurus geniculatus*, *Alisma Plantago*, *Lamium album*, *Epilobium hirsutum*, and *Stellaria glauca*. As an evidence of the lateness of the season it may be mentioned that the hawthorn, *Cratægus Oxyacantha*, was found in full bloom, a stage which is generally past two or three weeks earlier. It was observed that there was a great profusion of *Lychnis viscaria* in full bloom on the rocks known as Sampson's Ribs.

The fifth botanical excursion of the season took place on Wednesday, the 8th inst., to Craigcrook, starting from Caledonian station at 5.50 a.m., and returning from Craigleith station at 7.56 a.m. The morning was a little dull and showery, and this, coupled with the early start, probably accounted for the small attendance. Those who had the courage to turn out, however, thoroughly enjoyed the early ramble. The following plants were gathered:—*Stratiotes aloides*, *Viola tricolor*, *Vicia Cracca*, *Lychnis Flos-cuculi*, *Geranium robertianum*, *Orchis mascula*, *Lotus corniculatus major*, *Lathyrus pratensis*, *Epilobium montanum*, *Nasturtium officinale*, *Symphytum officinale* (purple flowered), *Rumex acetosa*, *Mentha aquatica* and *M. arvensis*, *Lamium Galeobdolon*, *Spergula arvensis*, *Polygonum aviculare*, *Veronica Beccabunga*, *Salix pentandra*, *S. fragilis* and *S. alba*, the latter having nearly every leaf bearing a gall, *Sparganium ramosum*, *Senecio Jacobœa*, *Sisymbrium officinale*, *Iris Pseud-acorus*, *Berberis vulgaris*. The marshy pool was nearly covered with *Lemna minor*, and on a piece of waste ground near Craigleith Quarry *Phalaris canariensis* was found. This is about half a mile from the place where it was formerly found by Mr. Hill (see *Pharmaceutical Journal*, [3], vol. xviii., p. 810).

The next excursion is to Poet's Glen, Currie, on July 29, leaving Caledonian station at 6.10 a.m., and returning from Currie at 7.58 a.m.

ABERDEEN AND NORTH OF SCOTLAND SOCIETY OF CHEMISTS AND DRUGGISTS.

The members and their friends held their annual outing on Thursday, July 2. The company left by the 7.50 a.m. Deeside train, and on reaching Aboyne were conveyed in brakes to Corry-Vraich, from which point they made an ascent of Mount Kean by way of the "Bridal Path."

On reaching Glen Tana, the highland home of Sir William Cunliffe Brooks, M.P., etc., they were met by the genial baronet and his lady with a right hearty welcome, and by his commands they were ordered to alight on their return journey. Sir William was again in waiting to receive the pill-builders, throwing open the lodge and policies for their inspection, and entertaining them to a most refreshing afternoon tea. After having done the "Lions" both inside and out, the President, Mr. Johnston, in the name of the company, proposed a hearty vote of thanks to Sir William and his Lady for the many and unexpected kindnesses they had showered upon them. In fact, he considered they had that day received such a welcome and hospitality as would be difficult to match, and would make the day one ever to be remembered in connection with the Society's outings. The President expressed his regret that Sir William had been unavoidably called away on business, but he desired his Secretary (Mr. Wallace) to express to Sir William their sentiments, and with three ringing cheers the company drove off. On reaching Aboyne there was just sufficient time left for dinner and a few toasts. The train left Aboyne at 7.40 p.m., arriving at Aberdeen at 9.5.

Reviews.

VETERINARY COUNTER PRACTICE. A Treatise on the Diseases of Animals and the most Suitable Remedies for them.*

This book, avowedly written for chemists and druggists, contains a large number of formulæ, many of which are excellent, and may be utilized at the counter with advantage to the customer and profit to the chemist; but more full and descriptive directions for the use of some of them are desirable, and the correction of some of the formulæ in a second edition will be an advantage. It is not found in practice that the ordinary carriage horse requires for "physic" as much aloes as a heavy cart horse. On page 11 a like dose of about ℥vj. is mentioned. "Turpentine sufficient" might be replaced with an exact or approximate quantity, and the method of using the blister described with advantage to the tyro in veterinary pharmacy. We have in our mind a case where an accomplished chemist, well up in elegant pharmacy, when transferred from town to country business became a laughing stock of the stable loafer, as a sequence to sending a blister for a horse, carefully spread on beautifully white leather. The suggested substitution of methylated spirit for turpentine (page 28) would render the liq. blister less effective, and moreover be an infraction of the law relating to the use of it. On page 28 lard might well replace some or all of the Venice turpentine.

At page 178 a formula for sheep wash contains two separate and differing quantities of arsenic, and this followed by cinnabar. This is very properly stated as "a dangerous preparation," a designation which we fully endorse, and would further say that all arsenical sheep wash contains an element of danger against which the compounder should protect himself by sending out with it full and printed instructions for use and caution against abuse.

On page 163 tobacco juice is recommended as a cheap and effective substitute of the older infusion or decoction of shag; this article is stated to be now imported at only a nominal duty. We believe it to be entirely a native production and a residual of tobacco manufacture.

The "secundum artem" suggested on page 210 for dispensing ol. amygd. dulc. in separate 1- or 2-drachm bottles, for daily use in the treatment of canker in the ear of the dog, does not impress us as having "the least amount of extractive" result. It savours very much of the good old times, which but few of the craft can now remember, when haust. iv. or vj. were dispensed instead of the mist. ℥vj. of the present day.

On page 49 the author expresses the opinion that "the man who refuses to perform the unpleasant operation of back-raking a horse is not fit for a horse-doctor, however well versed in the art of curative medicines;" neither do we think that the man is well advised who, having done so, would venture upon administering as an injection "a gallon or two of *hot* water."

In the article on lameness in horses, page 102, the author writes that "the diagnosis of lameness is one of the most difficult branches of veterinary practice, and the counter prescriber who would do justice to his client will not attempt it." Is not the diagnosis of acute and even chronic disease of the internal organs of the body equally difficult and far more important in its immediate results? We think so, and venture to suggest that the counter prescriber will be wise who strictly limits his veterinary practice to the length and breadth of his counter, and leaves to the qualified expert the

---

* London: *Chemist and Druggist* Office. Small 8vo. Pp. 268.

use of the clinical thermometer, the trocar, and canulæ, and the privilege of selecting either the fleam and bloodstick or the lancet as the safer instrument for blood letting.

PHARMACOGRAPHIA INDICA. By W. DYMOCK, C. J. H. WARDEN, and DAVID HOOPER. Part IV.*

The undertaking of the authors, in the preface of the first volume, to supplement the previous work published by Dr. Dymock with original investigation concerning the chemical composition and physiological action of Indian drugs, and to give toxicological statistics relating to the more important drugs, has been most conscientiously carried out. Consequently the present part, which completes the second volume, does not extend further than *Nicotiana Tabacum*, and the two volumes already published contain, as nearly as possible, twice as much matter as can be found in the 'Materia Medica of Western India,' up to the same point. Yet there still remains enough matter to be treated of to fill at least one more volume. Several new alkaloids have been discovered during the chemical examination to which some of the hitherto unexamined articles of materia medica have been subjected. Of these some have received a name, but of others only sufficient has been obtained to indicate their presence. Of those which have received a name may be mentioned—Bahmanine from red behen root; Nyctanthine from *Nyctanthes arbor tristis*; Jasminine from *Jasminum grandiflorum*; Salvadorine from *Salvadora persica*; Tylophorine from *Tylophora asthmatica*; Dæmine from *Dæmia extensa*; and Cuscutine from a species of Cuscuta. A new glucoside, to which the name of Dregein has been given, has been discovered in *Dregea volubilis*, an asclepiadaceous plant, and another, viz., gymnemic acid, in *Gymnema sylvestre*, a plant belonging to the same natural order.

Toxicological statistics form a marked feature in the present volume, the recorded cases of poisoning by *Plumbago rosea*, *Nerium odorum*, nux vomica and stramonium are given in a tabulated form. The last two appear to be the poisons most commonly in use for criminal purposes in India, for the tables extend over twenty-seven pages in the case of nux vomica and thirty-two in that of stramonium. In some instances interesting information is contributed concerning plants that are common in this country, but of which the medicinal properties are almost unknown here. Thus *Anagallis arvensis* is said to be used in India as a fish poison and to kill leeches, and Orfila's statement to the effect that three drachms of an extract of the plant proved fatal to a dog, and M. Gronier's that the plant has a poisonous effect on hares is probably known to but few. *Sonchus oleraceus*, a common weed in this country, is mentioned as possessing active hydrogogue properties and being likely to be useful in ascites and hydrothorax. 'Pharmacographica Indica' thus forms a work the usefulness of which is by no means confined to India. Being brought quite up to date, it will be found very valuable for purposes of reference on materia medica generally. Here and there throughout the volume interesting historical notes appear. In one of these, nepenthe is identified with henbane, Baron Hammer Purgstall's observation to this effect being quoted. "Bendj," the plural of which in Coptic is "nibendj," is without doubt the same plant as nepenthe, which has so much perplexed the commentators of Homer. Helen evidently brought the nepenthe from Egypt, and bendj is there still reputed to possess all the wonderful qualities which Homer attributes to it.

'Pharmacographia Indica,' like its namesake, is a work of reference that no student of materia medica can afford to be without, and which is not only valuable for the accuracy of its statements, but so far as its historical matter concerns cannot fail to prove most interesting to the student of Eastern languages, almost as much so as to the student of materia medica. The articles on poisons also should prove of great value to medical jurists, more particularly in India. Even the indefatigable searcher for new remedies will probably find scope for his energies in the long list of articles of materia medica as yet untried in this country. One of the most promising of these seems to be *Cosmostigma racemosum*, the root-bark of which, in doses of five grains, has been found by the author to be "a most efficient cholagogue, without purgative effect, but restoring the natural colour of the stools after the usual remedies, mineral acids, podophyllum, euonymin, etc., had been abandoned in despair." With these few extracts, the reader may be left to dive for himself into this treasure house of Eastern materia medica.

* London: Kegan Paul, Trench, Trübner and Co. 1891. Demy 8vo. Pp. 305-644.

Obituary.

Notice has been received of the death of the following:—

On the 23rd of June, Mr. Herbert George Willows, Chemist and Druggist, East Stockwith, Gainsborough. Aged 26 years.

On the 24th of June, Mr. Samuel B. Clarke, Chemist and Druggist, late of Holbeach. Aged 43 years.

On the 26th of June, Mr. William Dale, Chemist and Druggist, Weston-super-Mare. Aged 59 years.

On the 27th of June, Mr. John Thompson Clark, Chemist and Druggist, Russell Street, Battersea Park, London. Aged 58 years.

BOOKS RECEIVED.

ARZNEIMITTEL WELCHE IN DEM ARZNEIBUCH FÜR DAS DEUTSCHE REICH DRITTE AUSGABE NICHT ENTHALTEN SIND. Bearbeitet und herausgaben von dem Deutschen Apotheker-Verein. Berlin: 1891. From the Publishers.

PIESSE'S ART OF PERFUMERY and the Methods o obtaining the Odours of Plants. Edited by Charles H. PIESSE, F.I.C., etc. Fifth Edition. London: Piesse and Lubin, 1891. From the Publishers.

A DICTIONARY OF APPLIED CHEMISTRY. By T. E. THORPE, B.Sc. (Vict.) Ph.D., F.R.S., etc. Vol. II. London: Longmans, Green and Co. 1891.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE PRELIMINARY EXAMINATION, ETC.

Sir,—Illness, both personal and domestic, must be my excuse for not previously noticing the remarks you honoured me by making (p. 987) on my letter of April 18.

If the letters which have since appeared from practical pharmacists who have read my letter rightly and whose sympathy I appear to have secured, suggested a re-perusal of it, you have doubtless come to the conclusion that the objections which you urge "appear to arise from misconception rather than anything else" (p. 1047).

It may be that my letter did not state in so many words that thorough accord which I feel with those who advocate the need for raising the standard of the Preliminary examination. The feeling is not of yesterday, as far as I am concerned, but dates at least from the time twenty

years ago when Mr. S. R. Atkins, as an outsider, annually exhorted the Council to do its duty by the budding pharmacist. Together with the desirability of insisting on the passing of the examination before apprenticeship, this view has been impressed by me on pharmacist friends, when pharmaceutical education has come up for discussion. Such of them as agree with me carry their creed into practice.

Perhaps I assumed too readily that these views of mine were sufficiently known to yourself and your readers, and did not need repetition in what appeared to be an already too lengthy letter.

I desired, however, to examine into the effect on the subsequent examinations of raising the standard of the Preliminary. What inducement is held out to better educated youths? A rise of ten per cent. in the charges for prescriptions? Protection as dispensers? Why should a better educated youth enter for the examination because it is harder to pass? I have been told that he would, but I do not believe it is true of this generation. Raise the standard and you will shut out more men, but they will be the poorest, weakest and least desirable men. The average quality of those who pass will be raised, and in time no doubt fewer of the poorly prepared and poorly endowed men will present themselves. So the general average will be raised, and it may be that this is what is meant by saying that candidates for the entering examinations will be drawn from a better class. It would be more true to say that the best men will be drawn from the same class.

In considering the effect of raising the Preliminary standard, I was bound, like yourself, the Government visitor and others, to regard the position of the Minor examination as it stands. I could not conceive a better way of doing this than by dissecting the figures giving one year's results. And here I must confess surprise that the figures are regarded as significant when they show a large percentage of failures in dispensing, and cease to be so when they show a small percentage of failures in other subjects. Your argument is that many failures in dispensing show a want of education, and few failures in chemistry and botany show cramming. Do the teachers deserve no credit? The reasoning is to be commended as an instance of subduing facts and figures to views. Common men prefer to base views on ascertained facts and figures, and to learn from the figures how to modify operations so as to produce a more satisfactory set of facts. Hence my suggestion that the useless and misleading certificate of three years' practical engagement in the translating and dispensing of prescriptions should be replaced by a certificate of attendance for *n* months at a school or class for dispensing. Perhaps it would be better (as three years in a pharmacy means a certain amount of practice in neatness and of manual dexterity) to make the school certificate complementary to the one already required.

I should be one of the last to minimize the immense power for good in pharmacy of the Bloomsbury School, and shall ever be grateful for the facilities it has afforded to myself amongst better men. It is the parent of schools about the country, robust and active and self-supporting. You may be right in contending that to adopt my suggestion of founding a school for practical dispensing would be a cost to the Society, but the argument is insufficient if the plan itself be good. As an argument it is quite as powerful for closing the present school. The Society exists for the advancement of pharmacy, not to make a profit, and most of your readers will be of the opinion that pharmacy is best advanced by educating the pharmacist in what is the most important function he has to perform, the dispensing of prescriptions.

I must risk weakening the force of my letter in pressing home the above suggestion, by referring again to the Preliminary and expressing a hope that the discussion started by Mr. Saul may not remain purely academic in its want of results. His desire for a certificate of having passed a satisfactory scholastic examination was well and ably urged by Mr. R. W. Giles (p. 933) as the simplest way out of the difficulty. Such certificates are now obtained so much as a matter of course before leaving school that no hardship would be inflicted if required from those wishing to join the craft. The honour of belonging to a body which, in time, will include only well educated graduates, will have to be for this generation sufficient inducement to a satisfactory class of candidates. The next generation will doubtless receive the higher reward which comes to those more strictly trained for their duties, and posterity will benefit by the striving of to-day.

To give effect to the desire to readjust the Preliminary, which your columns seem to indicate is general, would it not be well to call a meeting, under the auspices of the Society, of those interested in the subject, and appoint a committee to report to the Council on the various scholastic examinations which appear to be adequate? The gentlemen named above would doubtless act on such a committee.

Galen Works, Deptford. JOHN MOSS.

CHLOROFORM.

Sir,—I cannot agree with your interpretation of the words used under "Chloroform" in the Pharmacopœia. The instance of ether is not analogous. In that case rectified spirit is distinctly ordered to be used. It may have been the intention of the Medical Council that only rectified spirit should be employed in the preparation of chloroform, but it is not so stated. Possibly the Council might be induced to issue a supplementary order clearly defining what is intended, seeing that the point in dispute is of considerable importance. D. B. DOTT.

104 and 106, *South Canongate, Edinburgh.*

Sir,—In reference to the letter of Mr. D. B. Dott in your issue of the 4th inst., which I fully endorse with every feeling of loyalty to the Pharmacopœia, I would like to point out that in addition to the instructions with reference to the production of chloroform (and in several other instances where it is not expected that the general pharmacist will manufacture), when it states "a product which may be made," that on referring to the preface of the 1867 Pharmacopœia, page 15, we have the following:—

"There are some medicines, for the preparation of which it is essential that precise directions should be given, namely, such as can only be obtained by some peculiar process, and with the exact composition of which we are but imperfectly acquainted. Processes are also, in most instances, appended to the descriptions of chemical compounds of definite and known composition, which admit of exact definition in other ways. In many of the latter cases, however, it is left optional with the manufacturer to use the processes given, or others by which products may be obtained, that will accord with the descriptions and tests given for their identification."

Where precise instructions are intended we are in most instances met by the command, "Take of."

If chloroform is to be manufactured strictly in accordance with the suggestion laid down in the Pharmacopœia, the price of the article would probably be nearer 10*s.* per lb. than what is at present paid for it, and the product would not be any purer, if as pure, as that obtained from other sources at the present time.

We meet with several difficulties in desiring to strictly comply with the instructions in the British Pharmacopœia. For example, "oils" are ordered in most instances to be distilled or expressed in Britain, but I question whether there is any law which compels the wholesale manufacturer and distributor to only sell for medicinal use such oils as are prepared in strict accordance with these instructions, so long as he always provides that the article he supplies is absolutely in conformity with the characters and tests given. ALFRED HY. MASON.

London.

A. T. Hill.—(1) *Scutellaria galericulata*; (2) *Filago germanica*; (3) *Melampyrum pratense*; (4) *Polygala vulgaris*; (5) *Veronica officinalis*; (6) *Ajuga reptans.*

D. Dickinson.—(1) *Elodea canadensis*; (2) *Spergula arvensis*; (3) *Lemna trisulca*, with *Coleochaete scutata* on it.

G. Jackson.—*Stellaria holostea.*

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Sutton, Helbing, Strype, Wright, Strachan, Barrett, Maiden.

STEREOCHEMISTRY.

Notwithstanding the enormous advances that have been made in the development of the science of chemistry during the last two decades, the ground for well-founded complaints of empiricism has not yet been removed. Although experimental evidence is alone regarded as decisive by the chemist, yet it must be remembered that experimental methods in chemistry are still very imperfect, and by no means bear a favourable comparison in accuracy with those of other sciences, whilst the eminent philosopher Dühring even disputes the value of experimental deductions.

It had long been felt that chemistry must be developed in fresh directions before the position of a mathematical science might be claimed for it, when the appearance of van t'Hoff's classical paper directed attention to the study of stereochemistry. The conception of the molecule in space, and not in one plane, as usually represented in chemical diagrams, was not new to leading men, and had evidently suggested itself to Wollaston in 1811, but no definite expression of ideas was formulated until Le Bel and van t'Hoff showed that the four valencies of a carbon atom might be represented by the corners of a regular tetrahedron.

This representation does not necessarily stipulate that the carbon atom must possess the shape of a tetrahedon, but only that the four valencies diverge into space in four symmetrical directions. Le Bel and van t'Hoff showed that with the acceptance of this theory several cases of isomerism, like that discovered by Wislicenus among the lactic acids, admit of explanation. If four different atoms combine with one carbon atom, isomerides occur of more intimate nature than those of different constitution, and such isomerides are related stereochemically to one another as an object to its image.

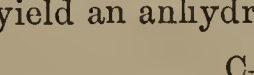
The first great success of van t'Hoff and Le Bel resulted from recognition of the fact that compounds which contain an asymmetrical carbon atom are capable both of stereochemical isomerism and of optical activity. A number of compounds can be instanced that contain an asymmetrical carbon atom in the molecule and rotate the plane of polarized light. Ethylidene lactic acid, optically active amyl alcohol and hydrobenzoin afford well known instances of isomerism that cannot be explained by the ordinary laws of chemical constitution. Further, van t'Hoff demonstrated in his first publication that by the aid of this theory the perplexing problem of the cause of the isomerism of maleic and fumaric acids might be solved in a satisfactory manner.

Amongst other great successes attained by stereochemical methods of investigation, that which followed analytical experiments must be especially mentioned. No doubt at first many laughed when van t'Hoff and Le Bel suggested that the reason of the optical inactivity of some bodies containing an asymmetrical carbon atom in the molecule might be in that they consisted of a mixture of two isomerides, one of which rotated to the right, the other in an equal degree to the left. But ridicule turned to astonishment when the analysis of simple inactive substances, like propylenglycol, into two active bodies was accomplished. In these attempts Le Bel sought physiological means when chemical means failed, and employed cultivations of microorganisms that appeared to have a greater appetite for the one or the other active modification, and consequently fed upon it to a greater extent. Lewkowitsch tried the same means with success in the case of mandelic acid, but when Ladenburg found this method failed to convert his artificial coniine into an active modification, he succeeded in attaining the desired result by combining the inactive base with an optically active acid.

The most notable, and for a long period the unique, instance of complete accord between observation and theory in relation to the optical isomerism of a compound containing two asymmetrical carbon atoms in the molecule, appears in tartaric acid. Not less than four isomerides are known and four only may be expected from the theory. Of these the inactive, the dextro-rotatory and the laevo-rotatory tartaric acids may be represented respectively by the diagrams— $\overset{d}{|}\overset{l}{|}$, $\overset{d}{|}\overset{d}{|}$, $\overset{l}{|}\overset{l}{|}$, in which the letters designate the direction of rotation of each asymmetric carbon atom. Further, racemic acid is known to be a more or less stable combination of the dextro-rotatory $\overset{d}{|}\overset{l}{|}$ and laevo-rotatory $\overset{l}{|}\overset{d}{|}$ tartaric acid. With a view of supporting the van t'Hoff theory by establishing another similar instance of optical isomerism amongst compounds containing two asymmetrical carbon atoms, Bischoff undertook the investigation of alkyl-substituted succinic acids and carried it through with such success as to materially assist in developing the dynamical hypothesis formulated from the independent researches of A. v. Baeyer and J. Wislicenus in connection with other aspects of the van t'Hoff theory. This service consisted more especially in acquiring information as to the exact influence of alkyl and carboxyl groups in stereochemical isomerism and also to the peculiar internal molecular rearrangements that pertain amongst the substituted succinic acids under varying conditions.

A most important extension of the original stereochemical views, so simply and intimately connected with the van t'Hoff theory that it now seems a wonder that the subject did not attract earlier attention, was made by A. v. Baeyer. By assuming that the formation of ring compounds results from stereochemical causes, Baeyer was the first chemist in a position to speculate seriously concerning the actual corporeal shape of the benzene molecule, as also of the molecules of lactones and numberless other closed chain compounds. The benzene molecule, on account of its relative stability, has been generally represented by the most simple symmetrical solid figure that can be defined by six points, that is to say, as an octahedron, but from Baeyer's speculation it was recognized that chemists have probably not to deal with such a body but rather with a system of six carbon atoms in one plane.

The formation of lactones occurs, it may be remembered, with great readiness when four carbon atoms and two oxygen atoms are so placed that they yield an anhydride of the form—



The resulting molecule may be represented by a

closed chain of five atoms. Such rings obtain in the anhydrides of succinic and phthalic acids, and of all those acids that are characterized by their tendency to lose the elements of water. The superior stability and ready formation of closed chains of five or six atoms indicates that there is some special natural requirement that is satisfied by those conditions. This cause Baeyer believes to be recognizable in the fact that the angle of the regular pentagon corresponds very closely with that formed by the directions of the valencies of the hypothetical carbon atom.

This leads directly to the thought that in molecules with closed chains not solid but plane ring formations occur, and that, for instance in pentamethylene, the five carbon atoms are arranged in one plane. The more frequent occurrence in nature of compounds with six-membered rings, although the angle of the regular hexagon does not approximate so nearly as that of the regular pentagon to the theoretical value, may be accounted for by the high degree of stability possessed by the more symmetrical molecule. In the struggle for existence in the organic world there is no doubt that those molecules exhibit the greatest stability which afford the fewest points of attack to decomposing influences. Thus the benzene molecule is completely symmetrical in construction, and it is impossible to conceive a molecule of a hydrocarbon with five atoms of carbon that possesses equal symmetry. These reasonings have already been demonstrated to be exceptionally fruitful and capable of great development, and doubtless they will continue in the future as in the past to act as a mighty impulse to other investigations.

Another conception of Baeyer's, based upon his researches in the polyacetylene compounds, that double or treble linkage between carbon atoms results in tension caused by the diversion of the valencies from their normal position, has met with less favourable criticism. Victor Meyer maintains that if the carbon atom be considered as a ball suspended in ether, in which the four valencies like four small magnets be arranged symmetrically, that is to say, in the direction of the corners of a regular tetrahedron, then it would be possible for two atoms to enter into combination by two or three valencies without the latter being diverted from the normal direction, and consequently without setting up any tension.

The most valuable development of the van t'Hoff theory is, however, that commenced in 1886 by Wislicenus and already referred to as the dynamical hypothesis. To this philosopher is accorded the merit of recognizing the true value of two fundamental hypotheses that had been passed unnoticed and almost forgotten. The first is that two carbon atoms attached to each other by a single bond are free to rotate about an axis that lies in the direction of the combining valency; and the second that such rotation is prevented by double or treble linkage of the carbon atoms. To these hypotheses Wislicenus also added two others, that the specific affinity of the elementary atoms combined with the carbon atoms exercises an influence upon each other and can be therefore employed to determine the probable stereochemical position of the substituting atoms, and that when treble linkage of carbon atoms is converted into double linkage the configuration of the resulting addition product can be *a priori* predicted. The great struggle in the establishment of these two latter hypotheses was principally centred around the maleic and fumaric acids, the isomerism of which Michael, Anschütz and Fittig attempted to explain by differences in constitution.

The investigations of Victor Meyer in relation to the causes of isomerism amongst the benziloximes, the compounds of the di-ketone, benzil, with hydroxylamine, also gave occasion for another fierce struggle, in which the advocates of stereochemical doctrines again proved victorious over the partisans of constitutional differences. Victor Meyer, with the aid of Auwers and Goldschmidt, produced experimental evidence that set aside every hypothesis based upon structural differences, and himself conceived the following ingenious explanation. When two carbon atoms are attached by a single bond, as in ethane, they are under ordinary conditions free to rotate, but instances may occur in which the power of rotation is limited by the arrangement of other atoms or groups in the molecule, and the six supernumerary valencies of the two carbon atoms would then have a tendency to arrange themselves in one or more favourable positions in regard to one another. Victor Meyer suggests that in such a case if the two singly linked carbon atoms be regarded as superimposed, the two positions that would be most probably assumed would be that in which the three valencies stand in corresponding positions, so that when looked down upon the valencies of the upper carbon atom cover the lower, and that in which the lower valencies appear midway between the upper ones. This assumption accounts for four isomeric dioximes of benzil, and as a matter of fact three have been at present met with.

The success attendant upon the propagation of the Le Bel-van t'Hoff theory, and the close accord between theoretical data and experimental observation, have suggested the question whether carbon is the only element the valencies of which may be represented by stereochemical positions. The first instance in which such an extension was actually applied to explain isomerism was in that of the oximes just referred to, for amongst other suggestions that were proved erroneous, the cause of isomerism was attributed to stereochemical relations of the nitrogen atom, and in support of this view Hantzsch and Werner published the hypothesis that the three valencies of the nitrogen atom in certain compounds are directed towards the corners of an irregular tetrahedron, the fourth corner of which is occupied by the nitrogen atom itself. Willgerodt and Behrend also extended the fundamental ideas of the Le Bel-van t'Hoff theory to the nitrogen atom, the former in order to explain instances of isomerism among the hydrazines, the latter to explain similar instances among the oximes. These two investigators, however, gave preference to the double tetrahedron as a more suitable representation of the nitrogen atom, in which the three active valencies of nitrogen in ammonia are accorded positions in the same plane at the corners formed by the bases of two tetrahedrons, inverted the one over the other. The two apical corners, representing the two potential valencies of nitrogen in ammonia, were designated by Behrend the positive and negative poles of the nitrogen atom, at which a negative and a positive atom or radicle could be respectively fixed when presented simultaneously to them.

Very important data for the consideration of the stereochemistry of the nitrogen atom have been recently furnished by Le Bel himself, who has shown that if the four hydrogen atoms in the molecule of ammonium chloride be replaced by different alkyl radicles with sufficiently high percentage of carbon to ensure stability of the molecule, as the chloride of isobutylpropylethylmethylammonium, the resulting compound is capable of existing in two or more modifications, and that by the action of ferments the inactive mother-substance may be resolved into two active, lævogyre and dextrogyre, isomerides.

The possible extension of the laws of stereo-isomerism to all the known elements has, moreover, been recently suggested by Dr. Benjamin Lagueur in a paper contributed to the *Chemiker Zeitung*. This paper is the outcome of several years' cogitation, and has been published at the present time, though still in an incomplete condition, owing to the apparent tendency of other chemists to adopt this line of investigation. A fundamental hypothesis of this new theory is that no element exists that is less than tetravalent in all its compounds, or in other words, there are no tri-, di- or monovalent elements. Though many apparent objections may be raised against this statement, it is already known to hold good in the case of several elements, and if the so-called monovalent halogens be considered heptavalent in the perchlorates and periodates, the assumption that hydrogen, sodium and potassium may under certain conditions behave as heptads does not appear illogical. Indeed, in Geuther's textbook on inorganic chemistry, published in 1870, all the elements are treated as polyvalent, and to the alkalies especially the properties of monads, diads, triads, tetrads and pentads are attributed. The oxygen atom of carbonic monoxide is possibly tetravalent, and recently Meldola has adduced strong evidence in favour of the assumption of the existence of trivalent hydroxyl groups, which can scarcely be otherwise explained than by the accordance of tetravalency to the inherent oxygen atom. The latter assumption further allows of a plausible explanation of the constitution of compounds containing water of crystallization, whilst the recognition of sulphur as a di-, tetra-, and hexa-valent element in different circumstances is also in accord with the above fundamental statement. Mathematical considerations also tend to this view, since the molecule occupies a space that must include or be expressed by at least four points.

These instances indicate, however, that the different valencies of some elements are not of equal values, for it will be observed that two valencies of the oxygen atom are saturated in preference to the other two. By stereometric representation these facts find a simple explanation in the laws of gravitation, for chemical combination is due essentially to attraction, and must therefore obey its laws. As attraction diminishes with the square of the distance, the difference in valency may be explained by assuming that weaker bonds result from a more, and stronger bonds from a less distant removal from the atomic centre. Designating the points in which the valencies of one element unite with those of another as points of valency, these arguments may be incorporated in the second statement that with equal valencies of polyvalent elements the points of valency are equally distant from the centre of the atom, and with unequal valencies the distances are unequal. If carbon and oxygen be chosen as exemplary elements and the highest observed valency be regarded as the limit of value, then the carbon atom may be represented, as in the van t'Hoff theory, by a regular tetrahedron, in which the four corners equidistant from the centre correspond to the four equal valencies, but the oxygen atom would be represented by an irregular tetrahedron, two corners of which are equidistant from the centre, whilst the other two are further removed, though equidistant in themselves. In the hypothetical carbon atom it will be seen that as all the valency points are equidistant from the centre they possess equal values, but in the oxygen atom two pairs of valencies, α and β, of unequal values, are encountered. In the combination of oxygen with hydrogen to form water it may be assumed that only the α-valencies are saturated, but that the free β-valencies enter into combination in compounds containing water of crystallization. The constitution of hydrogen peroxide, its proneness to decomposition, and the occurrence of ozone among its decomposition products, may also be satisfactorily explained on the same lines of argument.

If oxygen combines with carbon to form carbon monoxide, combination takes place between all four valencies of both elements, but the properties of the compound show that the combination between the β-valencies is unstable and immediately dissolved should two stronger valencies, as of Cl_2, or the α α-valencies of a second oxygen atom be presented to the carbon valencies attached to the β β-valencies of the first oxygen atom. As oxygen and carbon are two instances of elements with paired valencies, the same general conclusion may be drawn concerning all elements in the same category, viz., that they may all be represented by stereometric constructions in which each pair of corners are equidistant from the centre.

The atomic form of all the elements cannot, however, be at present definitely formulated according to this theory, since the maximum valency value is in many instances, as in the so-called "monads," an unknown quantity. The requirement that the maximum value shall be accounted for in the figure is in direct opposition to the views of Hantzsch regarding the nitrogen atom, but the representation of the nitrogen atom by a double tetrahedron, as adopted by Willgerodt, is in accordance with the maximum value theory. These deductions may be summed up in a third important law. The points of valency of an element may be considered as the corners of a stereometrical figure; the minimum valency value is determined by the number of corners that are least removed from the centre, the maximum value by the total number of corners.

In the conclusion of his preliminary notice Dr. Lagueur instances one other example of an element with an odd number of valencies. Chlorine is monovalent in the chlorides and heptavalent in the perchlorates. These facts may be easily brought into accord by representing the chlorine atom by a triangular prism, one end of which bears an obtuse point. This obtuse point is nearest to the middle point of the figure, and therefore represents the most easily saturated valency of monovalent chlorine, whilst as a heptavalent element all seven corners take part in the combination.

It is almost unnecessary to draw attention to the infinite number of possible stereoisomerides suggested by this theory, and it is to be hoped that experimental attempts will be made in this direction. At any rate such investigations should prove more advantageous to chemistry as a science than the continual preparation of new dyes and other organic compounds with barbarous-sounding names that tend to frighten the intending student of chemical literature. Apart also from the intrinsic value of such considerations, as evidenced by the influence they have exerted in Fischer's researches on the sugars and in Wallach's study of the essential oils, everything indicates that in future chemistry will be taught more and more on these lines. As Victor Meyer remarked at the conclusion of his address before the Berlin Chemical Society, we may no longer consider atoms as only material points, but are compelled to take their dimensions into consideration, and we have already, in a modest degree, gained some idea as to their relative size.

NOTE ON SANDAL WOOD.*

BY M. ADRIAN.

Sandal wood has been known in India from the highest antiquity; it is mentioned under the name "chandanna" in the "Nirukta," or writings of Yaska, the most ancient Vedic text known, dating the fifth century B.C. At that time, and for long after, it was specially utilized as a perfume, as well as in burial rites, either to enbalm the dead or to feed the funereal pile. Even now this wood is used for the same purpose in India, and the honour rendered to the dead is proportional to the number of logs of sandal wood upon the pile.

The Greeks and Romans seem not to have been acquainted with sandal wood. In any case it is not mentioned in their writings, and the first European writer who speaks of it is Constantinus Africanus, of Salerno, in the eleventh century. In the fifteenth, Ebn Serapi, surnamed Serapion the younger, mentions three kinds, red, yellow and white.

Already at this time the three kinds of sandal wood were indicated as being kept by the apothecaries, but it was not until later that the true medicinal properties of the wood were known. In 1750 Dutch travellers visiting the Moluccas brought back and communicated to Rumphius, of Rotterdam, a remedy used by the natives against blennorrhagia, which consisted of a maceration of disintegrated sandal wood. Rumphius studied this product, and it was he who first gave, in his work entitled 'Herbarium Amboinense,' a detailed description of *Santalum album*.

However, the favour accorded at first to sandal wood was of short duration, and as a medicine it had fallen completely into oblivion, when in 1865, in the United States, Dr. Henderson, in order to avoid the disagreeable repetitions and intestinal disturbances that accompany the administration of copaiba and cubebs, thought of substituting it by oil of sandal wood. The experiments made by him in this direction having been crowned with success, he communicated the results obtained to the *Medical Times and Gazette* of June 3, 1865.

In the month of July following mention was made in the Société de Chirurgie of the employment of oil of sandal wood in blennorrhagia. At that time Dr. Panas made some experiments with capsules containing 40 centigrams each in the Lariboisière hospital, and on the 20th of September of the same year he communicated to the Société de Chirurgie the results obtained, stating that oil of sandal wood is very well tolerated by the most delicate stomachs and does not occasion any disturbance either of the digestive canal or of the kidneys. Some months later Dr. Simonet confirmed the statements made by Dr. Panas.

Formerly three kinds of sandal wood were recognised:

(1) *Red sandal wood*, from *Pterocarpus santalinus* (Leguminosæ). This wood possesses no medicinal properties and is used exclusively in dyeing on account of the red colouring matter it contains.

(2) *White* and (3) *yellow sandal wood*. The last two kinds are the produce of several trees of the genus *Santalum* (Santalaceæ). Certain authors have stated that they represent one the sap wood and the other the heart wood; but it has long been recognised that the depth of colour of these woods depends solely upon the species that yields them, and the two sorts are in fact confounded under the same name.

This wood is very hard, of a more or less dark yellow colour, and has a very pronounced aromatic odour. The hard trunk wood is alone sent to Europe, the branches and white wood having no value; the roots are utilized in the country where they are grown in the preparation of essential oil.

Sandal wood came originally from India. The *Santalum album* is still cultivated there in the mountains of Mysore and at Arcot in Madras. The cultivation is protected by the government, which decides every year the number of trees to be cut down. The seeds of the tree are sown together with capsicum. The latter spring up very quickly, and the young capsicum plants protect the young sandal plants from the fierceness of the sun. They also serve the purpose of providing nourishment, as the young sandal plants, being parasitic, fix themselves upon the roots of the capsicum plants and draw from thence the necessary juices until they have attained a development, when they can nourish themselves directly by the aid of their own roots. When the trees have attained an age of twenty to thirty years they are cut down, and the trunks are freed from white wood and cut into small billets, which are sent to China or Europe. The roots are cut into chips and distilled on the spot by a very primitive process. The two ports of export from India of sandal wood and oil are Bombay and Mangalore.

The actual quantity of sandal wood oil exported from India tends to diminish. It is a strongly coloured oil and always adulterated, probably with castor oil.

Sandal wood is also met with in the Sandwich Islands, where it is yielded by *Santalum Freycinetianum*, and in the Fiji Islands, where the *Santalum Yasi* is found.

In Australia an essential oil is obtained by the distillation of *Fusanus spicatus* and *F. acuminatus*, which is beginning to arrive in the European markets, but which is less odorous, like the wood from which it is obtained.

Lastly, there is received from Venezuela, but in small quantities, an "oil of sandal wood," known as West Indian, and which is indicated in the price currents as "W. I."

The best oil is, without doubt, that which is prepared in Europe, principally in France and England. The billets are reduced to shavings and distilled with water in large apparatus. The oil, being mixed in the wood with a resinous substance, separates with difficulty and distils over only after a time, when it is collected in a series of Florentine receivers, where it separates slowly from accompanying water. It is afterwards clarified by paper filtration. In this way is obtained an oleaginous liquid, having a density of about 0·975 (the B.P. indicates 0·960 and the U.S.P. 0·945), lævogyre, neutral to litmus, soluble in alcohol, ether, and chloroform, and nearly insoluble in water. Exposed to the air oil of sandal wood oxidizes and resinifies; on the other hand, it gives reactions similar to oil of turpentine and other hydrocarbon essential oils.

* *Journ. de Pharm. et de Chim.*, July 15, Supp., p. vii.

The consumption of sandal wood oil is an increasing one, and its high price presents naturally a temptation for fraud. It is not rare to find this essential oil in commerce mixed with fixed vegetable or mineral oils of far inferior commercial value. This addition is easily detected, for these fixed oils are usually lighter than essential oil of sandal wood, and diminish consequently the density when mixed. Further, if a drop of suspected oil be placed on a piece of unsized paper, any fixed oil present will not volatilize, but leave a permanent stain.

A sophistication more difficult to recognise consists in the admixture of essential oil of cedar or copaiba, either made after distillation, or, as is sometimes practised, by distilling the cedar and sandal woods together. In this case it is not easy to detect the fraud, especially upon a brief examination. It can, however, be discovered with the aid of the polarimeter, as the addition of either cedar or copaiba oil to oil of sandal wood diminishes its rotatory power.

THE GENERAL FEATURES OF THE VEGETATION OF LOUISIANA AND ADJOINING REGION, AND ITS PRODUCTS, IN RELATION TO PHARMACY.*

BY CHAS. MOHR, MOBILE, ALA.

Entering upon the warm temperate zone of this part of our common country, with a vegetation in many of its features strange and new to him, the observant visitor from Northern climes beholding them for the first time will not only be struck by their novelty, but will find his attention engaged by the productions of the vegetable kingdom of these lower latitudes in their relation to those of other parts of the globe, and particularly in their bearing upon the activity of man as they contribute to his necessities and comforts.

In response to the call upon the members of our Association, made by the committee on papers to be read before the meeting, to select some subjects presenting local features of interest to members from other localities and of importance to pharmaceutical literature, I have ventured upon the attempt to point out what might be considered of most interest presented by the various phases of the plant world of this subtropical zone, and to direct the attention of our visitors to its products of importance in their bearing on pharmacy and allied branches of industry.

We meet here in the realm of the magnolia, the palmetto, of the long-leaved pine, and of oaks, with evergreen or semi-persistent foliage. Favoured by a clime of a range of temperature as free from the extremes of withering heat as from the blasts of severe frost, and by an abundant rainfall equally distributed through all seasons, conditions most favourable to the development of arboreal growth, the grand forests, covering yet in this pristine state a large area of the surface, are in their diversity and luxuriance only exceeded by those of the equatorial zone. The trees peculiar to lower latitudes are found here commingling with those that are equally at home in the northern forests. Palms with short or creeping stems, their fan-shaped leaves waving under the impulse of the breezes from the Gulf, are growing under the shade of the pine, a tree form most prominent in the forests approaching the subarctic zone; the magnolia occurs side by side with the northern beech, its dark, lustrous foliage standing in pleasing contrast with its northern associate when attired in its early garb of the softer tints of liveliest green. An arborescent lily (*Yucca aloifolia*), called the Spanish dagger, on account of its spreading, rigid, sharp-pointed, lance-shaped leaves, shares the ground with American holly (*Ilex opaca*), which also adorns the woodlands of the coasts of New England. Pines of a strictly Southern type contend for the possession of the soil with Northern oaks and hickories.

A similar blending of Southern and Northern plants is found to prevail among the crops of the fields and the garden. By the side of those originally derived from the subtropical zones in the different parts of the globe, producing the great staple products of this section, sugar, cotton, and rice, some of the most important field crops are raised successfully; and in the orchard the pear is found to ripen its fruit with the orange and the Japanese plum (*Eriobotrya japonica*).

In the following a hasty sketch is attempted of the features that characterize the different regions of this zone as they are traversed in its descent to the Gulf, with a consideration of those products indigenous to them or cultivated, deemed of most interest to us.

Following the great lines of travel from the North, east of the Mississippi River, the appearance of the magnolia and of the so-called "Spanish moss," a true epiphyte, of the order of Bromeliads (*Tillandsia usneoides*), pendent in long festoons from the limbs and branches of oaks of Southern type, denotes that the warmer temperate zone has been entered (about 33° 30′ N. L.) On reaching Louisiana the subtropical forest, distinguished by the prevalence of broad-leaved evergreens of various orders, is presented in the fullest display of its characteristic features on the fresher and damper soils of the land rising above the level of the alluvial bottom and the marshes of the coast. The stately magnolia, reaching a height of from 70 to 80 feet, reigns here supreme, forming, with the laurel, water willow, and live oak, the black gum (*Nyssa aquatica*), red bay, (*Persea Carolinensis*), the white bay (*Magnolia glauca*), the high forest, a host of trees of smaller size, in great variety, adding to its density; including the American olive or devil wood (*Osmanthus Americanus*), the titi (*Cliftonia ligustrina*), the cyrilla (*C. racemiflora*), the sweet leaf or horse sugar, the yapoon and dahoon (*Ilex Cassine*, *I. Dahoon*), wax myrtle or bay-berry (*Myrica cerifera*), the farkleberry (*Vaccinium arboreum*), the snowdrop tree (*Halesia diptera*, and *Bromelia lanuginosa*), all typical forms of this subtropical forest. A number of shrubs, in no less variety, most of them adorned by a profusion of flowers, add to the beauty and interest of these woods. There the interesting American star anise (*Illicium Floridanum*), a calycanthus, rich blooming andromedas, azaleas, blueberries, the gorgeously blooming kalmia, fragrant storax bushes, a stuartia and clethra, unfold their flowers from spring to summer, all intertwined by numerous climbing and twining plants, among them, of peculiar interest to us, and most frequent, the yellow jasmine (*Gelsemium sempervirens*), and several species of bamboo briars (*Smilax*) render the dense undergrowth often absolutely impenetrable.

The Southern Pines.—The highly silicious drift soils of the uplands are chiefly occupied by pines. The genus Pinus is represented in the lower Gulf region by five species: the short-leaved pine (*Pinus echinata*, *P. mitis*), and spruce pine (*P. glabra*), short-leaved species with two leaves in the sheath, and the small oval cones, with a flat apophysis armed with a weak deciduous prickle, and their wood poor in resinous matter; *P. tæda*, *P. Cubensis*, and *Pinus palustris*. These last three form a natural group of long leaved species with three, or two and three, leaves in the sheath, gregarious timber trees of large size and highly resinous wood. On account of their resinous products the trees of the latter group merit our closer attention.

The loblolly pine (*Pinus Tæda*). In Virginia and North Carolina this tree is found to predominate in damp, sandy soils of the coast region. It forms a considerable part of the forest growth on the tablelands of Alabama and in North Western Louisiana, and, almost purely, extensive forests in Western Texas to

* Read before the American Pharmaceutical Association.

the limits of the Atlantic forest region. It prefers a damp, cool soil, and in the localities most favourable to its growth reaches a height of from 100 to 110 feet and a diameter of from 36 to 40 inches. As met with ordinarily the wood is coarse, wanting in the strength and durability that distinguish its allies. It yields abundantly a resin rich in volatile oil, and the tree is tapped whenever found within the precincts of the turpentine orchard.

The Cuban pine, slash pine (*Pinus Cubensis*). A West Indian species, most frequent in the flatwoods of peninsular Florida, and in South Carolina, Georgia, and in the Gulf States to Eastern Louisiana, it is confined to the coast plain. It raises its stately trunk to a height of over 100 feet. The wood is heavy, of great strength and durability, highly resinous, the resin richest in volatile oil and of great fluidity. This tree is of rapid growth, attaining the full dimensions of a full-sized timber tree within a century.

The long-leaved Pine, heart or pitch pine (*Pinus palustris*, Mull., *Pinus australis*, Michx.). In economic value this pine takes the first place among the timber trees of the Southern States. The forests of this pine extend over the sandy and gravelly deposit of the Southern drift—the so-called pine barrens—without interruption, and cover, in the maritime pine belt of the Gulf States alone, an area estimated at 58,000 square miles, of which 6,400 square miles are located in Louisiana. This tree is provided with an enormous taproot; the tall trunk rises to a height of 90 to, rarely, over 100 feet, with a diameter of from 20 to 35 inches breast high. The massive limbs are contorted, diverging into comparatively few gnarled branches, with their foliage crowded in dense tufts at their extremity, forming an open, irregularly-shaped crown. The trunk is found free from limbs for a length varying between 40 and 60 feet. Arrived at the fulness of their growth, the trees are from 200 to 250 years old. The leaves are 10 to 15 inches long, obtusely triangular, and arise from the axils of bracts fringed with long white hairs which, covering them in the bud, impart to the terminal shoots the silvery covering by which this species is distinguished from all others at every stage of its life. The catkin-like, staminate flowers form dense clusters around the summit of the youngest shoots; the female flowers are united in an oval short-stalked catkin, the shapely mucronate, carpellary scales being almost entirely hidden by their scaly bracts. The flowers appear about the middle of March; the cones mature in the fall of the second year, and are of a dull leather colour, about 8 inches long, conical in shape when closed, and slightly bent. The seeds are discharged during the latter part of the fall. The wood of this tree is heavy, compact, close-grained and durable, unsurpassed among the pines in strength and elasticity, and is invaluable for heavy constructions. The timber resources of the forests of the long-leaved pine contribute largely to the industrial and commercial wealth of the Southern pine belt. During the year 1889 over 800,000,000 feet, board measure, of lumber have been shipped to foreign and domestic ports from the Gulf States alone.

With us the interest in this tree centres in its resinous exudation, the principal source of the spirits of turpentine and resin entering the markets of the world. According to P. H. Dudley the wood contains on the average about 18 per cent. resinous matter. Professor Mayr obtained from the sap wood, rich in volatile oil, 2·65 per cent. of a solid resin, and from the resinous heart wood, containing but a small portion of volatile oil, 11 per cent., the wood being absolutely dry.

The crude resin or turpentine, with the tar and pitch, obtained from the long-leaved pine, figured in colonial times as the most important export from North Carolina to the mother country. In the infancy of the naval store industry the distillation of spirit of turpentine was carried on in iron retorts at the ports, the largest part of the crude resin, or turpentine, having been shipped to England. With the introduction of the copper still and its removal to the forest (1834), and the augmenting demand for its products, this industry increased rapidly, and soon spread to the pine regions further south.

In traversing the forests of the long-leaved pine, the stranger, on his way to the coast, is struck with surprise on beholding the severe injuries inflicted upon the trees by the deep cuts made near their base. These cuts in the body of the tree and the excoriations above them constitute what are called boxes. Ten thousand of such boxes constitute a unit of work, called a crop; trees above medium size, according to their circumference, receive from two to four boxes. These reservoirs for the exuding resin are of the capacity of a quart. The operations in the turpentine orchard begin before the dawn of spring by the laying bare of the ground around the trees and the removal of all loose combustible material from it, which is raked in heaps and burned, in order to prevent the danger of fire during the coming season. As soon as the flow of resin begins, the excoriations are made on the surface of the trunk above the boxes to a height of eight inches, which are gradually increased, by a few incisions repeated every week (chipping), by two to two and one-half inches for every month to the close of the season. During the first two seasons the boxes are emptied every four weeks (dipping); each dipping yielding on the average from forty to fifty barrels, of 280 pounds each, crude turpentine. At the end of the season, late in October or November, when the resin ceases to run, the boxes are cleaned from the adhering solidified resin (scraping). For each one of the first two years seventy and eighty barrels respectively of such scrape are obtained, containing but little over half the quantity of the spirit of turpentine yielded by the dip, which amounts to seven gallons for each barrel. The solid part of the turpentine remaining in the still is the resin of commerce. The drippings of the first two months, the virgin dip, yield this article in highest quality, perfectly clear and almost colourless. The resin resulting from subsequent dips during the first season is of a straw to a pale amber tint, ranking as good quality: and of the second season, of a light brown colour, ranking as medium. The product of the crop during the first two years amounts in the aggregate to about 42,000 gallons of spirits of turpentine, and 460 barrels of resin of first to medium quality. In the third and fourth seasons the amount of spirits of turpentine is reduced to 1,000 and 900 gallons respectively, and the resin is of a deeper brown, that of the last year being almost black and of no commercial value. After the fourth year the yield is no longer valuable, and the orchard is therefore abandoned.

The working force of such a plant is generally on twenty such crops, requiring an area of not less than 4,000 acres of pine forest. During the four years of its operation the products amount in the aggregate to about 120,000 gallons of spirits of turpentine, and 12,780 barrels of resin of various grades, from which, at the rates of the market prices ruling at present, about $70,000 would be realized. The still in use at such a plant is of a capacity to receive twenty barrels of turpentine at a charge. After having been slightly heated, a constant stream of water from the top of the cooling tank enters the still to the end of the distillation. This process completed, the contents of the still are discharged through a pipe in its bottom, and the liquid resin is strained first through a wire cloth, and then through coarse cotton cloth, before it is transferred to the barrel for shipment.

Repeated attempts to extract the volatile oil from the wood directly have shown that, subjected to dis-

tillation by steam at high pressure, it will yield about 3 per cent. of spirit of turpentine. From 600 pounds of air-dried wood, subjected to the treatment of steam and subsequent destructive distillation, in the apparatus patented by Wm. Messau, twenty-one pounds of spirit of turpentine, ninety-five pounds of pyroligneous acid, 150 pounds tar and oily products, and 127 pounds charcoal have been obtained. In view of such facts, already arrived at ten years ago, it is surprising that this mode of the production of spirit of turpentine has made but little progress, particularly if the immense amount of material serving for this purpose is considered, which, as useless, is left to rot in the woods and is burned up to be gotten rid of at the sites of the sawmills.

A highly profitable disposal of this refuse has of late been found in the manufacture of dead oil. Under this name the oily product resulting from the destructive distillation of the wood of the long-leaved pine has, during the past few years, entered the market as a powerful antiseptic, used with decided success in the creosoting of timber. Combined with the by-products obtained in the manufacture of this article, another source of wealth has been added to those already derived from the long-leaved pine. The manufacture of pine wool from its leaves is highly promising. It has already passed the experimental stage, and is successfully carried on in a factory in North Carolina in the manufacture of rugs, baling stuff, and similar close fabrics from this material.

Among the fruits cultivated on the uplands the Scuppernong grape is to be mentioned. The Scuppernong vine is a sport of the Muscadine or Bullac grape-vine (*Vitis rotundifolia*), originated in North Carolina, and can only be propagated by layers. The berries ripening by the end of August, are collected in bunches of about a half dozen; they are of the size of a small plum, and, when fully mature, of a pale amber colour. The large amount of acid present in this grape is mostly confined to the cells of the thick hull. The must contains 13 per cent. of sugar. By the separation of the must from the pomace immediately after the berries have been crushed, and by the addition of from one-half to three-fourths of a pound of crushed sugar, an excellent dry wine, of the strength and acidity of a generous Moselle or Rhine wine, can be made.

Descending from the sunny pine-hills to the lowlands, the marshes of the coast region are entered upon. They are covered in great part with the forests of the bald cypress (*Taxodium distichum*), which extend also over the submerged depressions throughout the upper part of the delta. The cypress is esteemed for its highly valuable timber. In its dimensions this tree exceeds any other of the Atlantic forests; its mighty shaft rises to a height of 80 to 100 feet above its inflated base, by a diameter of from 4 to 6 feet and over. The sight of these monarchs of the tree world in the gloomy recesses of the primeval forest is almost overwhelming. Surrounded by the peculiar excrescences rising from their roots in the form of bald, sharp cones 2 and 3 feet high above the dark ooze of the swamp, these representatives of one of the most ancient of the gymnospermous types of the arboreal flora of our globe present in their assemblage strangely peculiar features. In these forest-covered swamps the *Tillandsia usneoides*, or moss, is found in great abundance, and the ginning of moss forms one of the industries of New Orleans. After having been gathered the plant is buried in the swamp for ten to twelve months, to effect the rotting of its softer tissue. Dried and roughly cleaned it is shipped to the city, where it undergoes a further cleaning, leaving only the elastic fibre, before it is baled for the market. This moss is largely used in upholstering.

The alluvial lands above the marshes, susceptible of drainage, are of the greatest fertility. Cleared, and protected from overflow by a system of levees lining the Mississippi and its large outlets to the Gulf, they are almost exclusively devoted to the cultivation of the sugar-cane. Under the stress of low prices, caused chiefly by the enormous increase in the production of European beet sugar, great efforts have been made of late years in this State in the improvement of the cultivation of the sugar-cane, but particularly of the processes in the manufacture of sugar, with achievement of splendid results, leading to continued investments in the cultivation of this crop. The rules of the thumb and guess have given way to the use of the analytical balance and the polariscope, guided by scientific principles. The investigations of the chemist, instituted by the aid of the United States Department of Agriculture, and at the sugar experiment station of the State, are eagerly taken advantage of by the planter, assisted by mechanical ingenuity and the free expenditure of capital. The extraction of the juice from the cane has been greatly perfected. The amount of saccharine matter left in the bagasse at the mill or in the chip of the diffusion process has been reduced to a minimum; in the first instance by the comminution of the cane by cutting previous to its passing through the rollers. The process of diffusion is steadily gaining favour, and is being more widely employed, as by it the dangers of accidents and consequent delays incident to the employment of heavy machinery under the strain of great power are avoided. Improved methods in the clarification of the juice, and its evaporization effected at low degrees of temperature in the multiple-effect evaporators and the vacuum pan, with the introduction of filter presses, have effected an astonishing increase in the yield of commercial sugar, amounting in some of the best equipped sugar houses to over 100 per cent. of sugar to the ton of cane (Mill work at Calumet, Wilkinson's Report, 1889–90). The saving effected in manual labour and in the consumption of fuel has kept correspondingly apace with the improvements in other directions. According to the statements kindly furnished by Mr. Murphy, acting president of the Louisiana Sugar and Rice Exchange, in 1889–90, 122,000 acres of cane were ground. Planters with modern apparatus gained 2753 pounds of sugar; those with apparatus of the old style, 1847 pounds. The year before 133,000 acres were ground, 2742 pounds and 2113 pounds of sugar per acre. In 1890–91 the yield of sugar to the acre has been at least 50 per cent. better, owing to an exceptionally favourable season. The crops for the past six years, in hogsheads, were as follows:

1890	420,000
1889	235,448
1888	267,851
1887	255,185
1886	148,968
1885	231,290

The cultivation of the citrus fruits for profit is in Louisiana confined to the sweet orange (*Citrus Aurantium*), and is restricted to the lowest parishes of the delta and of the Gulf coast east of Vermillion Bay. In the Parish of Plaquemine, the chief site of the orange orchards, groves from 10 to 200 acres in extent are found, yielding large incomes. The quality of the Louisiana or Creole orange is of the highest order, finding a market at the highest prices. The crop produced in the State is scarcely sufficient to supply the demands of the home market. The lemon (*Citrus Limonum*) is raised only in a few sheltered localities on the coast.

The fig produces abundant crops throughout the lower half of the Gulf States. On account of its perishable nature in the damp climate of this region it is of no value commercially.

Finally, the ramie plant, or China grass, deserves a

short notice. Three species of the urticaceous genus Bohmeria (*B. nivea*, *B. tenacissima* and *B. caudicans*), perennials, and natives of the warmer temperate parts of Eastern Asia, have been introduced for their fibre. Louisiana was the first and foremost of the Southern States in the attempts at the cultivation of the ramie, its decortication, and the further preparation of its fibre, a short time after its introduction into Mexico (1862). The high hopes entertained on the addition of a new crop to the old staples, the cultivation of which would require far less of the manual labour and attention demanded by the latter, have not yet been realized. Growing with greatest facility, most easily propagated in all parts of the subtropical zone, easy of cultivation and yielding large crops, an insurmountable obstacle in the way of its general introduction was presented in the want of a machine to perform the decortication of the fibre at a cost low enough to compete with the cheap manual labour of the Orient. During the time of the New Orleans Exposition in 1884, the ramie question met with an active revival. Several large companies have been incorporated under the patents of the inventors of improved machines. From the facts before us, it is to be expected that the problems connected with this side of the ramie question are approaching a successful solution. The preparation of the raw fibre to meet the highest requirements of the inventor has already been arrived at.

All that has been said of the ramie applies to another fibre plant, the jute, *Corchorus capsularis* and *C. olitorius*, annuals, also of Asiatic origin. These plants, throughout the subtropical zone, arrive at maturity in fullest perfection under the easiest cultivation. Many thousands of hundredweights of their crude fibre are imported to this country, required for cotton bagging. With the invention of an improved machine to perfect its decortication, another crop, of great importance to the cotton interest, will be added to the agricultural resources of this section.

Although of prime importance, the subject of cotton (*Gossypium*) is left out of this sketch as being already familiar to every one present.

THE ALLEGED WORTH OF ALUMINIUM.*

In the *Tribune* of May 6 we find what purports to be a communication from a Springfield, Mass., correspondent, signing himself "C. M.," over the date of April 6, which traverses in no ambiguous phrases the generally accepted value to the arts and sciences of aluminium. He says:

"It is interesting to watch certain crazes which at certain times in history have taken hold of and still affect the minds of men. Thus the tulip craze, the South Sea craze, and the balloon craze in the beginning of this century and end of the last. In the present age we may notice the aluminium craze. How people will invest thousands of dollars on hearsay evidence, when they could ascertain the truth by buying twenty-five cents' worth of pure aluminium wire or sheet, belongs to the oddities of capital gone crazy. The yarns about aluminium are so numerous, and are repeated in so many bold and frank lies, that it seems almost a vain task to try to set people right. Now, Jules Verne, the champion writer of scientific fancy, never uses aluminium much in his fiction. He knows too well that it is 'no good.' In 'De la Terre à la Lune' he uses a large aluminium bullet—not because of its strength, but because it is so light. Not long ago a card from persons interested in the making of aluminium came to me, stating that aluminium is as hard as steel. All wrong! The purer, the softer. Pure aluminium is just a trifle harder than ordinary cheap zinc or spelter, which can be soldered, threaded, and drilled without difficulty, while pure aluminium cannot be soldered reliably, and for working is one of the 'nastiest' metals in existence. One great point in its favour, but only a point of skin-deep beauty, is that the aluminium rust forming in the air is white, while it is brownish red on iron, green on copper, and gray on zinc,—but aluminium tarnishes readily, especially in salt air. Salt water acts upon it far more than it does upon iron, and a ship built of aluminium would be full of holes after one trip around the globe. Therefore, for ship-building and all parts exposed to the water it is even intrinsically inferior to iron—therefore not worth six cents a pound. For roofing it is vastly inferior to galvanised iron, because it cannot be soldered, and much inferior to zinc—therefore not worth five cents a pound. For vessels to be used in the kitchen it could only be employed if salt were kept away, but with salt present it would not have the slightest advantage over ordinary tin pails—therefore would not be worth eight cents a pound. For parts of machinery where strength is required, weight for weight, it is not as strong as iron. As such iron can be bought for fourteen cents a pound, aluminium would be worth less than that; for the same strength, aluminium would be four times more bulky. For spoons and knife handles, where no particular quality except looks is called for, it might be worth as much as tin—say twenty-two cents a pound. The drawback in that use would be its great softness, as it soils the fingers when handled, like lead. The only use for which, at present, pure aluminium may take, with advantage, the place of longer known metals, is for electric appliances and wires. For the same diameter, aluminium is twice as good a conductor as iron; its weight is almost exactly one-third, but its strength is only one-fourth, so that the wire could only be stretched three-fourths the distance over which iron wire is now stretched to keep the same relation between weight, strength, and sagging. For these purposes aluminium might be worth twelve cents a pound. It could be made harder by alloying it, especially with silicon; but even the hardest aluminium—short of aluminium bronze, which is essentially ninety per cent. copper—I met with was only about the strength of brass. The alloys of aluminium have all been made and tried thousands of times, but no value has been found in them which would make the aluminium worth more than copper—say, perhaps, eighteen cents a pound. The aluminium bronze keeps fairly bright, but when made in its proper proportion is extremely hard to work. In this bronze aluminium shows at its best, but does not come up to good steel in ease of handling and working. One advantage is that the bronze is elastic and springy, even when almost red-hot. It consists essentially of ninety per cent. copper and ten per cent. aluminium. How much the metal is worth for advertising medals, for plaques, and other uses of a more sensational character is, of course, impossible to estimate. Its value ranks with that of the chromo. At present its greatest use lies in the magnetic power which it has for greenbacks, and in proving the defective experience of capitalists. While, therefore, as will be seen from the frequent examples quoted, the true value of aluminium does not lie much above that of zinc, which costs six cents a pound, the cheapest aluminium in the market is held at $2.25, and the manufacturers are already compelled to send out circulars, in which you may read between the lines: "Tell us some use of aluminium." There is not a single application, at present, in which aluminium ranks intrinsically above the value of the same weight of copper, which is sixteen cents a pound. Even chemically it has not the energy of sodium, potassium, or magnesium, and in an extensive practice as a chemist I haven't had a single use for aluminium in fifteen years."

---

* From the *Popular Science News*, July.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, JULY 18, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

PATENT AND PROPRIETARY MEDICINES IN AMERICA.

THE production of medicinal agents by means of chemical synthesis has within the last few years led to a revival of the application of the patent system in regard to such articles, and considering the importance that some of them are acquiring in medical practice it appears only reasonable that the inventor of a process for the production of such a compound as antipyrin, for instance, should have recourse to that system as a means of securing an adequate reward for his labour. But in regard to such patent medicines it must be remembered that they differ very widely from the medicinal preparations with which the term "patent" is so frequently but erroneously associated by the public. Most of these so-called "patent medicines" are in reality secret preparations which are not protected by or made under the authority of letters patent under the great seal. In order to obtain a grant of letters patent for the manufacture of a medicinal preparation and protection for its sale it is essential that the method of manufacture should be disclosed in a specification filed at the Patent Office, so that on the expiration of the period for which the inventor's right to exclusive manufacture is granted, the invention may become public property, and with the aid of the published description of the process of manufacture any person will then be at liberty to practise it. It is for this reason that as a matter of fact very few letters patent for medicines are taken out at the present day, the proprietors of such articles preferring to preserve the secret of their production, and thus to continue for an indefinite period to reap whatever advantage arises from their sale.

At the recent celebration of the centenary of the United States patent system an interesting paper was read by Dr. JOHN S. BILLINGS, describing the patented inventions relating to medicine, surgery and practical sanitation, with special reference to the progress that has been made in that country in those branches of science and art. He represented the application of the patent system to medicine in the United States as having had its advantages for certain people, as giving employment to a considerable amount of capital in the production of medicinal preparations, and to a much larger amount in advertising them, also contributing materially to the revenues of the Government, and he dryly adds that it has made a great deal of work for the medical profession. From a report made by the Commissioners of Patents in 1849, it appears that eighty-six patents for medicines had been granted up to that date. The greater number of patents for medicines were granted between 1850 and 1860, and from 1880 to 1890 the number of patents granted for medicines was 540. This, however, applies only to "patent medicines," properly so-called, the claims for which are presented, as Dr. BILLINGS remarks, by simple-minded men who know little of the ways of the world. By far the greater number of the owners of panaceas and nostrums are too shrewd to publish their secrets in the manner required for obtaining a patent, since they can attain their purpose much better under the law for registering trade marks and labels, designs for bottles and packages, and copyrights of printed matter, which are less costly and do not reveal the arcanum. It is these proprietary medicines that constitute the great bulk of what the public call "patent medicines." The trade in these articles has been and still is an important one. The Americans are a pill and bitters taking people, and the demand for such medicines is general. Dr. BILLINGS believes that the chief consumption of them is by women and children, with a fair allowance of clergymen, to judge from the printed testimonials; but so far as he knows only one complete system of medicine has been really patented in the States, viz., the steam, cayenne pepper and lobelia system known there as Thomsonianism, for which a patent was granted in 1836. The right to practice that system was sold by the patentee, with a book describing the method, for twenty dollars, and the preparations used were known as composition powder and number six, the latter of which was essentially a concentrated tincture of cayenne pepper.

According to the Census of 1880 there were in the United States 592 establishments devoted to the manufacture of drugs and chemicals, with an invested capital of 28,598,458 dollars, and the annual value of their products was 38,173,658 dollars, while there were 563 establishments devoted to the manufacture of "patent medicines," their invested capital being 10,620,880 dollars, and the annual value of their products 14,682,494 dollars. These data will suffice to show the extent to which the American system of copious advertising has the effect of inducing people to believe in and

pay for secret medicinal preparations that are generally sold at a price nearly ten times as great as their cost. For the further promotion of their sale an automatic doctor has been proposed upon the principle of "put a quarter dollar in the slot and take out the pill which suits your case." Dr. BILLINGS regrets that he has been unable to obtain definite information as to any direct benefits which inventions of this kind have conferred upon the public in the way of curing disease or preventing death. He can only say that he knows of but four secret remedies that have been really valuable additions to the resources of practical medicine. The composition of those is now known, and they are all powerful and dangerous remedies that should be used only on the advice of a skilled physician. Most of the other remedies of the kind are described as having little value as curative agents, and some of them are prepared and purchased almost exclusively for immoral or criminal purposes.

According to an announcement in the *Pharmaceutische Zeitschrift für Russland* the printing of a fourth edition of the Russian Pharmacopœia has been completed, and its official introduction may be expected immediately. From its predecessors it is said to differ essentially, especially in the directions for and means of testing. Of the 1026 articles official in the third edition 318 have been struck out, while 100 new ones have been included in the fourth edition, making the total number 808.

* * *

A letter has reached us from Mr. Maiden, the Curator of the Technological Museum at Sydney, in reference to eucalyptus honey. Having taken some interest in the subject he is unwilling to let it rest where it is, and he regrets that owing to the reading of Professor Anderson Stuart's paper during the author's absence in Berlin, the apologists of eucalyptus honey did not receive the answer they otherwise would have had. Professor Stuart is now too much occupied to attend to the matter, but in the meantime Mr. Maiden desires altogether to dispute the possibility of producing an authenticated sample of natural eucalyptus honey, containing, as has been stated, from 15 to 17 per cent. of eucalyptol, or even 5 per cent. of that substance. We may add that the importance which appears to have been attached to the descriptions of eucalyptus honey in Australia is greater than that with which they have been generally credited either in England or in France.

* * *

Mr. Arthur A. Barrett, of Liverpool, writes in reference to the notice of Oliveri's investigation of oil of lemon which appeared in "The Month" at p. 1172, questioning the accuracy of some of the data arrived at. He considers that though the more volatile $C_{10}H_{16}$ hydrocarbon, called limonen by Oliveri, has a pleasant odour, the whole of the flavouring properties reside in that portion of oil of lemon which has the higher boiling point of about 240° C. He also disputes the statement that this latter fraction increases with the age of the oil of lemon, and states as the result of his own experience in the distillation of oil up to seven years old that there is a regular decrease in the older oil, that of seven years old being almost entirely destitute of this constituent. Mr. Barrett is of opinion that this constituent is more probably an aldehyde than a sesquiterpene. The gravities given by Oliveri are likewise considered to be unintelligible, on the ground that the gravity of oil of lemon varies from 856 to 860 at 60° F.

* * *

Opinions seem to vary as to the advantage that has resulted to pharmacists from the establishment of a pharmacy and materia medica section in connection with the American Medical Association. According to one visitor to the last meeting of that Association the delegates appointed by the American Pharmaceutical Association failed to obtain any recognition as delegates, while according to others their recognition was simply limited to the section which they were supposed to attend.

* * *

The *Pharmaceutical Era* records a sad fatality consequent upon the mischievous practice adopted by some manufacturers of applying to their products names that are misleading as to their composition. It appears that a new preparation has been put upon the market by a Chicago house under the name "hydrargyrum lactatum." A druggist having received a prescription to dispense in which it was ordered, borrowed some from a neighbour from which he twice dispensed prescriptions ordering 16 grains and once 2½ scruples in six powders to be taken one at noon and one at night. The stock being exhausted the druggist ordered through his jobber an ounce of "lactate of mercury," and from what was supplied dispensed some prescriptions, with the result of the death of a patient. It turned out upon investigation that the article sold under the name "hydrargyrum lactatum" was really a triturate made up of calomel, bismuth and sugar of milk, whilst the article supplied as lactate of mercury proved to be a mixture in nearly equal proportions of mercurous and mercuric lactates. The result of the legal inquiry was to exculpate both the physician and the druggist. But it is illustrative of the discredit brought upon medicine by the prescribing of remedies of unknown composition that the prescriber seems to have owned that he had no knowledge of any other "lactate of mercury" than the so-called "hydrargyrum lactatum."

* * *

We are indebted to Mr. W. C. Scott, of Birmingham, for the information that the chemists of the Lozells and Aston districts have as a body adopted early closing, and they have agreed to close their establishments from 2 to 6 p.m. on Wednesday afternoons. This movement was inaugurated about a fortnight ago by Mr. Scott, who found most of his colleagues in the district very willing to adopt his suggestion that the practice should be general, though, as is usual in such cases, some few were too conservative to do so.

* * *

In a report on the trade of Macao, Mr. Joly animadverts upon the gross adulteration practised by native dealers, and mentions that star anise is largely mixed with the Japanese shikimi fruit, which is known to possess poisonous properties.

Transactions of the Pharmaceutical Society.

PRELIMINARY EXAMINATION.

July 14, 1891.

The following are the questions that were set for this examination:—

LATIN.

(*Time allowed—from* 11 *a.m. to* 12.30 *p.m.*)

I. (*For all Candidates.*) *Translate into Latin:*—

1. The reasons for the war were many.
2. I have a father at home.
3. Let me know what you want.
4. Having appointed a day, he set out for Italy.
5. He said that, though men blamed him during his life, they would praise him after his death.

II. Translate into English either A. (Caesar) or B. (Virgil).

(*Candidates must not attempt both authors.*)

A. CAESAR.

1. Divitiacus multis cum lacrimis, Caesarem complexus, obsecrare coepit, ne quid gravius in fratrem statueret; scire se, illa esse vera, nec quemquam ex eo plus quam se doloris capere, propterea quod, quum ipse gratia plurimum domi atque in reliqua Gallia, ille minimum propter adolescentiam posset, per se crevisset; quibus opibus ac nervis non solum ad minuendam gratiam, sed paene ad perniciem suam uteretur.

2. Multa ab Caesare in eam sententiam dicta sunt, quare negotio desistere non posset, et neque suam neque populi Romani consuetudinem pati, uti optime meritos socios desereret, neque se judicare Galliam potius esse Ariovisti, quam populi Romani. Bello superatos esse Arvernos et Rutenos ab Q. Fabio Maximo, quibus populus Romanus ignovisset, neque in provinciam redegisset, neque stipendium imposuisset.

Grammatical Questions.—For those only who take Caesar.

1. Decline throughout, in the singular, *perniciem suam*; and in the plural, *multis lacrimis* (Par. 1).
2. Give the principal parts of all the verbs in Paragraph 2.
3. Account for the moods of *statueret*, *scire*, *posset* (Par. 1).
4. What cases are used in Latin to express Time and Place. Give examples.

B. VIRGIL.

1. Urbs antiqua fuit—Tyrii tenuere coloni—
Carthago, Italiam contra Tiberinaque longe
Ostia, dives opum, studiisque asperrima belli:
Quam Juno fertur terris magis omnibus unam
Posthabita coluisse Samo. Hic illius arma,
Hic currus fuit; hoc regnum Dea gentibus esse,
Si qua fata sinant, jam tum tenditque fovetque.

2. Necnon et vario noctem sermone trahebat
Infelix Dido, longumque bibebat amorem,
Multa super Priamo rogitans, super Hectore multa;
Nunc, quibus Aurorae venisset filius armis;
Nunc, quales Diomedis equi; nunc, quantus Achilles.
"Immo, age, et a prima dic, hospes, origine nobis
Insidias," inquit, "Danaum, casusque tuorum,
Erroresque tuos; nam te jam septima portat
Omnibus errantem terris et fluctibus aestas."

Grammatical Questions.—For those only who take Virgil.

1. Decline in full, in the singular, *infelix Dido*; in the plural, *vario sermone* (Par. 2).
2. Give the principal parts of all the verbs in Paragraph 1.
3. Parse *Multa super Priamo rogitans* (Par. 2).
4. What cases are used in Latin to express Time and Place? Give examples.

ARITHMETIC.

(*Time allowed—from* 12.30 *p.m. to* 2 *p.m.*)

[The working of these questions, as well as the answers, must be written out in full.]

1. A labourer lives 6 fur. 5 per. $3\frac{1}{2}$ yds. from his work; how many inches does he walk each day in going to and returning from his work?
2. A grocer buys a cask of sugar, containing 6 cwt. 39 lbs. for $17\frac{1}{2}$ guineas, and retails it at 3 guineas a cwt.; find his gain.
3. Express, as a fraction of £5, the difference between $£7\frac{4}{5}$ and $£7 \times \frac{4}{5}$.
4. Simplify $2\frac{9}{28} + \frac{1{\cdot}2 \text{ of } 7{\cdot}5}{\frac{3}{4}+4{\cdot}5} - \frac{{\cdot}9375 \text{ of } 3{\cdot}\dot{6}}{{\cdot}9\dot{1}6}$.
5. A man walked $4\frac{1}{2}$ miles in 72 minutes; find approximately, in French measure, his rate per hour of walking.
6. A bankrupt has good debts to the amount of £456 18*s.* 1*d.*, and the following bad debts—£360 7*s.* 10*d.*, £120 13*s.*, and £19 18*s.*, for which he receives respectively 4, 5, and 9 shillings in the pound; his own liabilities amount to £3408 12*s.* How much can he pay in the pound?
7. A man buys 27 sheep for £30, and sells 12 of them so that he loses 3 per cent. in the sale; at what price per sheep must he sell the remainder, so that he may gain $2\frac{1}{2}$ per cent. on the whole purchase?

ENGLISH.

(*Time allowed—from* 3 *p.m. to* 4.30 *p.m.*)

1. What kinds of verbs take a nominative case after them as well as before them? Mention six, and construct two sentences in illustration.
2. Analyse the following:—

"There leviathan,
Hugest of creatures, on the deep
Stretched like a promontory, sleeps or swims,
And seems a moving land, and at his gills
Draws in, and at his trunk spouts out, a sea."

3. Parse fully—"All the fairies, save one, had been bidden to his cradle."
4. In the following passage supply the necessary capital letters, and put in the stops and inverted commas where necessary:—they raised the body and great was their horror and sacred indignation to discover in that lifeless clay a priest of the adored and venerable isis but still greater perhaps was their surprise when they found the accused in the brilliant and admired athenian glaucus cried the bystanders with one accord is it even credible i would sooner whispered one man to his neighbour believe it to be the egyptian himself here a centurion thrust himself into the gathering crowd with an air of authority how blood spilt who the murderer the bystanders pointed to glaucus.

*5. Give an account of some modern invention with which you are familiar, *or* describe some journey you have taken.

JACOB BELL SCHOLARSHIPS AND REDWOOD SCHOLARSHIP, 1891.

The following are the questions that were set for this examination, which was held on Tuesday, the 14th inst:—

PART I.—Time allowed, three hours (11 *to* 2).

In awarding marks the neatness and legibility of the writing will be taken into account.

---

* This must be attempted by every candidate.

NOTICE.—In framing Answers, Candidates should not enlarge upon the Questions, but should confine themselves to giving, as briefly and clearly as they can, the information required.

LATIN.

1. Translate into English—

Quos ubi confertos audere in prœlia vidi,
Incipio super his: "Juvenes, fortissima frustra
Pectora, si vobis audentem extrema cupido
Certa sequi: quæ sit rebus fortuna videtis:
Excessere omnes, adytis arisque relictis,
Di, quibus imperium hoc steterat; succurritis urbi
Incensæ: moriamur et in media arma ruamus.
Una salus victis nullam sperare salutem."
Sic animis juvenum furor additus.

Virg. Æneidos. Lib. ii., 347—355.

2. Translate into English:—

Tinctura coloris e subrubro flavi, odoris qualis est myrrhæ, saporis amari, ustulantis, aromatici, addita aqua, liquor lacteus efficitur.

3. Give derivation of *confertos*, *relictis*. Decline *extrema*, *cupido*, *certa*. Parse fully *videtis*, *excessere*, *adytis*, *steterat*, *addita*, *efficitur*.

4. Translate into Latin:—

Boil one ounce of dandelion root in a pint of water for ten minutes, strain and take a wineglassful now and then.

ENGLISH.

1. Parse fully the words and expressions in italics in the following lines:—

"*Soft you*; *a word or two*, *before you go*.
I have done the *State* some service, and *they* know it;
No more of that. I pray you, *in your letters*,
When you shall these unlucky deeds relate,
Speak of me as I am; *nothing extenuate*,
Nor set down aught in malice: then, must you
Speak of one that lov'd, not wisely, but too well;
Of one not *easily* jealous, but, being *wrought*,
Perplex'd in the extreme; of one, whose hand,
Like the base Indian, threw a pearl away,
Richer than all his tribe; of one, whose subdued eyes,
Albeit unused to the melting mood,
Drop tears as fast as the Arabian trees
Their medicinal gum." OTHELLO.

2. Write a short essay on one of the following subjects:—The Naval Exhibition. Sketching from Nature. Photography. Strikes.

ARITHMETIC.

1. How many persons can be paid 9*s*. 6*d*. each out of a sum of £135 3*s*. 11*d*.? And if the balance be also equally distributed among them, how much more will each receive?

2. A trustee has $\frac{2}{2}\frac{4}{5}$ of $\frac{1}{3}$ of £50 10*s*. 5*d*., $\frac{4}{17}$ of $\frac{3}{3}\frac{2}{5}$ of £99 3*s*. 4*d*. and $\frac{2}{3}$ of $\frac{1}{1}\frac{8}{9}$ of £46 1*s*. 6*d*. which he wishes to divide between *A*, *B*, and *C*, so that *A* receives $\frac{1}{4}$, *B* $\frac{1}{3}$, and *C* the remainder. What amounts will each receive?

3. How many grammes of a drug shall I obtain for 13*s*. $4\frac{3}{4}$*d*. at the rate of £17 10*s*. per cwt.?

FRENCH OR GERMAN.

The candidate is at liberty to choose either French or German, and is not required to show a knowledge of both. Marks will only be awarded for one.

French.

Translate into English:—

1. L'amour-propre est l'amour de soi-même et de toutes choses pour soi. Il rend les hommes idolâtres d'eux-mêmes et les rendrait tyrans des autres si la fortune leur en donnait les moyens. Il ne se repose jamais hors de soi, et ne s'arrête dans les sujets étrangers que comme les abeilles sur les fleurs, pour en tirer ce qui lui est propre. Il n'est rien de si impétueux que ses désirs, rien de si caché que ses desseins, rien de si habile que sa conduite. Ses souplesses ne se peuvent représenter, ses transformations passent celles des métamorphoses, et ses raffinements ceux de la chimie.—LA ROCHEFOUCALD.

Translate into French:—

2. A wise man is above all the insults which people can say to him, and the great answer which one ought to make to these outrages is moderation and patience. —MOLIERE.

German.

Translate into English:—

1. Es war einmal eine Königin, die hatte keine Kinder, und wünschte sich eins, wie sie so ganz einsam war. Da sie nun eines Tages an einer Stickerie sass, und den Rahmen von schwarzem Ebenholz betrachtete während es schneite und Schneeflocken vom Himmel fielen, war sie in so tiefen Gedanken, dass sie sich heftig in den Finger stach, so dass drei Bluttropfen auf den weissen Schnee fielen, und da musste sie weider daran denken, dass sie kein Kind hatte. Ach! seufzte die Königin, "hätte ich doch ein Kind, so rot wie Blut, so wiess wie Schnee, so schwarz wie Ebenholz."

Translate into German:—

2. The art of prolonging life is an old wish of mankind, but so far the average length of life does not seem to be greatly on the increase.

PART II.—Time allowed: Two hours (3 *to* 5).

CHEMISTRY AND PHARMACY.

1. Explain by means of formulæ the different methods by which ammonia can be produced.

2. What influence have temperature and pressure upon the volume of a gas, and state what is meant by "standard temperature and pressure."

3. If 273 volumes of a gas be taken at 0° C., to what temperature must they be heated so as to measure 300 volumes.

4. Describe the process for the preparation of vinum ipecacuanhæ and the principles upon which the formula is based.

5. How is hydrargyrum c. creta made, and what changes does the mercury undergo either during the process or subsequently.

BOTANY.

1. Describe the structure of an acrogenous stem, explaining how it increases in length.

2. What is meant respectively by "centripetal" and "centrifugal" expansion of flowers.

Pharmaceutical Society of Ireland.

PRELIMINARY EXAMINATION.

The following have passed the Pharmaceutical Preliminary Examination:—

Barron, R.	Belfast.
Brady, F. H. R.	Dublin.
Brien, W. H.	Dublin.
Cahill, A.	Dublin.
Guest, F. C.	Kilmallock.
Hall, E.	Bailieborough.
Harris, J. R.	Dublin.
Joze, T. M.	Dublin.
Kelso, H. A.	Wexford.
Lambe, J. T.	Dublin.
Maxwell, J.	Belfast.
O'Neill, J. F., jun.	Carrick-on-Suir.
Salisbury, W.	Dublin.
Vance, C. B.	Bray.
Walsh, G.F.	Mallow.
Yoxall, J. G.	Belfast.

Five candidates were rejected.

EXAMINATIONS FOR LICENCE TO ACT AS A REGISTERED DRUGGIST.

The following passed the Druggists' Examinations held in Dublin on the 8th and 9th inst.:—

Annesley, J. ..... Arklow.
Bolger, J. ..... Ferns.
Boyd, W. ..... Dublin.
Byrne, J. ..... Clonmel.
Claffey, J. ..... Moate.
Collins, T. ..... Castlecomer.
Cope, S. C. ..... Castledermott.
Darlington, J. S. ..... Carnew.
Donaghey, J. F. ..... Dublin.
Donohoe, M. ..... Enniscorthy.
Dormer, R. ..... Newtownbarry.
Dowling, J. J. ..... Dublin.
Doyle, J. H. ..... Athy.
Doyle, W. ..... Athlone.
Fisher, T. ..... Dunlavin.
Fitzpatrick, Mary ..... Dublin.
Glynn, J. W. ..... Gort.
Gorman, J. R. ..... Ballymote.
Greenfield, W. ..... Dublin.
Hally, T. ..... Clonmel.
Hamilton, H. ..... Ballymoyer.
Haskins, N. H. ..... Wicklow.
Kearney, R. W. ..... Enniscorthy.
Kirk, T. ..... Dublin.
Kirley, T. ..... Frankford.
Lyon, H. A. ..... Dublin.
M'Cann, J. F. ..... Killeshandra.
M'Swiney, J. ..... Dublin.
M'Tighe, J. J. ..... Roscrea.
O'Neill, C. ..... Carnew.
O'Toole, G. ..... Tullow.
Perry, G. S. ..... Rathdowney.
Pim, S. B. ..... Clonmel.
Pollard, J. ..... Callan.
Ross, J. M. ..... Carlow.
Ryan, E. P. ..... Thurles.
Smyth, J. ..... Trim.
Sweny, F. W. ..... Dublin.
Wright, C. W. ..... Dublin.

Five candidates were rejected.

At a Druggists' Examination held at Queen's College, Cork, on the 10th inst., the following passed:—

Bateman, W. D. ..... Cork.
Pattison, G. ..... Cloughjordan.
Smyth, F. L. ..... Cork.
Wheeler, A. A. ..... Cork.

Society of Chemical Industry.

ANNUAL GENERAL MEETING.

After the President's address, reported in our last issue, had been delivered, and the general business of the meeting dispatched, the members adjourned to the first quadrangle of Trinity College, and were photographed in a group by Mr. Lawrence, of Sackville Street. The party then adjourned to luncheon, provided by the Reception Committee at the Antient Concert Hall, and were very hospitably entertained. The programme for the afternoon included an excursion by steamer in Dublin Bay, which is said almost to rival the Bay of Naples when seen under its best conditions, an excursion to Victoria Hill, Killarney, county Dublin, through the grounds of Samuel Boyd, Esq., J.P., and a visit to the Dublin City Distillery. On account of the slight swell on in the bay only a few ventured to undertake the first part of the programme, but a number of members visited Victoria Hill, and a select party went the round of the distillery, preferring that course on account of the somewhat dubious state of the weather. Whiskey is made here both by the pot still and patent still process, the former selling (duty unpaid) at 2*s.* 8*d.* per gallon and the latter about 2*s.* On account of the difficulty of disposing of the spent grains in the summer time, operations are stopped for about three months from about the present date, and it was therefore particularly fortunate that in this case the visit was paid just before work was suspended. The process presents no feature of novelty and needs little description; no attempt is made to recover the lactic acid from the pot-ale, in spite of the profitable possibilities pointed out in the discussion upon Mr. Allen's recent paper before the London section of the Society.

In the evening, at 8 o'clock, a conversazione was held by invitation of the Reception Committee, and by permission of the Lords of the Committee of Council on Education at the Science and Art Museum, Kildare Street, the Lord Mayor of Dublin, Chairman of the Reception Committee, and the Lady Mayoress receiving the guests. The band of the Sussex Regiment was in attendance, the music was, in consequence, good, and the function passed off admirably.

Visit to Power and Son's Distillery.

Next day (Thursday, July 9) members gathered at the entrance hall of Trinity College, and at half-past ten started by tramcar to the distillery of Messrs. John Power and Son, first, however, being taken into Sackville Street to view the Post Office—a fine building, not unlike St. Martin's le Grand—and Nelson's Pillar, almost a *replica* of that in Trafalgar Square. On arriving at the distillery the company was first taken to the new mechanical shops used as a smithy, fitting and turning shops, with the usual equipment of planing and mortising machines, drilled slotters, and so forth. Thence a move was made for the corn receiving store, where specimens of Irish barley were to be seen. Besides the native product, that from Algiers and Tunis is sometimes used. The mills used are fitted with French burr stones and are driven by a compound condensing beam engine on the McNaught system, the high pressure cylinder being on the crank side between the crank and the pivot on which the beam swings. In consequence of this arrangement its stroke is shorter than that of the low pressure cylinder, and therefore the usual difference in the capacity of the two is maintained without decreasing its diameter considerably. In the brew house were two mash tins 33 feet in diameter and 7½ feet deep, capable of mashing 500 barrels each, the mash being started at 7 o'clock morning and evening. The engine driving the rousers is another beam engine also Macnaughted. Steam is supplied by two Lancashire boilers 37 feet in length. The wort, before fermentation, is cooled by refrigerators of the horizontal type, passes into the fermenting backs, and thence to the stills. In this distillery pot stills are alone used, there being six in all, some of which are of noticeable size. It is remarkable that copper is the only metal used for their construction, in spite of its high price; no serious attempt, however, appears to have been made to find an efficient substitute. The stills are usually built up of copper plates bolted or riveted together, but one recently put in by Messrs. Power and Son is in almost as few pieces as an ordinary laboratory still and is a fine piece of coppersmith's work. The heads of the stills and the works are also of copper, the latter tapering towards the lower end, where condensation approaches completion. Two worms are placed in each worm tub. Descending by the lift, the ram of which is 22 inches in diameter, the party reached the spirit store, and having been equipped with small oil lanterns, hinged to a stick which served as a handle, proceeded to roam through a perfect labyrinth of whiskey casks.

After completing the round of the premises the members of the Society sampled the product of their hosts at a light luncheon that was provided for the purpose, and were unanimous in its praises. On leaving, each guest was presented with a memento of his visit, in the shape of a pint bottle of whiskey in a tasteful box.

Before the visit was finished, a messenger came from Messrs. Guinness and Co., seeking to know when the party might be expected to arrive. The interest of the visit to Messrs. Power and Son's Distillery and the hospitality which had concluded it had taken up so much time that Messrs. Guinness feared through some mistake the intending visitors had gone astray.

Visit to Guinness's Brewery.

When the tardy ones had come at last, they were met by representatives of the firm, who divided them into parties of about ten or fifteen, each of which was furnished with a number, in order that its members might know their guide (who bore the same number attached to a stick) and keep together. There are two actual breweries at Guinness's—the old and the new. The one being nearly a duplicate of the other, only the new was visited. The malt is discharged in the malt receiving room, and carried by elevators to an upper room, where it is screened and then passes to be ground. Although some of the malt is made on the premises, the drying being done on iron floors and with anthracite coal, much is bought from outside maltsters. About one-tenth of the whole is roasted malt, giving the beer its characteristic colour and flavour, the rest being the ordinary dried variety. Irish, Algerian and Tunisian barley are all used. Before being ground it passes through a magnetic separator, to remove pieces of iron that may have accidentally mixed with it. It is curious to note that the black malt is not made by Guinness's at all, but by a distinct firm.

The malt passes from the mills to the mash tuns or "kieves," which are large circular vessels fitted with rousers, and practically identical with those used in distilleries. Mashing is started at 1 a.m., and is conducted at a temperature of 100° F. The total amount mashed daily is about 1100 quarters. The grains are in great part dried by the Passburg and other driers, and thus the difficulty already mentioned as troubling the distillers, namely, the absence of a market for a perishable material, is eluded.

After boiling the wort with the hops, specimens of which were exhibited, the product is run into hop backs, strained and cooled by vertical refrigerators, after which process it passes to the fermenting tuns and is there converted into beer. The temperature of the tuns is kept low so as to permit of the proper growth and action of the yeast by a system of pipes through which circulates a solution of calcium chloride which has been previously cooled by a freezing machine. The pipes and bends, covered thick with hoar frost, testify to the efficiency of the method. One of the most interesting developments of the primary business of brewers was here shown, and merits a few words. The cooling of the atmosphere in the fermenting vats was originally carried out by lowering the temperature of the calcium chloride solution by means of an ammonia freezing machine. On account of the corrosion caused by the liquid ammonia another machine was tried instead, found preferable, and is still in use. The requirements of the work, however, made another machine necessary, and one working with liquid carbon dioxide was put in. In order to supply this it was suggested that the carbon dioxide given off during fermentation should be collected and compressed. This was done and the surplus sold to other users of freezing machines worked by liquid CO_2. The adoption of the same material for making aerated waters, for raising beer and similar purposes, suggested further outlets for a product of which the amount was almost limitless. A difficulty then presented itself. The carbon dioxide as drawn from the fermenting tuns had a characteristic taste and smell due to bye-products of fermentation, which were objectionable when it was used for the preparation of such things as aerated waters. In consequence experiments were made to determine the best means of freeing it from these substances. It was passed through scrubbers containing sulphuric acid, glycerin and other liquids, but eventually it was found that persistent and systematic scrubbing with water was the best method that could be used. The great weight of the gas makes its collection extremely easy. When a supply is needed a parachute is let down into a tun (until below its surface, which can be determined by letting small air-balloons float down into the tun) and the gas sucked off and compressed. During the Society's visit the experiment of allowing the liquefied gas to vaporize and freeze a portion of itself was shown on a scale considerably greater than one is accustomed to in the lecture room. The liquid CO_2 is sold at 4*d.* per lb. in bottles containing 25 lbs. each.

The fermented beer is freed from yeast by skimmers and stored in enormous vats, of which there are 150. The largest has a capacity of 88,200 gallons and its contents has a value of £4900. The vats are made of oak and hooped very closely with iron, so that an accident is rare. About twelve years ago one occurred, however, a vat bursting, a by no means incomprehensible occurrence, as the factor of safety is only about two, but without killing anyone. The total length of hoop round the vats is about fifty miles.

The stables were visited, but were, of course, empty, their occupants being engaged in their daily work; most of the horses are Clydesdales. The malt store houses and distributing gear were inspected, and the party then passed by the narrow gauge spiral railway to the malting floors. The railway in question is a remarkable engineering achievement, the gradients being very sharp and the curves of very short radius. The cask cleaning shed was also visited, the method of cleansing being ingenious and efficient. The cask is placed in a cradle, is partly filled with hot water and closed by a bung to which a spiked iron chain is attached inside. The frame communicates a tumbling motion to the cask and at the same time rotates it about its major axis, so that the washing action of the water and the scraping action of the chain take place at every part of its interior. It is then steamed, examined and passed as "sweet" or rejected as "foul." The cooperage came next under the survey of the members. Those who were familiar with modern practice were surprised to find the casks being made exclusively by hand. Inquiry elicited that this curiously archaic arrangement had its origin from philanthropic motives. Had machinery been introduced many hands would have been thrown idle. Firms holding a less assured position would scarcely venture upon such a line of action. Whatever be the economic aspects of hand and machine making, the execution of the work of building up a cask was well worth watching, and the finished goods seemed unexceptionable. It is found that even including the export trade each cask is filled on an average ten times a year.

The casks are filled in the racking shed, the system in use being particularly economical and good. The inlet of beer to the cask is through a two-way cock which, while admitting the beer, allows the air and froth to pass out by a return tube to a covered vessel. In this return tube a small piece of glass tubing is inserted, which allows of the observation of the contents, whereby the moment when air and froth cease to be expelled and are replaced by beer can be noted and the flow stopped. It may be here remarked that the casks are painted differently, according to their

contents. Ordinary single stout, which is mostly sold on draught, is put up in casks with a ring of white paint at each end. Double stout, which is commonest in England, is distinguished by a red ring, while export stout is marked with a yellow ring. On account of the need for distinguishing these colours readily and quickly the arc light is used in the racking room. After the visitors had endeavoured to discriminate between these varieties of liquor by personal experiment, to the accompaniment of sundry light eatables, they separated to meet again later in the day.

Rather too much was attempted in the time at the Society's disposal, as while the two works described above were being visited, a trip of great interest was being carried out elsewhere. A detachment of members were conveyed by tramcar and special train to Inchicore, at which are the Great Southern and Western Railway Co.'s works. They are under the charge of Mr. H. A. Watt, who received the party and acted as guide. The works cover an area of 52 acres, and suffice for the construction and repair of the whole rolling stock. Inverting the natural order the painting shop was first visited and the shop where the carriages are upholstered. In the foundry are made all brass and iron castings used on the works, such as cylinders, axle-boxes, buffer-sockets, etc. The locomotive smithy is 282 feet long and 50 feet wide, and contains thirty-seven fires; here are four small steam hammers used for welding and stamping; the shop is lit by Lucigen lights instead of gas. The forge with two Siemens' gas furnaces and a 50-cwt. steam hammer came next, after which the boiler shop, in which hydraulic rivetters (instead of steam rivetters as at Derby) are used in rivetting up the shells. The saw mill and joinery, attached to which is a creosoting plant, were also inspected, as were the smith's shop and the two erecting shops, one of which is 286 feet long by 50 feet wide, with sixteen pits, and the other 326 feet long by 5 feet wide, with nineteen pits. The coppersmith's shop, the testing room and the machine and fitting shop are adjacent. It is to be regretted that on account of the various other attractions offered to members the number taking part in this excursion was small, but those who went felt more than repaid by the interesting character of what they saw, and by the courtesy with which they were received.

In the afternoon of the same day a garden party was given by the Reception Committee in the grounds of the Zoological Society in Phœnix Park. Possibly on account of their morning labours many members failed to put in an appearance, but a fair gathering resulted. The grounds, though not stocked in the same complete manner as those with which Londoners are familiar, are in excellent order, and formed a suitable place for an entertainment of the kind.

The Annual Dinner.

In the evening a special train left Westland Row Station for Kingstown, where the annual dinner was to be held. The Town Hall was utilized on this occasion and accommodated the party admirably. The distance from the hotel whence the dinner came was an undeniable disadvantage, however.

In accordance with custom the retiring President, Mr. Rider Cook, occupied the chair, and he was supported by the Lord Mayor of Dublin, and Professor Emerson Reynolds (the President elect). There was a good attendance of members.

After the usual loyal toast the President proposed the health of "The Reception Committee and the Honorary Officers," coupling with it the names of the Right Honourable the Lord Mayor of Dublin, Messrs. S. P. Boyd, M.A., W. G. Strype, C.E., and W. W. Wilson, C.E. After adverting to the welcome the Society had received, characteristically Irish in its hospitality, and comparing the reception with the imperial function then in course of procedure, the President said that the pleasure the members had derived from their visit was so great that he hoped an opportunity would arise for coming to Ireland again and experiencing it anew. He called upon those present to testify to their deep sense of obligation to the Reception Committee.

After the toast had been drunk with enthusiasm, the Lord Mayor replied, adverting to the efforts that had been made to cause the visit to be a success, and in particular to the way in which the Great Southern and Western Railway Company had thrown open its works for inspection.

Mr. Boyd, also responding, spoke of the advantages that accrued from the closer union of Englishmen and Irishmen, which would inevitably ensue on their getting to know each other better than they did. The development of the country would follow upon its consummation.

Mr. Strype made the speech of the evening in many respects, native wit being apparent in every sentence, but the poor acoustic properties of the hall must have prevented many members appreciating all the good points he made.

Sir Charles Cameron replied in place of Mr. W. W. Wilson, who was unfortunately absent, and the health of the President having been proposed by the President-Elect and suitably acknowledged, and the time-honoured toast of "Our Guests," including the representatives of those firms who had been hosts in themselves in the earlier part of the day, the meeting broke up in order to catch the special train back to Dublin.

On Friday, July 10, three excursions were got up, and members proceeded by special train to Bray, where two of the parties alighted, while the third did so at Rathdrum. At Bray one of the sections went by car to Roundwood *via* the Glen of the Downs, and the other to Enniskerry and Powers Court. Of these the first was the largest of the three. Its members were conducted through Powers Court demesne by Professor Emerson Reynolds, and the Powers Court waterfall and the well-wooded hills and glens duly viewed. The second section drove through the grounds of Sir Richard Hodson, passing by Hollybrook and returned by Carrow Hill amd Rocky Valley. On arriving at Roundwood the party inspected the city waterworks under the guidance of Sir Charles Cameron, Mr. Spencer Harty, C.E., and Mr. Andrews.

The third party, that went to Rathdrum, was personally conducted by Messrs. Strype and Boyd, and visited Glendalough and the seven churches, seeing the hermitage lake and ruins of the district.

The official programme was thus concluded, but numerous minor festivities occupied some members on Friday evening and the following day.

Proceedings of Societies in London.

CHEMICAL SOCIETY.

Contributions to our Knowledge of the Aconite Alkaloids.*

Part I. On the Crystalline Alkaloid of Aconitum Napellus.

BY PROFESSOR W. R. DUNSTAN AND W. H. INCE, PH.D.

(*From the Research Laboratory of the Pharmaceutical Society*).

The discovery of an alkaloid in the root of *Aconitum Napellus* was made by Geiger and Hesse (*Annalen*, vii., 276) in the year 1833. This alkaloid, which they did not succeed in crystallizing, was named "aconitine." Some years later, von Planta (*Annalen*, lxxiv., 257)

* Read March 19, 1891.

obtained what was apparently the same alkaloid and analysed it in the amorphous state. The analytical data pointed to the formula $C_{30}H_{47}NO_7$.

In 1860, T. B. Groves (*Pharm. Journ.*, [2], viii., 121) obtained from the root of this plant a crystalline alkaloid which furnished crystalline salts. In 1871, Duquesnel (*Ann. Chim. Phys.*, [4], xxv., 151) pointed out that the method of Geiger and Hesse, which was generally employed in extracting the alkaloid from the root, was objectionable, since it involved heating the substance with mineral acids and with alkalis, both of which were likely to decompose it. Duquesnel believed that the amorphous character of commercial specimens of the alkaloid was due to the presence of decomposition products of the crystalline alkaloid formed during its extraction. The process suggested by him for obtaining the alkaloid from the root was intended to obviate these defects. The powdered root is exhausted with alcohol acidified with tartaric acid, an acid which, unlike mineral acids, does not attack the alkaloid. The alcoholic solution is concentrated at a low temperature (60°) and then precipitated with sodium hydrogen carbonate. The precipitate is crystallized from a mixture of ether and light petroleum.

The alkaloid thus obtained, melted at 140°, and on combustion yielded numbers which agreed best with the formula $C_{27}H_{40}NO_{10}$. It was lævorotatory and furnished crystalline salts.

In 1875, the question as to the nature of the aconite alkaloids was taken up by Dr. C. R. A. Wright, whose researches were aided by grants from the British Pharmaceutical Conference. This inquiry lasted many years, and was productive of a number of interesting and important results which may be briefly summarised here, so far as they relate to the alkaloids of *Aconitum Napellus*.

The crystalline nitrate prepared by Mr. T. B. Groves was chemically examined. The base regenerated from this salt afforded, on combustion, numbers which stand about midway between those calculated from the formulæ $C_{32}H_{43}NO_{10}$ and $C_{32}H_{43}NO_{11}$. A more detailed examination was made of a new specimen of alkaloid which had been extracted by Mr. T. B. Groves from 1 cwt. of roots purchased in commerce as those of *Aconitum Napellus*. From this crude alkaloid there were finally obtained two distinct alkaloidal nitrates which furnished two bases, both soluble in ether, the one being deposited from its ethereal solution as a varnish which refused to crystallize, the other in distinct crystals. Both of these bases yielded crystalline salts. The uncrystallizable base did not produce the tingling of the tongue which is characteristic of aconitine. On account of its bitter taste, this alkaloid was called *picro-aconitine*. The name *aconitine* was reserved for the crystalline base.

The composition of picro-aconitine seems to be best expressed by the formula $C_{31}H_{45}NO_{10}$, and its crystalline hydrochloride by the formula—

$$C_{31}H_{45}NO_{10},HCl+1\tfrac{1}{2}H_2O.$$

The aurochloride, $C_{31}H_{45}NO_{10},HAuCl_4$, is a pale yellow precipitate, very slightly soluble in water. The platinochloride (not analysed) is extremely soluble. This uncrystallizable alkaloid was apparently not present in the root of *Aconitum Napellus* with which Mr. T. B. Groves first worked.

The crystalline aconitine was burned after recrystallization from ether. It gave numbers agreeing with the formula $C_{33}H_{45}NO_{11}$. Its properties were identical with those of the alkaloid first obtained by Mr. Groves, and also with the crystalline aconitine of Duquesnel. Further examination proved, however, that the alkaloid was still contaminated with traces of impurity which repeated crystallization from ether failed to remove. That this was the case was evident from the fact that its properties were changed by conversion into a salt, repeated crystallization of the salt from water, and regeneration of the base from it. The regenerated base, after recrystallization from ether, afforded the following results on combustion:—

	Found.	Calculated for $C_{33}H_{43}NO_{12}$.
C. . . .	61·71 per cen	61·39 per cent.
H. . . .	6·78 „	6·67 „

It would therefore appear that the formula of crystallized aconitine is $C_{33}H_{43}NO_{12}$. The hydrochloride and aurochloride were prepared and analysed. The latter salt is precipitated in pale-yellow flakes when auric chloride is added to a solution of aconitine hydrochloride. The amount of gold contained in the dried precipitate was ascertained to be 19·98 per cent.; that calculated for the formula $C_{33}H_{43}NO_{12},HAuCl_4$ is 19·92 per cent.

A fresh quantity of alkaloid was now isolated by Messrs. Hopkin and Williams from 2 cwts. of root, Duquesnel's process being employed for the purpose. Resin was removed by extracting the acid liquid with light petroleum, and the alkaloid precipitated with potassium carbonate in slight excess. The precipitate was removed. The alkaline filtrate was found still to contain alkaloid, which was thrown out, after acidifying, with Mayer's reagent, and the base regenerated from the mercuric compound. It yielded some crystalline aconitine, but the greater part consisted of *uncrystallizable alkaloid*, which furnished uncrystallizable salts, and hence was not picro-aconitine.

The precipitate thrown down by potassium carbonate was successively extracted with small quantities of ether, and the ethereal solutions agitated with solution of tartaric acid in order to remove alkaloid, and leave in the ether a small quantity of resin. The acid liquid was precipitated with sodium carbonate, and the resulting alkaloid collected and partially dissolved in ether. This ethereal solution deposited some slightly coloured crystals which were dissolved in benzene, and precipitated by adding light petroleum. This constituted the first specimen of *crystalline* alkaloid. A second specimen was obtained from the ethereal mother liquors, which finally left a residue of uncrystallizable alkaloid resembling that which had been dissolved by the alkaline liquid. On combustion, this amorphous substance afforded numbers which agreed approximately with those recorded by von Planta, and from which he deduced the formula $C_{30}H_{47}NO_7$. It is probably a mixture.

The crystalline alkaloid, after recrystallization from ether, was converted into hydrobromide, and this salt crystallized from water. Specimens of alkaloid regenerated from this compound were burned, and afforded the following results:—

	Mean result of the combustion of seven specimens.	Calculated for $C_{33}H_{43}NO_{12}$.
C. . . .	61·02 per cent.	61·39 per cent.
H. . . .	6·79 „	6·67 „

Another portion of crystalline alkaloid gave C 61·41 per cent., H 6·81 per cent., which agreed better with the suggested formula. The alkaloid melted at 183°–184°, and formed a crystalline hydrobromide, $C_{33}H_{43}NO_{12},HBr+2\tfrac{1}{2}H_2O$, and an aurochloride,

$$C_{33}H_{43}NO_{12},HAuCl_4.$$

The percentage of total alkaloid in the root was about 0·07 per cent., of which 0·03 per cent. was crystalline aconitine, and 0·04 per cent. uncrystallizable base.

It appears from these results that the root of *Aconitum Napellus* contains but one crystalline alkaloid. This had been obtained from each of the three separate batches of root examined. Picro-aconitine, the amorphous base yielding crystalline salts, had only

been found in one parcel of roots, and would thus seem not to be a constant constituent. It may have originated from foreign root which was present in one of the collections of roots of *Aconitum Napellus*.

Besides picro-aconitine, a second amorphous alkaloid was isolated, which did not form crystalline salts. This substance was only found in one collection of roots, and seems to correspond with the alkaloid of von Planta. It may be a decomposition product of aconitine. The existence of a crystalline alkaloid in the root of *Aconitum Napellus* may be regarded as certain, but the occurrence of the two amorphous alkaloids above referred to requires confirmation.

The latter results which Dr. Wright gained from an examination of *Aconitum ferox* and Japanese aconite root have rendered it probable that the different species of this plant yield distinct alkaloids, and in future work on this subject it will therefore be necessary to carefully establish the homogeneity and exact source of the roots which are submitted to chemical investigation.

More recently the crystalline alkaloid of *Aconitum Napellus* has been examined by Jürgens (*Inaug. Dissert., Dorpat*, 1885). The origin of the roots used is not stated, and there is no evidence that they were carefully selected. They were extracted with alcohol, and the residue left by the alcoholic liquid, on evaporating it at first at 100°, and finally under reduced pressure at a low temperature was found to be acid; no foreign acid was therefore added. Resin having been removed by extraction with ether, the liquid was made alkaline with sodium hydrogen carbonate, and the alkaloid removed from it by repeated agitation with ether. The residue from the distillation of the ethereal solution was faintly acidified with a dilute solution of hydrogen chloride, and the liquid poured away from the insoluble brown resin.

By the addition of sodium hydrogen carbonate, the alkaloid was liberated from the acid solution and dissolved from it by ether. The partly crystalline but coloured alkaloid left on the evaporation of the ether was converted into the hydrobromide, and the alkaloid regenerated from this salt. By this means a colourless crystalline base was obtained, of which the root yielded as much as 0·2 per cent.

This alkaloid melted at 179°, and afforded the following results when burned:—

	Mean result of three combustions.	Calculated for $C_{33}H_{43}NO_{12}$.	Calculated for $C_{33}H_{47}NO_{12}$.
C. . .	61·16 p. c.	61·39 p. c.	61·02 p. c.
H. . .	7·26 „	6·67 „	7·24 „

The mean result of four combustions showed that the substance contained 2·21 per cent. of nitrogen. The formula $C_{33}H_{43}NO_{12}$ corresponds with 2·17 per cent., whilst $C_{33}H_{47}NO_{12}$ corresponds with 2·16 per cent.

The aurochloride was produced as an amorphous, pale-yellow precipitate by the addition of auric chloride to a solution of the hydrochloride by the alkaloid. This precipitate contained 19·84 per cent. of gold ($C_{33}H_{47}NO_{12},HAuCl_4$ = 19·8 per cent.). The salt was crystallized from a mixture of chloroform and ether. When heated, the crystals changed colour at 120° and melted at 140°.

From the quantitative results recorded above, Jürgens concludes that crystalline aconitine is best represented by the formula $C_{33}H_{47}NO_{12}$, which differs from that suggested by Wright in containing an additional four atomic proportions of hydrogen.

Jürgens determined the solubility of the alkaloid in several liquids. He found that 1 gram of aconitine is dissolved by the following quantities of the respective liquids at 22°–24°:—Ether (rel. dens., 0·728), 39·21 grams; ether (rel. dens., 0·720), 63·9 grams; alcohol (rel. dens., 0·7945 at 21°), 37·04 grams; alcohol (90° Tralles), 23·78 grams; light petroleum (rel. dens., 0·670), 2·806 grams; benzene, 5·5 grams; water, 726·4 grams.*

Duquesnel observed aconitine to be lævorotatory. The specimen examined by Jürgens was inactive in the form of a 3 per cent. alcoholic solution when examined in a layer 200 mm. long. The anhydrous hydrochloride in aqueous solution was strongly lævorotatory $[a] = -35·89°$, from which result the specific rotation of the alkaloid contained in the solution was calculated to be $[a] -37·91°$.

Besides the crystalline alkaloid, Jürgens obtained from the roots two amorphous bases. One was found dissolved in the ethereal solution from which the greater part of the aconitine had crystallized out. After purification it formed a coloured varnish, which melted below 100°. When boiled with alcoholic soda it yielded benzoic acid and an amorphous base resembling the aconine of Wright. A combustion of the original substance showed it to contain of carbon 67·74 per cent., of hydrogen 8·4 per cent.

The second amorphous alkaloid was nearly insoluble in ether, but dissolved readily in chloroform, by means of which solvent it was isolated from the original alkaline liquid after it had been completely extracted with ether. It seems likely that this substance may have been impure aconine, the product of the hydrolysis of aconitine.

The Properties of Crystalline Aconitine from Aconitum Napellus.

The alkaloid which we have examined is an indistinctly crystalline powder having a yellowish-brown tint. The mode in which it was obtained is described in a paper by Mr. John Williams, read at the meeting of the British Pharmaceutical Conference, in 1887 (*Pharm. Journ.*, [3], xviii., 238).† The coarsely ground root dried at a low temperature, was exhausted with amyl alcohol, a solvent which was found to be capable of readily dissolving the alkaloidal salts contained in the root. The solution was shaken with dilute sulphuric acid, and the acid liquid precipitated with sodium carbonate. The precipitate thus obtained was crystallized from ether. Mr. Williams states that besides the crystalline alkaloid nothing was isolated by this method except a minute quantity of "gummy amorphous" alkaloid, which remained obstinately attached to the crystals.

Our first experiments were made with the indistinctly crystalline powder above referred to. This melted at 188·4° (corr.), and dissolved readily in chloroform and benzene, less readily in alcohol and ether, and hardly at all in light petroleum. It crystallized best from a mixture of alcohol and ether, and by this means large, perfect crystals were obtained, forming tabular prisms belonging to the rhombic system. The crystals had a faint yellow tinge, and those last obtained from the alcoholic liquid were slightly contaminated with the amorphous, gummy substance to which Mr. Williams has alluded as being so difficult to remove.

The results of two combustions of the original material were—

	Found. I.	Found. II.	Calculated for $C_{33}H_{43}NO_{12}$.	Calculated for $C_{33}H_{45}NO_{12}$.	Calculated for $C_{33}H_{47}NO_{12}$.
C . .	61·31	61·51 p.c.	61·39	61·19	61·11 p.c.
H . .	7·67	7·58 „	6·67	6·95	7·26 „

These numbers agree fairly well with Wright's formula, but the substance burned was known to be slightly impure. The alkaloid furnished well crystallized salts, from which pure alkaloid was regenerated. The aurochloride was thrown down as a pale yellow,

* In a determination of the solubility of the aconitine with which we have worked, made in this laboratory by Mr. J. C. Umney, it was found that nearly ten times this quantity of water was required.

† We are indebted for a supply of this very valuable material to the liberality of Messrs. Howards and Sons, of Stratford.

amorphous precipitate (m. p. 120°), when auric chloride was added to an aqueous solution of the hydrochloride, but was readily crystallized from its alcoholic solution. The properties of this salt were carefully studied, with a view to its employment as a means of characterizing the pure alkaloid. It is readily soluble in absolute alcohol, chloroform, acetone, and methyl alcohol, less readily in ether and dilute alcohol. It is very sparingly soluble in water and dilute hydrochloric acid. The alcoholic solution does not decompose when heated, except in the presence of much water.

The crystals melted at about 135° (corr.). In order to ascertain the melting-point of the pure aurochloride, a considerable quantity of that prepared from the original alkaloid was fractionally crystallized from absolute alcohol, the crystallization being facilitated by the successive addition of small quantities of water. When evaporation was necessary, it was effected in a vacuous desiccator over calcium chloride. The melting-point of each fraction of crystals was ascertained, with the following results:—(1) 135°; (2) 135°; (3) 134°; (4) 135·6°; (5) 135°; (6) 132°. Each of these numbers represents the mean of three determinations. Since no distinct separation was effected by this means, a solution of the hydrochloride was fractionally precipitated with auric chloride, each precipitate was crystallized from alcohol, and the melting points of the different crystals taken. These were (1) 129°; (2) 135°; (3) 135°; (4) 135°. The first precipitate was very small, and evidently contained nearly the whole of the impurity with which the original alkaloid was contaminated. In order to ascertain whether the gold salt melting at 135° was pure aconitine aurochloride, seven specimens of it, obtained in this and the preceding experiments, were burned with lead chromate. The mean result of these seven combustions was, carbon, 41·56 per cent.; hydrogen, 5·35 per cent.; gold, 19·66 per cent. A separate determination of chlorine gave 13·85 per cent. These numbers do not agree well with any of the probable formulæ for the alkaloid.

	Found.	Calculated for $C_{33}H_{43}NO_{12},HAuCl_4$.	$C_{33}H_{47}NO_{12},HAuCl_4$.
C. . .	41·56 p.c.	40·2 p. c.	40·08 p. c.
H. . .	5·35 „	4·36 „	4·75 „
Au . .	19·66 „	19·92 „	19·8 „
Cl . .	13·85 „	14·43 „	14·34 „

It therefore appeared likely that the aurochloride melting at 135° was still contaminated with an impurity richer in carbon, no doubt the same impurity (or its aurochloride) as that associated with the original substance.

(*To be continued.*)

Provincial Transactions.

SUNDERLAND CHEMISTS' ASSOCIATION.

On Wednesday, the 8th inst., the members of the Sunderland Chemists' Association entertained their President, Alderman Thompson, to a dinner, at the Grand Hotel, Sunderland, and presented him with an illuminated address as a mark of their respect and esteem and as a recognition of his services as President for twenty-two years.

The Secretary, Councillor John Harrison, presided, and there were a good number of members present.

After the usual loyal and patriotic toasts the Chairman proposed the toast of the evening, "The Health of the Worthy President," who he said for twenty-two years had devoted a large amount of his time and ability to the work of the Association. In the early days of the Association a good amount of educational work was done, which was largely owing to the President, who was then already a man of mature judgment and experience. He started their library with a complete series of the *Pharmaceutical Journal* down to that date. That educational work was only suspended in consequence of lack of interest on the part of those for whose benefit it was instituted. They not only regarded their President as an able pharmacist, but as one of the most honoured of their public men. He entered the Town Council in 1847, and eighteen years later became an alderman. He was a fine type of the English public man: a man who first mastered and attended to his own business and the wants of his family, and then devoted his time and talents to the service of his country. The speaker asked Alderman Thompson to accept an illuminated address, which set forth the esteem in which the recipient was held, referred to his long public services and his election twice as Mayor, and expressed hopes that he would long continue to be of service and to receive the respect of his fellow men.

The toast having been drunk with musical honours, Alderman Thompson in responding said he was sorry that in one point the Pharmaceutical Society had not made the advance he would like to see, and that was in getting the compounding of medicines entirely done by pharmaceutical chemists. It was beneath the dignity of the medical profession to compound drugs for their patients. Their proper province was to give advice, and to leave compounding to be done by the men whose business it was and who understood it. He was sorry that medical men could not see their way to leave off that trading department. If they went on to the continent they would see no such thing, but a doctor gave his patient a prescription and the patient went to a chemist to have it made up. Although he had been hammering at this for thirty years he hoped the day was not far distant, and that he would live to see it, when pharmaceutical chemists would have the compounding of drugs entirely in their own hands, and medical men would devote their time exclusively to their patients.

Later in the evening Dr. Harris, Medical Officer of Health of the Borough of Sunderland, proposed the toast of the Sunderland Chemists' Association, and in the course of his remarks said he came from Ireland, where the evil ways of his profession with regard to the compounding of medicines had not spread, but where it was still largely in the hands of those who were still called there the apothecaries. He thought if the medical profession were to look at the matter carefully they would see that it was not to their benefit to compound their own medicines. If the old prescription writing times were to come again it would put much money into the medical men's pockets. When a doctor supplied medicine, and then at the end of the quarter or half year sent in his bill, there was a demur to payment, the patient saying, "I have only had so much medicine." Formerly that was not the case; it was known that a medical man was being paid for his advice. It was a scandal to his profession that 2*s.* 6*d.*, and even 7*s.* 6*d.*, was sometimes taken for advice and medicine together. He could not help thinking that the foundation of the whole evil lay in medical clubs. These clubs were a great benefit to working-men, but they were on a wrong basis. Those who belonged to them expected to get medical advice and medicine for next to nothing. These clubs should have a capable medical man to give advice, and a capable chemist to supply drugs ordered by him. Then they would find themselves far better treated than at present. It was altogether wrong for a medical man to visit his club and private patients, and then have to go home and compound medicines for perhaps a hundred people, for under the present system a doctor had as many patients as that at once. The medical men of this country were doing themselves a great injustice. Unfortunately in the hurry and skurry of visiting and compounding they got to accept certain

formulas, and got certain pills and mixtures already made up, and did not bring an independent judgment to bear on each prescription. Thus they did not give the abilities they were possessed of free and fair play. He hoped that any reformation that might come in his profession would be in the direction of medical men becoming medical advisers, instead of being looked upon as men who supplied certain medicines.

The toast having been drunk and responded to, other toasts followed, and the pleasant little gathering was brought to a close with "Our next merry meeting."

EXETER ASSOCIATION OF CHEMISTS AND DRUGGISTS.

A quarterly meeting of the above was held on Wednesday, July 8, at Mr. Stocker's. The President, Mr. H. Gadd, J.P., presided, and there were also present Messrs. Harris, Stocker, Lemmon, Reid Bartleet, Lake, Webber and Rowsell (Hon. Sec.). The minutes of the last meeting having been read and confirmed, Mr. J. W. Webber read a paper "On the advisability of establishing a School of Pharmacy in Exeter to meet the requirements of the proposed curriculum." The views set forth in the paper met with general approval, and after some remarks from most of those present, Mr. Stocker proposed and Mr. Lake seconded—"That in the opinion of this meeting it is desirable that a School of Pharmacy should be established." This was carried unanimously, and the meeting adjourned for a month for the further consideration of the subject.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

On Wednesday afternoon, 8th inst., a number of the members of this Association visited the botanical department of University College, on the invitation of Professor Geddes, who is an honorary member of the Association. The visitors having been introduced by the Secretary, Mr. W. Mair, were conducted by the Professor over the botanic garden which is in process of formation. An interesting feature of the visit was the inspection of the collection of paintings illustrative of the flora of Britain and other lands. This department, which was quite recently inaugurated, has already made encouraging progress. Tea was afterwards served, a very pleasant and profitable afternoon being spent. Professor Geddes, and Miss E. J. Johnston, and Mr. A. J. Herbertson, demonstrators, were thanked for their kind attention.

Reviews.

ARZNEIMITTEL WELCHE IN DEM ARZNEIBUCH FÜR DAS DEUTSCHE REICH DRITTE AUSGABE NICHT ENTHALTEN SIND. Bearbeitet und herausgegeben von dem Deutschen Apotheker-Verein.*

This book has had its origin in the feeling that it was desirable to attempt to secure for non-official substances the uniformity of condition in all German pharmacies which is provided for in respect to official medicines by the national Arzneibuch, but which is not favoured by the conflicting statements contained in various so-called 'Supplements' to that volume. The work was taken up by the German Pharmaceutical Association in 1889, and remitted by it to the Pharmacopœia Commission of the Association for execution. Subsequently, the members of this Commission met in Berlin, and decided upon a plan of carrying out the compilation, and resolved that any profit resulting from the sale of the first edition should be handed over to the relatives of Dr. Schlickum, the late president of the Commission. It was also determined that the work should not partake of the explanatory character of a commentary, but like the official work should be limited to a description of the characters and tests, and, as far as requisite, the methods of preparation of the different articles. An invitation published in the journal of the Association to all pharmacists, to make known their wishes upon the subject of the projected book, brought no less than 2400 suggestions; but those were eventually reduced by the Commission to 800, an article being adopted when it had received the approval of one-fourth of the members.

From what has been said it will be seen that this new work on the medicinal substances not contained in the third and latest edition of the German Pharmacopœia resembles, in some respects, the 'Unofficial Formulary' issued by the British Pharmaceutical Conference, but it far exceeds it in comprehensiveness, since it contains as many as 811 monographs. Like the official 'Arzneibuch' it is written in the vernacular, and the rules followed in the compilation of that work, as described in the Preface, have been adopted in the preparation of the present one. In order to make the nomenclature correspond with the latest Prussian 'Arzneitaxe' several of the newer remedies have been included under the trivial names given to them by manufacturers, such as "aristolum," "diuretinum," "exalginum," "salipyrin," etc., but "ichthyol" appears under the principal title "ammonium sulfoichthyolicum," and "adeps lanæ" and "wool-fat" represent another well-known substance.

As to the contents of the book, the rejection of two-thirds of the articles suggested has still allowed of the inclusion of a good sprinkling of the unexpected. "Aqua communis filtrata" is defined as "clear spring, river, or rain water, without colour, odour, or taste." Then there are "Blatta orientalis," "Butyrum," "Conchæ præparatæ," "Lapides cancrorum," and "Sapo domesticus." The vegetable materia medica is freely represented. The flowers (including the Caucasian and Dalmatian insect flowers, the former referred to *Chrysanthemum roseum* and *C. carneum*, and the latter to *C. cinerariæfolium*) number 14, the leaves 11, fruits 12, herbs 28, roots 14, rhizomes 7, seeds 14, and species 5. Many of these, as might be expected, smack somewhat of the herbalist; others represent recent importations from across the Atlantic. Maranta, rice and potato starches are all included. The essential oils number 30, and there are 17 other fixed and medicated oils. Of the pharmaceutical preparations the principal are 56 extracts, 15 iron preparations, 30 liquors, 8 lozenges, 24 ointments, 20 plasters, 7 powders, 13 spirits, 19 syrups, 71 tinctures, 44 waters and 13 wines. Several of these are special preparations, and their formulæ are such as are usually looked for in this country in Gray's 'Supplement' and similar receipt books. But perhaps as useful a part of the work as any is to be found in the descriptions of the new synthetical compounds and of various powerful chemical substances not included in the official work, but presumably sometimes ordered in German prescriptions. Aconitine is defined as occurring in colourless prismatic or tabular crystals, melting at 184° C. (Dunstan and Ince give 188·5° as the melting-point of the pure alkaloid). "Duboisinum sulfuricum" is described as a "white crystalline mass, which consists mostly of a varying mixture of hyoscyamine sulphate, hyoscine sulphate and probably sulphates of other bases contained in the leaves of *Duboisia myoporoides*." Other substances included that may be mentioned are atropine valerianate, brucine, crystalline digitalin, osmic acid, curare, eseridine, pilocarpine salicylate, pyridine, hydroxylamine hydrochloride, hydrogen peroxide, hydroquinone, kosin, kefir, nitroglycerine, codeine and its hydrochloride, the soluble salts of caffeine and the "citrate," hyoscine hydriodide, hyoscyamine and its sul-

* Berlin: Deutscher Apotheker-Verein. Large 8vo. Pp. 320. 6·25 Marks.

phate, the compounds of sozoiodol with ammonia potassium and sodium, thiol, and most of the remedies of this class that have been recently introduced.

The monographs have all been drawn up by a thoroughly competent and experienced body, and are as a rule terse and clear. The book is of the same size as the official 'Arzneibuch,' but differs from it in being printed in Roman characters, which renders it somewhat more agreeable to English eyes. Altogether, it is well worthy of a place among the works of reference on a pharmacist's shelf.

MODERN MATERIA MEDICA, for Pharmacists, Medical Men and Students. By H. HELBING, F.C.S. Second Edition.*

The object of the production of this little volume is stated to be to supply the want generally felt in this country of full and comprehensive details as to the constitution, methods of preparation, tests and medicinal applications of the numerous chemical compounds that have been put forward during the last few years as candidates for a place in the materia medica. Such information has, of course, as a rule, already appeared in this and other journals, and in the literature now issued so copiously by certain chemical manufacturers. But the author, who has special facilities for becoming acquainted with the subject, has rendered useful service in making a good digest of these scattered publications, and producing it in a compact and handy form. In an appendix there are tables of average doses, solubilities and melting and boiling points of the compounds mentioned.

Correspondence.

A WORD OF ADVICE.

Sir,—Some foolish, semi-threatening letters having been sown broadcast amongst all sorts and conditions of men connected with pharmacy, and causing some amount of trembling, I would write to advise that no answer be sent to the writer, remembering that all action for evasion of the Pharmacy Act has to be taken through the Council of the Pharmaceutical Society, and not by any private individual, even if endorsed by the awe-inspiring notice, "on behalf of the committee."

Norwich. OCTAVIUS CORDER.

THE PRELIMINARY EXAMINATION.

Sir,—You and I appear to attach different meanings to the word curriculum, and I trust to set matters right by this short communication.

I understand a curriculum to be a course—originally, a track marked out specially for running upon. It has grown as words do grow, and its meaning has expanded, so as to include a course for the mind as well as the body. The candidate for the Minor must produce a certified declaration that he has for three years been practically engaged in the translation and dispensing of prescriptions; *i.e.*, that he has followed a certain prescribed course. Ill-defined, but still, a course. In this sense am I not justified in regarding dispensing as "the only subject in respect of which anything of the nature of a compulsory curriculum may be said to exist?" I expressly guarded against my remarks being supposed to be antagonistic to a regular adequate curriculum, by saying: It is not curriculum *qua* curriculum that is at fault, but the system (p. 953). What is the system? To require a certificate that the candidate has for three years, etc. I agree with you that the certificate is no evidence that the candidate knows anything about dispensing, and in my first letter I endeavoured strenuously to show that this is my opinion.

Now having something which to my mind is of the nature of a compulsory curriculum, but of which the results are profoundly unsatisfactory, I ask, will it not be better to improve the instrument we have and employ it with the knowledge that comes from experience, than spend probably vain endeavours after another, of which we cannot so easily prove the need. The principle of compulsion is conceded in regard to dispensing. Why not take advantage of this and improve the instruction? To do this cannot be so difficult as to go for a brand new curriculum, and it seems to me ought to be conservative of force.

One word more and I have done. On page 31 you say that I "argued that the greater proportion of failures in dispensing, as compared with those in botany, chemistry and materia medica, was sufficient to show that a regular curriculum of study was of little or no value for enabling candidates to pass the qualifying examination." My argument is that there is no regular curriculum of study in dispensing (it is very irregular and uncertain), that it is more necessary in that subject than in any other, and that the means probably exist for arranging one. If this be done, the results of examination in dispensing will be brought in line with those in other subjects.

Galen Works, Deptford. JOHN MOSS.

Sir,—I gather from the letter of Mr. Moss in your last issue that he is in sympathy with the desire for alterations in the Preliminary examination. Mr. Moss's position, however, is so difficult to understand, some parts of his letter so obscure, and many of his statements so astounding, that I venture to ask for an explanation.

Mr. Moss asks why better educated men should enter for an examination because it is harder to pass. It is obvious that this question is not be taken literally, for if there is no connection between the education a man possesses and the examination he can pass, and the two do not increase in direct proportion, our educational system is indeed a failure.

With regard to the inducements which are to be held out to successful candidates at a higher Preliminary examination, I fail to see the relevancy of Mr. Moss's arguments thereon. It is the duty of an examining body, it seems to me, to see that every candidate possesses that amount of Preliminary knowledge which will enable him to learn his professional subjects thoroughly; this I maintain at present our examining body does not do, and I fail to see that a chartered body, such as the Pharmaceutical Society, existing in the interests of the public, has any right to tolerate incompetence because the calling it represents may not be particularly remunerative. But, apart from this, many of us believe that the very reason why pharmacy is so poorly paid is because the bulk of the followers of it in this country are so badly educated, and that is why we insist so strongly on better Preliminary education.

I agree with Mr. Moss as to the expediency of modifying the regulations relating to the dispensing experience necessary in a Minor candidate, but at the same time I am persuaded that the failures in that subject are largely due to defective early education. My own experience, and it has not been inconsiderable, has taught me that most of the failures are due to want of development in the candidate's reasoning powers, and I have invariably noticed that the best educated men are the best dispensers.

In conclusion, Sir, I wish to enter an emphatic protest against the admission of any examination, in lieu of the Preliminary, which does not include the subjects mentioned in my last letter. Many of the subjects embraced in the new Minor and Major examinations are of such a nature that they cannot be grasped adequately without a knowledge of Preliminary mathematics, and a candidate whose mind is so constituted that it cannot grasp a simple algebraical equation had better not study the exact sciences.

The qualifying examination of the Pharmaceutical Society is unique in many respects; it requires a definite scholastic preparation, and our duty both to the candidate and the craft demands that we should correlate the two examinations, and make the first one genuinely preliminary.

37, *Sloane Square, S.W.* A. CAMPBELL STARK.

---

* London: Office of *British and Colonial Druggist*. 16 mo. Pp. 115. 1*s*. 6*d*.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Savege, Johnston, Hill, Bomergue, Inquirer, Splendens, M.P.S.

ON THE HISTORY OF THE COCA BASES.

BY C. LIEBERMANN.

In Nos. 1093 and 1094 of this Journal, "A Study of Coca Leaves and their Alkaloids" is published by O. Hesse, containing statements which I cannot allow to pass without correction. In that communication Hesse attempts to obtain credit for investigation of the coca alkaloids that in no way belongs to him, and is sought at the expense of the labours of Giesel and myself. He there repeats, in a most unbecoming tone, for English readers, all the assertions which I have long since refuted and disproved in the German literature on the subject.*

I deny that Hesse is entitled to any other merit in clearing up the chemistry of the cocaine group than the moderate one of having incidentally discovered an alkaloid accompanying cocaine, to which he ascribed a completely false formula and mode of decomposition. Hesse cannot push aside the fact that I determined the correct formula and decomposition products of that alkaloid;† and hence came to the important conclusion that all the non-volatile bases accompanying cocaine are constituted in like manner from ecgonine, methyl alcohol and an aromatic acid. From the knowledge thus acquired Giesel and I elaborated an easy technical method of preparing ecgonine from the valueless secondary coca alkaloids;‡ and, after we had learnt how to benzoylate ecgonine easily, that method led us to a technical synthesis of the base which completely revolutionized the manufacture of cocaine. That is the explanation of Hesse's unfounded attacks upon me.

I shall now consider in greater detail the remarks that Hesse has directed against me.

With respect to Hesse's complaint that I have unjustifiably interfered with his investigations, the facts of the case are contained in the following lines:—

Previous to the publication of my work Hesse had published two notes on the subject in the *Pharmaceutische Zeitung* (1887, July 16, p. 407, and Nov. 23, p. 669). In the first of these papers Hesse describes a secondary alkaloid, called by him "cocamine." He says, concerning the same:—"This new base has the same empirical formula as cocaine, namely, $C_{17}H_{21}NO_4$," its hydrochloride is $C_{17}H_{21}NO_4 \cdot HCl$; the platinum salt has the formula $(C_{17}H_{21}NO_4)_2 \cdot PtCl_6H_2 + 3H_2O$. A few lines later is the formula $(C_{17}H_{21}NO_4)_2 \cdot PtCl_6H_2 + 4H_2O$. Further, according to Hesse, cocamine yields upon boiling with alcoholic baryta solution an acid that "crystallizes from ether in needles like benzoic acid, but does not appear to be identical therewith, since with sugar of lead the ammonium salt gives a white flocculent precipitate, and with nitrate of silver a milky turbidity." Finally, he says, "On the other hand the basic product formed by this decomposition does not appear to be ecgonine. . . . I did not succeed in preparing the characteristic platinum salt of ecgonine from this base."§ In the second communication Hesse describes a second accompanying alkaloid in the following manner:*—"I call the pure alkaloid cocaidine. Cocaidine bears the composition $C_{17}H_{21}NO_4$ (calculated 67·32 per cent. C. and 6·93 per cent. H.; found 67·20 per cent. C. and 7·01 per cent. H.), and is therefore isomeric with cocaine and cocamine. Upon boiling with alcoholic baryta solution it splits off benzoic acid. Its platinochloride is constituted according to the formula $C_{17}H_{21}NO_4, PtCl_6H_2 + 3H_2O$."

Let this be compared with what I published in my first communication on the subject, which was read before the German Chemical Society on July 9, 1888, one year after Hesse's first and six months after his second publication. Those results, relating to isatropylcocaine (now called truxilline and probably identical with Hesse's cocamine), have been subsequently established as correct, and are now also acknowledged to be so by Hesse. I found that the alkaloid referred to as accompanying cocaine possesses the formula $C_{19}H_{23}NO_4$; that it splits up readily into ecgonine, methyl alcohol and an acid, $C_9H_8O_2$, which exists in two isomeric modifications, which I termed γ- and δ-isatropic acid.†

I had dealt with these facts so comprehensively in every direction that all doubt as to the correctness of my results was completely eliminated, yet they are absolutely inconsistent with the statements made by Hesse regarding the base he referred to.

In my paper I referred to the fact that the above-mentioned papers by Hesse were known to me, but not until after I had begun my own investigations. I also mentioned expressly that "since Hesse has reserved to himself the further investigation of cocamine, I should not have continued the present research if it had not been established by more accurate comparison of Hesse's statements with my own results, that either Hesse's bases were different from mine, or that his results were incorrect." In the first case my results would have been only supplementary to Hesse's, and could only be agreeable to him. On the second supposition, which has been now proved to be the correct one, the publication of my results was not only justified but necessary in order to avoid further confusion in the cocaine literature, as every sensible chemist will admit. Hesse, for the forbearing manner in which I treated him, ought to have been thankful; now I must express myself with regard to his style of work in quite another manner.

Hesse's extremely curious reply to my paper‡ appeared nine months later, after I had in the meantime, in conjunction with Giesel, described

* *Berichte d. d. Chem. Ges.*, 1889, 672; and *Pharm. Zeit.*, 1889, Nos. 36 and 42.

† *Ber. d. d. Chem. Ges.*, 1888, 2343.

‡ *Ber. d. d. Chem. Ges.*, 1888, 3196.

§ See translation, *Pharm. Journ.*, vol. xviii., p. 72.

* See translation, *Pharm. Journ.*, vol. xviii., p. 438.

† Hesse, amongst other things, cites as a fault that I changed the names at first chosen to α- and β-truxillic acid. The names γ- and δ-isatropic acid were, however, quite justifiable both, on account of the similar formula and great resemblance of my acids to the α- and β-isatropic acids. Only after I discovered that these acids were converted by distillation into cinnamic acid, and therefore stood in near relationship with this rather than with the isomeric isatropic acid, did a change of name appear advisable in order to avoid misunderstanding. The convenient trivial name truxillic acid would, at the same time, recall the origin of the acid from the truxillo leaves. It is incorrect to suppose that I assumed, as Hesse implies, that truxilline occurred in the truxillo leaves exclusively, since the occurrence of this companion alkaloid in larger and smaller quantity in different coca leaves was well known to me (*vide Ber. d. d. Chem. Ges.*, 1889, 783).

‡ *Pharm. Zeit.*, 1889, April 17, p. 245.

and patented* a technical method for the preparation of ecgonine and its conversion into cocaine, and had effected the synthesis of cinnamylcocaine† (more recently found by us to occur also in the plants), of anisylcocaine and of truxilline,‡ and had thoroughly investigated the truxillic acids. In that reply he admits the correctness of my results, although in exact opposition to his earlier ones, concerning the composition and decomposition of the alkaloids accompanying cocaine, but asserts that he arrived at these conclusions before me, and independently of me. The inaccuracy of this assertion can be easily detected from his own statements. In this third communication Hesse declares his earlier "absolutely pure cocaidine" to be an impure substance, that yielded upon hydrolysis "benzoic acid, besides some cocaic acid." This compound may be therefore withdrawn completely from further discussion.

Hesse now claims to have found the correct formula for cocamine by a determination of the chlorine in the hydrochloric acid salt. But Hesse attributes to this hydrochloride the formula $C_{38}H_{50}N_2O_{10}2HCl = C_{38}H_{46}N_2O_8 \cdot 2HCl + 2H_2O$, and thus he could only have been able to calculate the formula for the base, if he had simultaneously determined the percentage of water of crystallization. But according to his own statement that is impossible, because the salt decomposes upon heating with loss of hydrochloric acid, etc. The assumption of two molecules of water is therefore quite arbitrary, and none the less so from the complicated method§ that he now employs several years later in the attempt to estimate more accurately the percentage of water. Hence the correct formula could not be deduced from the chlorine estimation, and Hesse only arrived at it from my investigations.

Hesse was not more fortunate in the determination of the composition of the base itself. He obtained the following analytical data :—

C. .	67·46	67·33	67·17 per cent.
H. .	6·99	7·09	7·16 „
N. .	4·33		„

which correspond quite well to the formula of an isomeride of cocaine $C_{17}H_{21}NO_4$. Theory requires for the latter 67·33 per cent. C, 6·93 per cent. H, and 4·62 per cent. N, whilst truxillin, $C_{19}H_{23}NO_4$, requires 69·30 per cent. C, 6·99 per cent. H, and 4·26 per cent. N, and from his experimental results Hesse actually deduced the first formula in his first communication. In order to now obtain my formula $C_{19}H_{23}NO_4$ from the same figures, Hesse simply assumes that the base contains ½ molecule of water of crystallization. But here again misfortune overtakes him, since he cannot drive off and estimate the hypothetical water without decomposing the base; an experience all the more remarkable because I was able to obtain the correct figures for the anhydrous base.

The fact that the base resulting from the decomposition of cocaine, which previously appeared to him "no ecgonine," is now recognized by him as ecgonine after I have proved it to be so, occasions Hesse but little disquietude. He even suggests that in his earlier decision he was misled by my statements respecting the melting-point of ecgonine. I had, in fact, mentioned with regard to the melting-point of ecgonine that it lies near 198° C., as Lossen states and Hesse confirms, but that it rises to 205° C. if the admittedly hydrous ecgonine is previously dried at 140° C. until the last trace of water of crystallization has been removed. At present I have nothing to withdraw with regard to this, in itself unimportant, observation. My statement, however, could never have exercised any influence on the recognition of Hesse's basic decomposition product, since it was made after Hesse's first investigation; and further, sufficient ecgonine resulting from the splitting up of cocaine was at Hesse's disposal to allow of direct comparison.*

Here again Hesse appears to have forgotten that he previously gave quite another reason for his non-recognition of ecgonine, in that he did not succeed in preparing from his basic decomposition product the "platinum salt so characteristic of ecgonine."

Hesse's previous declarations concerning the acid resulting from this decomposition—my α-truxillic acid—also present themselves in a very peculiar light. He appears now seriously (under the name of cocaic acid) to claim the discovery of the acid to which I have given the name of α-truxillic acid. The fact that he knew nothing further to say with regard to an acid that is quite insoluble in water, nearly insoluble in ether, possesses no odour or taste, melts at 274° C., and indeed does not show the slightest similarity to benzoic acid than that it crystallizes from ether like benzoic acid, but does not appear to be identical with it, excites no confusion in him. On the contrary, without reference to my work, he arrives at the correct formula from a lead estimation of a hydrous lead salt and from a carbon and hydrogen estimation of the acid. If Hesse bases the formulæ of newly discovered compounds upon such slight foundations, the mistakes that surround him need not be further wondered at. At any rate, after this I must dispute the statement that Hesse discovered and recognized the truxillic acids.

After all these gross errors of Hesse's have been

* *Deutsch. Patent*, No. 47,602, Aug 14, 1888.

† *Ber. d. d. Chem. Ges.*, 1888, 3372; 1889, 2661. I also dispute with Hesse the priority of discovery of this compound as well as of cinnamic acid in the accompanying alkaloids.

‡ *Ber. d. d. Chem. Ges.*, 1889, 130, 680.

§ *Pharm. Journ.*, 1891, p. 1114.

* The style of Hesse's polemic is too characteristic to be begrudged a small space here. He says (*Pharmaceutical Journal*, 1891, p. 1113): "I admit that I committed an error by not publishing a reply immediately after the appearance of Liebermann's article. But in this reply I should have been compelled either to have declared Liebermann's statements respecting the melting-points of ecgonine, ecgonine hydrochloride, and the so-called γ-isatropic acid to be false, or to have considered the substances in question as different from those I had obtained from the decomposition of cocamine. As I had no right to make the first assumption, and yet on the other hand the suggested difference appeared doubtful, nothing else remained for me than to postpone the reply until the matter had been re-examined. Unfortunately this examination, which terminated with the failure to corroborate Liebermann's statements in regard to the melting-points, involved a great expenditure of time and labour. As I am not in the same pleasant position as Liebermann and able to dispose of the time and energy of others, but was compelled to rely upon myself, it happened that month after month went by in this investigation."

pointed out, his conduct in most violently attacking me now on account of some melting-points that he considers he has more accurately determined, appears in a peculiar light. But unfortunately for him even here I cannot admit Hesse to be right, irrelevant as these small differences in melting-point results will appear to everyone acquainted with the subject. I am by no means rendered less confident in this if Hesse states that his melting-points were determined in Roth's apparatus and with corrected thermometer. My thermometers are also, as a matter of course, tested from time to time, and they do not indicate, as Hesse imputes, 8° too high. Moreover, the melting-points of the truxillic acids have been determined some hundreds of times in the course of my investigation. I know very well that substances not absolutely pure sometimes show the lower melting-points observed by Hesse. On this account I have always been in the habit of recording the melting point that I have observed with the purest analytical material. Every chemist knows that substances which decompose near the melting-point, like ecgonine and its salts, and crystalline compounds containing water of crystallization, yield somewhat varying results according to the more rapid or slower rate of heating.

On this account I still maintain as before that the melting-point of the α-truxillic acid is 274°, not 266°, as Hesse says; that of β-truxillic acid is 206°, not 201°, as given by Hesse; and that of hydrous benzoylecgonine is 87° (Hesse found 92°); the melting-point of the anhydrous benzoylecgonine was found likewise by Hesse and myself at 195°. Certainly I recorded the melting-point of ecgonine hydrochloride somewhat too high, probably resulting from a slight admixture of the anhydroecgonine salt.

If, finally, Hesse thinks he is justified in reproaching me with not having worked with pure α-truxilline, with which no β-truxilline was admixed, I will, to a certain extent, admit the fact, and also that I am still unacquainted with a good method of separation for both truxillines. But so long as Hesse does not publish his own method of separation, I shall doubt that he has worked with much purer or even as pure material as myself. Notwithstanding Hesse's opinion I have, however, had pure α-truxilline; that is to say, such that only yielded α-truxillic acid by its decomposition. As it constitutes the greater portion of crude truxilline, it was obtained by repeated solution of the base in hydrochloric acid and fractional precipitation with soda, the first and last portions being removed, which naturally occasioned a considerable loss of material. How little the presence of any β-truxilline in the α-truxilline could have influenced the correctness of my statements is shown most conclusively by the failure to observe scarcely any other difference in the two truxillines afterwards prepared synthetically by Drory and myself, than the difference in the acids resulting from their hydrolysis.

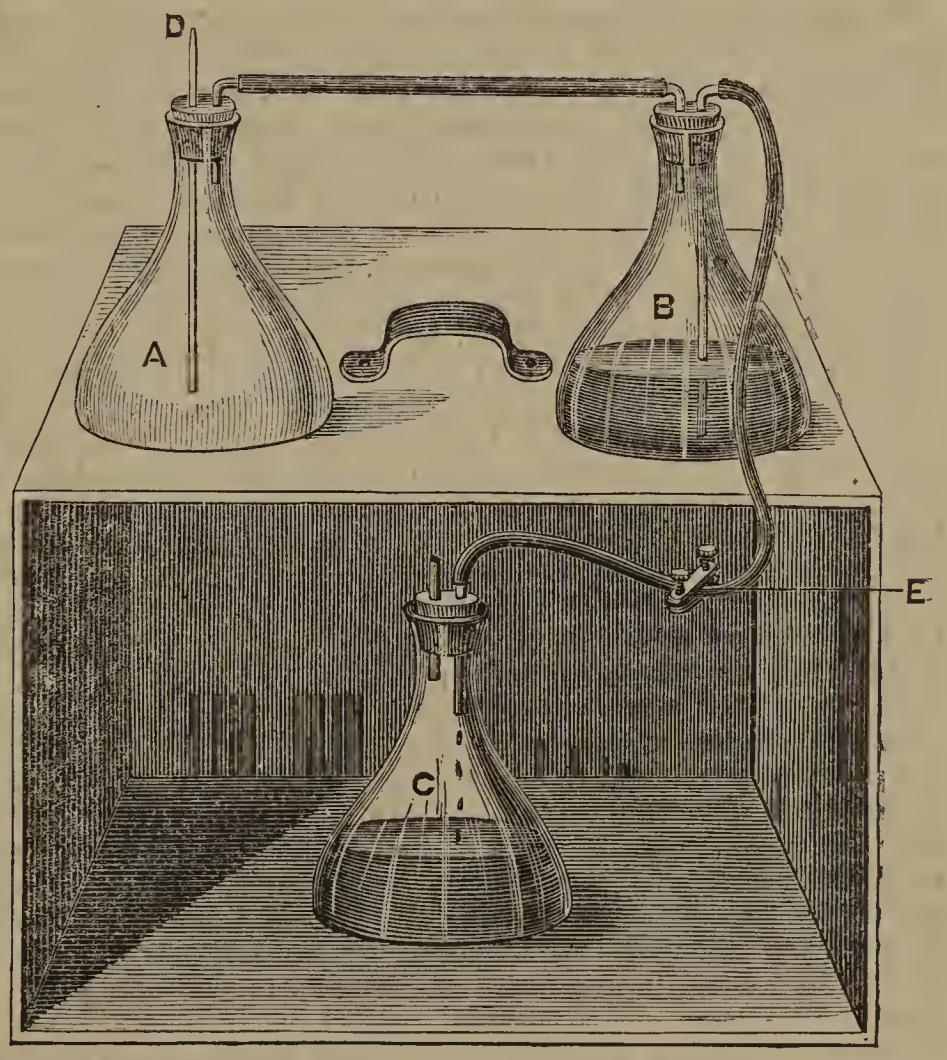
Since nothing is to be gained by further discussion with Hesse, I will only just briefly mention that I do not consider that either "ecgoninecocaic acid" or "homococaic acid," which are said to possess the slightly incomprehensible property of being converted into their lower homologues "cocaic" and "isococaic acid," by treatment with hydrochloric acid, are at present well-defined substances. Further, I would point out that the base to which Hesse gives the name hygrine in no way agrees with the base to which I have applied that name.

A SIMPLE APPARATUS FOR THE ESTIMATION OF THE NUMBER OF MICROBES PRESENT IN AIR.

BY E. W. LUCAS, HONG KONG.

This, as shown in the sketch, consists of a light wooden box, large enough to carry three flasks with flat bottoms, each having a capacity of 1 litre. A is fitted with a rubber cork perforated by two glass tubes, the end of one, D, being drawn out to a fine point, the other, bent at right angle, is connected by a rubber tube to B, which is again connected to C; on the tube connecting the outlet of B to inlet of C is a small screw clamp, E. The interior of the flasks is in communication.

Into the flask A, previously sterilized, are introduced 20 c.c. of nutrient gelatine, and the mouth plugged with sterile cotton. It is then placed in



a steam sterilizer for half an hour on three successive days.

On cooling, the gelatine sets in a thin layer on the bottom of the flask. The cotton plug is then removed and the rubber cork (previously sterilized by washing with 1 per cent. solution of $HgCl_2$, and afterwards absolute alcohol) quickly inserted. The prepared flask being connected with B, the latter is filled with water and the two are placed on the top of the box. The point of the tube D is now nipped off, leaving a small pore, and the clamp E unscrewed so as to allow the water in B to syphon over drop by drop into C, placed inside the box, drawing fresh air into the gelatine flask, out of

which the micro-organisms quickly deposit on the prepared surface. When a sufficient volume of air has been drawn through, the flask A is disconnected, the openings of the tubes secured by rubber caps, and set aside for the colonies to develop.

This, while being on the same principle as Dr. Hesse's, is much cheaper and simpler, as it can be fixed up in any laboratory; it can be easily sterilized, the colonies counted, and if necessary removed by a long platinum needle for further cultivation in test tubes. Its portability is its most useful feature, the author having used it regularly in making examinations of the air in crowded dwellings, marshy and mountainous districts, the number of microbes varying from 36 per litre in a crowded Chinese lodging house to 2 per litre at a height of 1800 feet in the open.

Instead of allowing the nutrient gelatine to cool on the bottom of the flask, rather a larger quantity may be used, and on cooling, if the flask is gently revolved, a thin layer is obtained all over the inside. However, this has been found to have little advantage, the microbes invariably gravitating to the bottom layer.

THE "ARROW WEED" AND MEXICAN "JUMPING BEANS."*

It has long been known that the Indians in Mexico make a powerful poison from some native plant, which poison, in a milder form, is also used as a cathartic. It has also long been known that seeds possessing the curious power of jumping are produced upon the same plant in Mexico, and are sent to other parts of the world, forming quite an article of commerce. The exact nature of this plant, however, has hitherto remained a mystery. At a recent meeting of the Washington Entomological Society, Professor C. V. Riley read an interesting paper on the determination of the plant upon which these "jumping seeds" are produced. In the Transactions of the St. Louis Academy of Science for 1875, in an account of *Carpocapsa saltitans*, Westwood, the insect which causes the saltations of the "beans," he had called attention to the fact that the particular euphorbiaceous plant upon which these seeds are produced was not determined. Westwood in his original description of *Carpocapsa saltitans*, states that the plant is known to the Mexicans as *Colliguaja*, and in a recent letter to Professor Riley from M. Chretien, of the French Entomological Society, the plant was referred to as a Mexican euphorbiaceous plant called *Colliguaja odorifera*, Moline. About this time Mr. J. M. Rose, of the botanical division, brought to Professor Riley specimens of plants recently collected by Dr. Edward Palmer, who sent with the plants specimens of the capsules, thus rendering it certain that the jumping bean occurs on this particular plant. It turned out to be undescribed, has been referred to the genus *Sebastiania*, and will be described by Mr. Rose as *S. Palmeri*. Professor Riley decides that the reference given by M. Chretien is erroneous, as Bentham and Hooker give *Colliguaja odorifera* as from South America, and there is no record of it as from Mexico. Comparison of the specimens in the Department herbarium showed that while evidently closely allied, *Colliguaja* is quite distinct from *Sebastiania*, which renders it rather remarkable that the name given by the Mexicans to the plant should be identical with that adopted for the South American genus. The name seems to be of Chilean origin, and was doubtless introduced into Mexico by the Spaniards. It is doubtless applied to various euphorbiaceous species having the same poisonous attribute, whether occurring in Mexico or south of the equator.

A closely allied species of *Sebastiania* from the same localities (as yet undescribed, but which Profe ssor Watson will describe as *S. Pringlei*) also shows evidence of being infested with *Carpocapsa saltitans*, and a third species (*S. bilocularis*, Watson) is infested by an allied larva of a moth which Professor Riley describes by the name of *Grapholitha sebastianiæ*. There is therefore good evidence that the insect causing the saltations of the "beans" develops in the capsules of at least two different species of the genus *Sebastiania*. The young larva doubtless hatches from an egg laid externally on the capsule, and penetrates the same while quite young, very much as in the case of the common pea weevil. Dr. Palmer found *S. Palmeri* only in certain canons near Alamos, where it is popularly known as *palo de la flecha cuero de las simellas*, *brincaderos* (arrow tree which produces the jumping beans). The plant exudes a good deal of milky juice, which is what the Indians use on their arrow heads. It is a loose growing shrub, from 5 to 8 feet high, the wood very hard, and the milky juice readily crystallizing into a clear, white, brittle substance. In the appearance of the wood it reminds one somewhat of our witch-hazel, and in the leaf of a broad-leaved willow. As in the case of other Euphorbiaceæ, the carpels, or each of the three parts of the capsule, dehisce, or suddenly split when ripe, but when the larva inhabits the same, the parts fail to separate, being kept together by the carpet of silk which the larva spins on the inside. The peculiar jumping motions of the carpel are thus produced, as first described by Professor Riley in the Transactions of the St. Louis Academy before mentioned. The full grown larva, by its holding fast to the silken lining by its anal and two hind pair of abdominal pro-legs, which have very strong hooks, then draws back the head and fore-body, the thoracic parts swelling and the thoracic legs being withdrawn. The contracted parts being then suddenly released, the larva vigorously taps the wall of the cell with the head, sometimes thrown from side to side, but more often brought directly down, as in the motion of a woodpecker when tapping for insects. The seed will thus move whenever warmed for several months during the winter; because, as with most tortricid larvæ, this one remains a long time in the larval state after coming to its growth and before pupating.

Remarkable as are the movements of this seed, Professor Riley remarked that they are thrown into the shade by a little jumping gall produced on the leaves of our post oaks and other oaks. This is a little spherical seed-like gall, and the insect within, and which produces the fly known as *Cynips saltatorius*, can make it bound twenty times its own length. Here the motion is imparted by the insect in the pupa and not in the larva state.

* From the *Scientific American*, June 13.

PHARMACEUTICAL USES OF EXTRACT OF MALT.*

BY JEAN GORDON, PH.G.

Although the use of extract of malt as an emulsifying agent and as a vehicle for various remedies is frequently mentioned in journals and pharmaceutical works, and manufacturing chemists have put upon the market a very large number of mixtures or emulsions of malt extract with cod liver oil, some of them so prepared as to be quite agreeable to the taste; yet I am not aware that the dispensing pharmacist has availed himself to any extent of its advantages in preparing mixtures when insoluble substances are to be suspended. I was first led to experiment with it on

* From an Inaugural Essay presented to the Philadelphia College of Pharmacy. *Amer. Journ. Pharm.*, July.

being asked by a physician to prepare an emulsion of *naphthalin* and to make it as pleasant as possible. The slight solubility of naphthalin in water renders most of its mixtures very unpleasant, and after trying many experiments it occurred to me that extract of malt might be used, it not seeming to possess sufficient medicinal activity to cause its use to be objectionable in the very small proportion necessary to form a good mixture. After rubbing the naphthalin in a mortar to a very fine powder, a definite quantity of malt extract is then added gradually and triturated until a perfectly smooth mixture is obtained. The substance is now suspended, but the mixture is too thick to pour well from a bottle; it is then diluted by the addition of an equal volume of syrup of wild cherry, which not only renders the mixture fluid enough to pour out easily, but also imparts to it an agreeable flavour. The higher specific gravity of the malt extract causes the particles of the naphthalin to remain suspended, and its viscidity, even when diluted one-half, is sufficient to prevent it from floating on the top until after standing for some time, when slight agitation will restore a uniform mixture. In an emulsion of naphthalin with mucilage of acacia a very large proportion of acacia must be used, and after standing for a few hours the naphthalin will be seen at the bottom of the bottle, and it is only after the most vigorous shaking that a smooth mixture can be restored, if at all—it being very difficult to dislodge the sediment. Compressed tablets of naphthalin are prepared, but, on account of its bulkiness and the large dose sometimes used, it is not a substance exactly suited to that form of administration, if by any means a preparation can be obtained that will to some degree mask the strong odour and taste.

In extract of malt it seems to be less soluble than in syrup or mucilage of acacia; the mixture just described having scarcely any of the odour and even less of the taste of naphthalin unless held on the tongue until it has been partly dissolved by the fluids of the mouth. It was not the purpose of the physician to administer a medicinal dose of malt, hence only a sufficient quantity was used to make a satisfactory preparation—five grains of finely-powdered naphthalin being contained in one fluid drachm.

Some of the resinous substances most frequently administered in form of emulsion yield with extract of malt mixtures equal in all cases to the acacia emulsions, and, in most instances, more agreeable to the taste, and of more attractive appearance. The unsightly appearance of both the tincture and resin of guaiac when made into an emulsion with acacia is well known to every pharmacist, and as it is a remedy which is frequently prescribed, it would seem to be worth making an effort to improve upon the old emulsion. With the tincture of guaiac a good mixture can be made by stirring together, in a graduate, equal measures of extract of malt and afterwards tincture of guaiac, gradually added; care must be taken not to allow the tincture to come in direct contact with the sides of the graduate, and it is well to take the precaution to first wet the sides with the extract and the syrup before the addition of the tincture. The mixture obtained in this way, while not as bright in appearance as either the malt extract or the syrup, does not assume the bluish colour of the gum emulsion. After standing for a day it separates into two layers, the lower transparent and bright, the upper one having a slightly curdled appearance, but a slight shake of the bottle suffices to cause the layers to mix again. That the guaiac is contained in both layers I have determined by setting aside a portion in a narrow tube until the two layers had formed and examining them both; the lower one becomes opaque by the addition of water, but glass tubes or graduates containing it can be made perfectly clear and bright by simply rinsing with cold water, thus showing that the resin has been taken up or emulsionized by the extract of malt.

With the resin of guaiac the method must be slightly different; it should be first rubbed thoroughly in a mortar with the extract of malt until a smooth paste is obtained, after which sufficient of the syrup of wild cherry is added to make the mixture fluid enough.

With tincture of asafetida a mixture is obtained in the same manner as with tincture of guaiac, but to prepare a mixture from the gum resin, it is best to rub it first in a mortar with a small quantity of hot water to form a paste, then add the malt and syrup alternately in small portions; it can easily be made to contain 8 per cent.—double the strength of the U. S. P. Mistura Asafœtidæ. An advantage of this over the official mixture is, that it does not have the exceedingly disagreeable smell of the latter and the taste is less unpleasant. Like the mixtures mentioned before the addition of water renders it opaque.

For the administration of the tincture and fluid extract of cannabis indica, malt extract answers very well; with these preparations the best result is obtained with the following proportions:

Tincturæ cannabis indicæ	℥ss
Extract malti	℥j
Syrupi pruni virginianæ	℥ss

With copaiva it is necessary to proceed much the same as in making an ordinary emulsion, starting with a small portion of the extract of malt in a mortar and adding with trituration alternately portions of copaiva, malt and syrup. The mixture retains about the colour of the malt, forms two layers on standing, but is easily restored by agitation.

With other resinous tinctures and fluid extracts the results have been similar to those described, the ones selected for mention being those we are called upon most frequently to dispense—and are also typical resinous substances. Extract of malt as prepared by the U.S.P. official process, or as found in the market prepared by the various manufacturers, is in itself too thick to dispense as a vehicle, hence it is necessary to use a diluent of some kind. I have selected the syrup of wild cherry for the purpose, because of its agreeable taste and slight odour of hydrocyanic acid. With extract of malt made according to the direction of the U.S.P., results were obtained identical with those from the commercial extracts; about the only difference noticed was in the colour of the mixtures, some of the commercial extracts being of a darker colour.

In summing up the result of my work in this direction it may be said that in extract of malt we have a ready, inexpensive and equally good substitute for acacia in suspending and masking the taste of disagreeable, resinous and other insoluble substances, wherever its presence in small quantity is not found to interfere with the therapeutic action of the substance prescribed.

SANDAL WOOD.

BY P. L. SIMMONDS, F.L.S.

The note on sandal wood published in the last number of the Journal is interesting and exhaustive, as far as it goes, and perhaps a few statistics of the commerce in this wood may be acceptable.

India is still the chief source of the supply, although the bulk is sent to China. The value of the exports from thence range from £60,000 to £80,000 per annum. They were in the financial years ending March as follows:—

1889.	£50,500
1890.	63,945
1891.	79,482

The annual sale of sandal wood, which is a government monopoly, in the year 1889 was 2420 tons. The imports of sandal wood into China, chiefly for incense and perfume, range from 94,000 to 106,000 cwt. yearly. Comparing the former import trade with the present, we find the imports to have been in—

1868	44,450 piculs
1869	79,105 „
1870	52,336½ „
1871	42,843 „
1872	64,273 „
1886	83,601 „
1887	75,432 „

The picul is equal to about 1¼ cwt.

From these figures it will be seen that although the export of sandal oil from India may be declining, the supply of the odoriferous wood from different quarters is increasing. There are no official figures which show the imports of sandal wood into London. One hundred pounds of good sandal wood should yield from 25 to 30 oz. of otto. The chief use of this oil in India is at the period of festivals and weddings. It is then distributed largely to the guests as they arrive and sprinkled with profusion in the apartments, not, of course, pure, but mixed with rose and other perfumed oils.

In China the powder of sandal wood is supposed to possess sedative and cooling properties, and on that account is prescribed in fever and gonorrhœa. Internally it is given in bilious affections and externally in prickly heat and cutaneous eruptions. The wood in powder or rubbed up into a paste is used by all Brahmins in the pigments for their distinguishing caste marks.

Besides the species of *Santalum* named by M. Adrian, the following also enter into commerce: *S. austrocaledonicum*, Viellard, the Emmango wood, *S. cygnosum*, Miguel, and *S. spicatum*, Dec., of Western Australia, furnish scented woods, of which 4527 tons were exported in 1885, valued at £36,216.

Santalum Preissianum, Miguel (*S. acuminatum*, Dec.), is very rich in oil, which is much sought after in China. The wood in the rasped condition has a peculiar balsamic odour, suggestive of roses. The wood of *Sethia indica*, Dec., is so fragrant as to be used in Mysore instead of sandal wood. A brown-red wood of Madagascar yields a so-called sandal wood oil, but like the West Indian it is of no practical importance.

NOTES ON SOME NORTH AMERICAN MEDICINAL PLANTS.*

BY JOHN M. MAISCH.

In a paper bearing the same title as the present one, which I presented last year (see *Amer. Journ. Pharm.*, 1890, p. 331), some account of Colorado cough-root was given, and it was suggested that it was probably derived from a species of Ligusticum. Shortly after the publication of the paper my supposition was confirmed by a letter from Mr. John Kochan, of Denver, who stated that "Mr. Ebert collected and identified the plant in 1888, as well as myself in 1889, mention of which is made in *Botanical Gazette*, vol. 14, p. 278 (1889)." The reference alluded to reads as follows:—

Ligusticum filicinum, Watson, was collected in great abundance near Lake City, Colorado, by E. J. Ebert, in 1888, and in the mountains back of Denver, by John Kochan, in July, 1889. This is the "Osha" of the Indians, who use its very large aromatic roots. It was referred to *L. apiifolium* by Rothrock in report of Wheeler's expedition, who collected it about Twin Lakes, Colorado.

The origin of Colorado cough-root being established, another interesting question is opened as to the identity of this Colorado Osha with the *Osha* from New Mexico, described by Wm. Procter from specimens received from Jacob Krummeck, Santa Fé, New Mexico (see *Amer. Journ. Pharm.*, 1867, p. 202). From incomplete botanical specimens sent by Krummeck, Elias Durand (*ibid.*, 1868, p. 106) referred the probable origin of this root to *Daucosma laciniata*, now known as *Discopleura laciniata*, which is very common in Western Texas and New Mexico; immersed in boiling water this root has a very strong smell of carrot. It was chemically examined by Herman Haupt (*ibid.*, 1873, p. 347). To the writer the odour of this root suggests that of lovage, and also in general appearance and in structure it resembles the Colorado root; but the latter, probably, does not grow in New Mexico, at least, "Coulter's Rocky Mountain Botany" gives the Wahsatch and Uinta Mountains and Wyoming as the range of distribution of this plant, and does not enumerate the species of Discopleura among the plants growing in the Rocky Mountains. It is not unlikely that the Indian name *Osha* may be used in different localities for different species having similar properties; the New Mexican Osha may therefore be derived from one of the South-western species of Ligusticum or of Discopleura, and the question cannot be definitely decided until complete botanical specimens of the parent plant can be examined.

While the roots of many species of Umbelliferæ are aromatic, carminative and stimulating from volatile oil, it is well-known that acrid or narcotic properties pervade in some plants of this order. From time to time cases of poisoning have been reported from eating what has been called wild parsnip root. The cultivated parsnip, *Pastinaca sativa*, is widely esteemed as a valuable esculent, and since it has become thoroughly naturalized in many parts of the United States, the question as to its poisonous qualities, when growing wild, is certainly a most important one, but in the writer's opinion has been settled in the negative; see account of "the wild parsnip (*Pastinaca sativa*)," by Professor F. B. Power in "Contributions from the Department of Pharmacy of the University of Wisconsin," No. 2, p. 43. From the root of this plant Jos. T. Bennett (*ibid.*, p. 39) could not obtain any poisonous principle, nor did the cooked root produce any symptoms of poisoning in a cat.

A case of poisoning by "wild parsnip" occurred in April last in Du Bois, Pa.; three of the children who had eaten it died within three hours, and four recovered. Mr. C. J. C. Boyles sent me some of the fresh roots, which were easily recognized as coming from an umbelliferous plant; but when, after a prolonged absence from home, the specimens reached me, the few leaves were not in condition for determining with certainty the plant, which appeared to be either *Sium cicutæfolium*, Gmelin, or *Cicuta maculata*, Linné. One of the roots was planted and is at this date beginning to flower, and from the character of the stem and leaves is easily recognized as the species of Cicuta just mentioned. That this plant, and more particularly the root, is very poisonous is stated by most writers on American plants. Dr. Darlington (*Flora Cestrica*) writes that "the lives of children and others are often endangered and sometimes destroyed by eating the root in mistake for that of sweet cicely (*Osmorrhiza longistylis*, D. C.)," and that "the herbage is also said to be destructive of cattle when eaten by them." Since the sweet cicely has a distinct anise-like odour, the root of Cicuta cannot well be mistaken for it. Dr. W. P. C. Barton ('Compendium Floræ Philadelphicæ') describes the odour, taste and smell of Cicuta as being "remarkably sweetish, aromatic and warm." Dr. R. E. Griffith ('Medical Botany') says: "The whole plant in a fresh state is poisonous; but

* Read before the Pennsylvania Pharmaceutical Association, June 24. From the *Amer. Journ. Pharm.*, July.

by drying, the stem and leaves become innocuous, and are eaten by cattle without danger. The root, however, is the most active portion; it has a strong, aromatic taste and odour, and the cortical portion contains a yellowish viscid juice."

The common names, by which the plant is known in different sections of the country, are water-hemlock, spotted cowbane, beaver poison, snake-weed, and musquash; in Mr. Boyles' letter I have for the first time noticed the name of wild parsnip applied to it; but it is very likely that many of the cases of poisoning reported by plants of the latter name were really due to the cicuta.

Two years ago (*Botanical Gazette*, 1889, p. 18) a case of death was reported, a farmer in Iowa having mistaken this root for an artichoke. So it seems that the fleshy character and agreeable odour and taste render this root as particularly dangerous by mistaking it for others which are edible and harmless.

That the fruit *Cicuta maculata* contains a volatile alkaloid was shown by Joseph E. Young (see *Amer. Journ. Pharm.*, 1855, p. 289), and has quite recently again been demonstrated by R. Glenk; but whether it is identical with coniine or with the little known cicutine of Polex and Wittstein has not been satisfactorily demonstrated. Neither investigator succeeded in isolating from the root a similar alkaloid, to which possibly its virulent properties might be due. It deserves to be mentioned in this connection that in 1868 Van Ankum was likewise unsuccessful in obtaining from the root of the European species, *Cicuta virosa*, either a volatile alkaloid or a crystalline principle possessing the poisonous properties of this plant. The *cicutoxin* of R. Boehm and Trojanowski (1876, 1877) is soft, amorphous, and of acid reaction, and represents, essentially, the alcoholic extract of the ethereal extract of the root.

Dr. C. B. White, U.S.A., has recorded (see *Amer. Journ. Pharm.*, 1873, page 371) a case of poisoning by the root of the water parsnip, *Sium latifolium*, now known as *Sium cicutæfolium*, Gmelin, which, like the water-hemlock, is indigenous throughout the North American continent. Analysed by A. R. Porter and by N. Rogers (*ibid.*, 1876, pp. 348 and 483), no poisonous principle could be detected, and the deleterious effects were ascribed as being possibly due to a resin. Whether this root has, to some extent, been eaten in the place of other umbelliferous roots will be difficult to determine. In a large number of works on descriptive and medical botany which I have consulted, no allusion could be found to its supposed poisonous properties, except in Carter's 'Synopsis of the Medical Botany of the United States.'

During the last and in the beginning of the present century *Cicuta maculata* appears to have been employed medicinally, and references to its properties and uses will be found in the writings of Schoepf, Barton, Muhlenberg, Bigelow, and others.

Euphorbia marginata, Pursh, a well-known garden plant, commonly called "snow on the mountain," is indigenous to the country between the Rocky Mountains and the Mississippi River, and in the Eastern States is beginning to establish itself. Like other species of the same genus, it contains an acrid milk-juice. Applied to the skin, this juice produces a decided burning sensation and ultimately redness and a pimply eruption, somewhat resembling that occasioned by poison-oak, as has been observed by Mr. J. Schneck, of Mount Carmel, Ill. (see *Botanical Gazette*, 1890, p. 276). As far as examined the acrid principle of the euphorbias is an amorphous resin, and exists in the different species in very unequal proportion, the annual plants being usually mildest in their action. It would be of interest to determine the nature of the irritating principle of the plant in question, likewise the amount of fixed oil obtainable from the seeds, and to what extent this may possess purgative and rubefacient properties, which are commonly observed in oils of the Euphorbiaceæ.

Eupatorium purpureum, Linné, is known in some localities as gravel-root and kidney-root, in allusion to the supposed virtues of its subterraneous parts. Some time ago it was sent to me from Harrisburg, Pa., with the statement that it was said by some parties to be a sovereign cure for rheumatism, and that it was used in the form of a tincture prepared by steeping the root in whiskey for a week. An analysis of this drug was made by Mr. G. Herbert Ray and published by Professor Trimble (see *Amer. Journ. Pharm.*, 1890, p. 74), from which it appears that only 13 to 14 per cent. are taken up by simple solvents, and of this amount fully four-fifths consists of carbohydrates and albuminoids, the remainder being resinous, oily, and waxy matters, so that it is difficult to imagine to what principle the alleged medical properties could be due. A compound of undoubted interest, though most likely destitute of decided activity, is Professor Lloyd's euparin (*ibid.*, p. 76), which crystallizes in handsome bright yellow needles, and is apt to be deposited from the fluid extract on standing. A bitter principle which is present to a limited amount in this drug is prevalent to a larger extent in other species; but the aromatic properties, which are frequently encountered among the 560 known species of Eupatorium, are wanting almost entirely.

Hieracium is another extensive genus, of fully 200 species, of the order Compositæ, to which also Eupatorium belongs. The plants of the former genus are generally more or less bitter and astringent, and like others of similar qualities have occasionally been employed as mild astringents and tonics. Of the North American species, *H. venosum*, Linné, enjoyed considerable repute as an alexipharmic, hence the popular name rattlesnake weed, by which it is still known. The case related by Dr. Harlan (*Trans. Am. Phil. Soc.*, new ser., vol. iii.) of a person who allowed himself to be bitten by a rattlesnake, and was completely revived after taking some decoction of this plant, is still quoted in medical works on indigenous materia medica. Another claimant for similar honours has recently been reported by Mr. F. D. Kelsey, of Helena, Montana (*Botan. Gazette*, 1890, p. 237), upon the testimony of a clergyman, Rev. Mr. Clark, who affirms that he has successfully treated several patients and has never yet lost a case. He employs *Hieracium Scouleri*, Hooker, the fresh plant being bruised, then gently steeped in milk, the liquid strained and drank in large quantities until the patient has fully recovered; he also believes that it can be made into a preparation like an extract.

The plant is described by Coulter ('Rocky Mountain Botany,' p. 217) as follows: Robust, a foot or two high; hairs long and soft setose, whitish or yellowish; leaves lanceolate or spatulate-lanceolate, 3 to 6 inches long; panicle irregular or branching; involucre somewhat furfuraceous and glandular, also sparsely or copiously beset with long bristly hairs; akenes columnar and short; pappus whitish—from Montana to Oregon and south to the Wahsatch.

It may not be without interest to refer in this connection to a species introduced from Europe, *Hieracium præaltum*, Villars, which, according to Lester F. Ward (*ibid.*, 1889, p. 10–17), has become such a pest in Jefferson county, New York, that it is now known there as devil-weed and king-devil.

The common name fever-root, by which *Triosteum perfoliatum*, Linné, is known in some localities, indicates the use which is said to have been made of it by the Cherokee Indians. It is a mild cathartic, and in the fresh state possesses emetic properties. The drug appears to enjoy considerable popular reputation in various complaints, as may be judged from informa-

tion received by me from different sections of the country. Lately I have learned that near Dallas, Georgia, it is in local repute as a remedy in rheumatic affections, and that it is cultivated there by a farmer and prescribed in rheumatism with seeming success. The plant grows mostly in woodlands, from Canada to Iowa and southward to Alabama. It deserves a thorough chemical investigation. It has been variously known as Dr. Tinker's weed, wild ipecac, horse-gentian, and wild coffee, the latter name having reference to the use which has formerly been made of the hard nutlets, three of which are contained in the rather dry drupaceous fruit.

Ceanothus americanus, Linné, is perhaps best known in the Atlantic States as New Jersey tea in reference to the use sometimes made of the leaves as a substitute for tea. Medical works also speak of the use of root by the Cherokees in gonorrhœa, cancer, and syphilis. Until recently I had not learned that it was popularly employed for one of these complaints; some time ago I received information from the central part of Texas that it is used there in a crude manner in gonorrhœa with much success, and is designated as clap-root. The drug is astringent, and from a recent investigation made by F. C. Gerlach appears also to contain an alkaloid.

Helianthemum canadense, Michaux, is the only plant of the indigenous Cistaceæ which was formerly admitted into the Pharmacopœia, and is still employed to some extent, mainly in scrofulous affections. The closely allied genus Lechea comprises about eight homely North American herbs growing in sandy soil and sterile localities. They are generally known as pin-weeds; but under the name of flux-weed a plant was received from a southern town, which proved to be *Lechea major*, Michaux, and which was stated to be used for complaints indicated by the common name. It has an astringent and somewhat bitter taste, and according to Dr. Carter (*loc. cit.*, p. 14) is reputed to be tonic, febrifuge and antiperiodic. Its constituents are unknown, except so far as they are indicated by the sensible properties of the plant.

To the indigenous plants reputed to possess alexipharmic properties another may possibly have to be added, which, however, is not likely to prove very efficient for such purposes. The plant came from North Carolina, and was claimed to have been successfully used for some time in cases of snake bites, poisoning from insects, etc. It was *Galium pilosum*, Aiton, an herbaceous perennial, found in rather dry soil from New England westward to Eastern Kansas and southward to near the Gulf. It has a nearly erect rough stem, oval and punctate leaves in whorls of four, small purplish-brown pedicellate flowers, and a subglobular dry fruit beset with hooked bristles. The few species of Galium which have been subjected to chemical examination have shown the presence of a peculiar kind of tannin, some citric and other organic acids, to which is probably due the effect upon milk, this being curdled by some species. They have generally been regarded as being mildly refrigerant, diuretic and aperient, and more striking effects were, most likely, not observed from the plant in question, since the party sending it desired to learn from me all its medicinal properties.

A species of the same genus was recently the cause of a curious, though innocent, mistake. A German physician in a western state ordered for use in his practice a quantity of leaves of "Hirschzunge" (hart's tongue). Both the German name and its English equivalent are applied to a fern which is still officinal in some pharmacopœias of Europe, *Scolopendrium vulgare*, Smith, and which is indigenous throughout a large part of the northern hemisphere. While this fern is rare in the United States, and not often found in drug stores, an entirely different indigenous plant is well known by the similar English name of deer's-tongue, *Trilisa* (*Liatris*) *odoratissima*, Cassini, now also called vanilla plant, on account of its fragrant odour, due to coumarin. This species grows only in the Southern States, and from the experience in the present case appears to be replaced in some localities, probably for use as a tobacco flavour, by another more common plant, which also contains coumarin; for the article supplied as Hirschzunge was *Galium triflorum*, Michaux, the so-called sweet-scented bedstraw, which is indigenous throughout North America. The package having been labelled deer's-tongue leaves, it seems that this name is now, in some localities at least, given to the substitute for that plant for which it was formerly exclusively used. In this connection it may be mentioned that the same species of Galium is collected by German inhabitants as Waldmeister, and used in the preparation of "may-wine," in place of, and as a substitute for, the closely allied *Asperula odorata*, Linné, which does not grow in the United States.

Tillandsia usneoides, Linné, known in our Southern States as long, black or Spanish moss, has been found very useful by Dr. L. M. Tiffany, of Baltimore (*Med. News*, Dec., 1890), as a soft and elastic dressing for wounds. This so-called moss is botanically related to the pineapple, and is classed with the order of Bromeliaceæ. It is a true epiphyte, and is met with only in humid situations, where it hangs in long tufts from the branches of trees. After it has been deprived of the softer portions of the tissue, the nearly black fibres are used for upholstering, and are now recommended as stated. The living plant is of a grayish-green colour.

ALKALOIDS FROM THE SEEDS OF DELPHINIUM STAPHISAGRIA, L.*

BY CHARALAMPI.

To extract these alkaloids, 2 kilos. of the seeds is digested in 8 kilos. of 80 per cent. alcohol during four days at 15°. The liquid is removed, and the residue is again treated until the extraction is complete. The alcohol is evaporated below 60° under diminished pressure and the residue from the distillation is diluted with an equal volume of water. After twenty-four hours three layers are formed: an upper one of a greenish, fatty oil; a middle one of brown, aqueous, alcoholic liquid; and a lower one composed of a resinous mass. The lower layer is run off. The middle one is freed from alcohol at a temperature not exceeding 50°. The oily layer, which retains a considerable amount of alkaloids, is agitated with water containing a little sulphuric acid, allowed to remain five or six days, the layers formed separated, and the oily part again repeatedly treated (ten times). The acid liquids are united, filtered, treated with ether to remove the last traces of fat, and united with the liquid obtained from the aqueous alcoholic layer. Hydrogen sodium carbonate is added, and then ether to take up the alkaloids. The ethereal solution is removed and evaporated, spontaneously towards the end, when delphinine is not long in making its appearance on the sides of the vessel. This base is purified by combining it with tartaric acid, and repeating the treatment with hydrogen sodium carbonate and ether.

Delphinine has the formula $C_{62}H_{49}NO_{14}$, as deduced from direct analysis, and also from the composition of its aurochloride and platinochloride; this differs sensibly from the composition given by Dragendorff and Marquis in 1877. It gives anhydrous, rhombic crystals. It withstands a temperature of 120°, but a

* *J. Pharm.* [5], xxiii., 302-306; from *Pharm. Zeit. Russ.*, xxix., 641. Reprinted from the *Journ. Chem. Soc.*, July.

little higher it begins to colour, and melts at 191·8°. It has a pungent, burning taste. 1 gram dissolves at 15° in 20·49 grams of benzene, in 642·4 grams of light petroleum (sp. gr. 0·633), in 53·4 grams of ether of 0·728 sp. gr., in 47·6 grams of absolute ether, in 44·4 grams of absolute alcohol, in 238 grams of 90 per cent. alcohol, and in 1594 grams of water. The recently prepared aqueous solution has an alkaline reaction. This base gives crystallizable salts with nitric and sulphuric acids, sparingly soluble in water, alcohol, and ether; they easily dissolve in acidified water. Hydrochloric, acetic, oxalic and tartaric acids yielded amorphous compounds.

The mother liquor, left after removal of the delphinine, when evaporated very slowly, yields a certain quantity of *delphisine*, $C_{62}H_{50}NO_{14}$, in the form of acicular crystals melting at 189·2°. This alkaloid dissolves at 15° in 75·2 parts of benzene, in 665 of light petroleum, in 43 of ether of sp. gr. 0·728, in 71 parts of absolute ether, in 104 of 90 per cent. alcohol, and in 370 parts of absolute alcohol. It is very slightly soluble in water, but dissolves readily in chloroform, as does delphinine.

Delphinoidine, $C_{50}H_{42}NO_8$, obtained in an amorphous state after the foregoing, is scarcely soluble in water; at 15°, one part dissolves in 9·43 parts of light petroleum, in 30 5 of benzene, in 17·8 of 90 per cent. alcohol, in 4·03 of ether (sp. gr. 0·728), and in 37·03 of absolute ether. The author has also examined the product previously described as staphisagrine, which forms the residue of the operations yielding the alkaloids already described. This base appears to him to be really a mixture of four amorphous alkaloids. Delphinine, delphisine, and delphinoidine, especially the two former, are highly poisonous, resembling aconitine in their action.

CICUTA MACULATA, LINNE.*

BY ROBERT GLENK, PH.G.

This species is popularly known as water hemlock, musquash root, beaver poison, or spotted cowbane, and grows on the borders of swamps and on the banks of streams, flowering during July and August. After fruiting, the stem dies off to the ground, but a bud survives, and from this the shoots of the following spring appear. The flowers grow in umbels of 2 to 4 inches in diameter, without a general involucre. Calyx consists of 5 minute sepals adhering to the two-celled and two-ovuled ovary; the 5 inflected white petals alternate with the 5 stamens and are inserted on the disk which crowns the ovary and surrounds the base of the two diverging styles. The fruit is a sub-globular cremocarp, about $\frac{1}{12}$ in. long, contracted or compressed on the side, each mericarp having 5 strong ribs and 6 single oil tubes, two of which are on the face. The seed is suspended from the top of the cell, and consists of a minute embryo, surrounded by albumen. The stem is smooth, branched at the top, hollow, jointed, usually of a striated purplish green colour, except when growing in the shade, when it is green. The leaves are alternate, pinnately compound; the leaflets oblong-lanceolate, coarsely serrate, the veins ending in the notches, and not in the points of the serratures. The petioles are hollow and sheathing at base. The root is composed of from two to seven large, fleshy branches, frequently 3–4 in. long and 1 inch in thickness. In various parts of the root bark are found cavities or cells, containing a yellowish, resinous juice. It has a strong, parsley-like odour and taste.

Microscopical Structure.—The root has a corky layer consisting of about three rows of flattened cells. The thick bark consists mostly of parenchyma tissue, with large intercellular spaces and numerous large resin cells. Under the thin cambium zone is the meditullium, with broad medullary rays and without wood fibres, but in the centre with a layer of large ducts. The hollow stem is made up of a cylinder of wood, enclosed by a thin cortical layer. The wood wedges are slender, of the same size as the medullary rays, and surround a few circles of parenchyma of a white colour, the remnants of the pith. The hollow petiole has a structure analogous to that of the stem. The epidermis of the upper side of the leaflets consist of one row of cells; the palisade layer is in one or more rows of vertically elongated cells; the parenchyma, between this layer and the lower surface, encloses irregular air spaces. On the lower surface are numerous scattered stomata. The leaves are free from hairs on the surface. The tissue of the albumen of the seed is composed of parenchyma, containing colourless drops of fixed oil, also transparent colourless spherical grains, several of which are enclosed in each cell. Under a high magnifying power they show a series of concentric layers; they are coloured brown by iodine. The vittæ are filled with a yellowish-brown essential oil, and extend the whole length of the fruit.

Chemical Investigation of the Fruit.—The fruit was gathered during August, September and October, before the dark green colour had been lost, it giving then a stronger odour with solution of potassa than in the fully ripened condition.

Following out a plan of analysis, similar to Dragendorff's, the following proximate constituents were noted:

The fruit, owing to its oily nature, was first macerated in the bruised condition with petroleum spirit, of a boiling point 40° C., for three days; this first extract was then poured off and reserved. The residue was finely powdered and again extracted with petroleum ether until nothing further was dissolved out. On evaporation a residue was left, equal to 21·2 per cent. of the fruit, of which 5·1 per cent. is volatile oil. The fatty oil is semi-solid at ordinary temperatures, and of a green colour, owing to the presence of a little dissolved chlorophyll. It belongs to the class of non-drying oils, and forms, with HNO_2, a soft, brownish solid. On decolorizing its solution in ether by animal charcoal, a light, yellowish oil is produced, having the sp. gr. 0·946; with H_2SO_4 conc. (1 acid, 5 oil), coloured dark brown; soluble in all proportions in absolute alcohol, ether, chloroform, bisulphide of carbon, and in 100 parts of acetic ether; insoluble in glacial acetic acid.

The volatile oil obtained by distilling the bruised fruit with water was first of a dark colour, but on redistillation was obtained nearly colourless; yield 4·8 per cent.; sp. gr. ·855; boiling point 177° C. (350° F.); soluble in 1½ parts of commercial alcohol, in all proportions of absolute alcohol and in 50 parts of glacial acetic acid. The following colour reactions were observed: a solution of bromine in chloroform (1-20) gives a brownish colour; a strong alcoholic solution of HCl colours a reddish violet; H_2SO_4 conc. (6 drops to 1 of oil) immediately dark brown; fuming HNO_3 on a solution of the oil in bisulphide of carbon gives a brownish tint; solid iodine added to the oil dissolves slowly; picric acid on warming dissolves with an orange colour.

The ether extract weighed 2·12 per cent., of which ·98 per cent. was resin soluble in alcohol. This, on incineration, left ·5 per cent. of ash; it gives with H_2SO_4 a brown colour, with conc. HNO_3 a light brown solution; with 5 per cent. KOH a yellow solution, and this with potassium permanganate becomes an emerald green, purplish, then reddish brown.

The absolute alcohol extract weighed 2 per cent. of which ·68 per cent. was resin and 1·32 per cent

* From an Inaugural Essay presented to the Philadelphia College of Pharmacy. From the *Amer. Journ. Pharm.*, July.

soluble in water. The watery solution gave with ferric chloride a brownish green colour, with lead acetate no precipitate; with KOH a decided coniine-like odour; and after acidulation with HCl, a precipitate with potassio-mercuric iodide. After the preparation of the volatile oil from the drug, the residue in the retort was mixed with milk of lime and distilled. The distillate had a strong coniine-like odour. On agitation with petroleum ether and evaporating the solvent, a syrupy strong smelling liquid was left, which turned darker on standing in a beaker for 24 hours. The alkaloid forms heavy white fumes on bringing a rod moistened with HCl in contact with the vapour. On the addition of conc. H_2SO_4 a reddish colour is produced.

The aqueous solution reduces mercuric chloride and silver nitrate. Neutral acetate of lead produces a white precipitate; ammoniacal copper sulphate bluish white; platinic chloride yellowish red; potassio-mercuric iodide grayish white; gold chloride yellowish white; tannin or picric acid give no precipitates with the aqueous solution, and ferric chloride is merely darkened in colour. Whether this alkaloid is identical with coniine could not be fully determined, owing to scarcity of material. It does not seem to be present in the root.

The results on treating the fruit with other solvents are given in the tabular statement below.

On drying at 100° C. the loss of the fruit was 10 per cent.; the ash amounting to 6 per cent. contained—

	Per cent.
CaO	14·9
Al_2O_3	20·0
MgO	29·3
H_2SO_4	15·2
Cl	14·5

Smaller quantities of K, Na, SiO_2, Fe_2O_3 and CO_2; phosphorous acid could not be detected.

Recapitulation.

	Per cent.
Moisture	10·00
Ash	6·00
Petroleum Ether Extract—	
Volatile oil	5·10
Fixed oil and chlorophyll	16·10
Ether Extract—	
Resin sol. in alcohol	·98
Resin sol. in ether, chlorophyll	1·14
Absolute Alcohol Extract—	
Resin	·68
Extractive, etc., sol. in water, alkaloid	1·32
Aqueous Extract—	
Mucilage, etc.	12·90
Glucose	6·00
Malic acid, etc.	2·70
Ash	4·00
Dilute soda: Pectin and albuminoids	3·20
1 per cent. hydrochloric acid: Inorganic matter	2·00
Chlorine water: Lingnin, etc.	6·00
$KClO_3$ and HNO_3: Incrusting matter	4·00
Residue: Cellulose, etc.	17·00
Loss	·88
	100·00

RESISTANCE OF FUNGI TO CORROSIVE SUBLIMATE.

Although corrosive sublimate is usually regarded as absolutely destructive to both animal and vegetable life, even in the smallest quantities, Mr. H. W. Russell states, in the American *Botanical Gazette*, that glycerin containing 1 part in 10,000 of this substance is capable of sustaining *Penicillium glaucum*, while a proportion of 1 part in 6000 or 1 part in 4500 effectively prevents its growth. This fungus appears to be somewhat less resistent to the poison than some other forms.

UNOFFICIAL FORMULARY OF THE BRITISH PHARMACEUTICAL CONFERENCE.

The following are the formulæ included for the first time in the edition of the B.P.C. Unofficial Formulary, 1891, just issued:—

Collodium Belladonnæ.

Collodion of Belladonna.

Syn.—Emplastrum Belladonnæ Fluidum.

Take of—

Alcoholic extract of belladonna	5 oz.
Spirit of camphor	2½ fl. oz.

Dissolve and add—

Flexible collodion sufficient to produce	1 pint.

Set aside, and decant the clear liquid.

Elixir Rhei.

Elixir of Rhubarb.

Take of—

Rhubarb root in No. 12 powder	5 oz.
Fennel fruit, bruised	2 oz.
Glycerine	3 fl. oz.
Refined sugar	4 oz.
Rectified spirit, 1 volume Distilled water, 3 volumes	a sufficient quantity.

Moisten the rhubarb and fennel with fifteen fluid ounces of the mixed spirit and water, macerate for forty-eight hours, and express. Break up the marc, and add to it sufficient of the same menstruum to furnish, with the previous pressing, fifteen fluid ounces of clear product. Express again after twenty-four hours' maceration. Unite the liquors, allow to stand for two days, and filter into the sugar and glycerine. Dissolve without heat; then, if necessary, add sufficient of the above menstruum to make the product measure 1 pint.

Dose.—1 to 3 fluid drachms.

Glycerinum Belladonnæ.

Glycerine of Belladonna.

Take of—

Extract of belladonna	1 oz.
Boiling distilled water	1 fl. drm.

Rub together in a warm mortar to produce a smooth paste, and add—

Glycerine sufficient to produce	2 fl. oz.

Unguentum Hydrargyri Oleati.

Ointment of Oleate of Mercury.

Take of—

Oleate of mercury	1 oz.
Simple ointment	1 oz.

Mix without heat.

Vinum Aurantii Detannatum.

Detannated Orange Wine.

Take of—

Orange wine	1 gal.
Gelatine, cut small	2 oz.

Macerate for fourteen days and decant.

Vinum Xericum Detannatum.

Detannated Sherry.

Take of—

Sherry	1 gal.
Gelatine, cut small	2 oz.

Macerate for fourteen days, and decant.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, JULY 25, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE CONFERENCE MEETING.

THOUGH the customary autumnal gathering of pharmacists will take place this year at a somewhat earlier period than usual, no official notification of the arrangements decided upon for the meeting at Cardiff has yet appeared. This is no doubt mainly due to the circumstance that Mr. COLEMAN has been unavoidably prevented by domestic affliction from giving his full attention to the work which falls upon the Honorary Local Secretary of the Pharmaceutical Conference. However, our readers will be glad to learn that the arrangements for the Cardiff meeting are now complete, though the usual circulars of the local committee and of the Conference executive will not be issued for some few days. By the kindness of Mr. NAYLOR, the senior Honorary Secretary, we have been furnished with some particulars of the intended programme, and are thus enabled to place this information before our readers. The meetings for the reading of papers and transaction of other business will be held in the lecture theatre of the University College of South Wales and Monmouthshire on Tuesday and Wednesday, the 18th and 19th of August, and these meetings will be preceded by a reception and conversazione on the Monday evening, which will take place at the assembly rooms of the Cardiff Town Hall at 8 p.m. The first business at the meeting on Tuesday will be the official welcome of the Conference by the Mayor of Cardiff, the Most Hon. the Marquess of BUTE. The President of the Conference, Mr. MARTINDALE, will then deliver his address, and after the close of the meeting there will be a steamboat trip at 5 p.m. to Barry Dock. After the meeting on Wednesday there will be a carriage drive to visit Caerphilly Castle, which lies about seven miles to the north of Cardiff on the range of hills which runs through Glamorganshire and extend northwards into Brecknockshire. This castle appears to have been of Norman origin and to have been one of the largest and grandest in the Kingdom, covering an area of not less than thirty acres. One of its most interesting features is a massive leaning tower nearly eighty feet in height, which is as much as eleven feet out of the perpendicular. On the road to Caerphilly the picturesque remains of Castell Coch will be visited. It is of British origin, but was taken possession of by the Normans, who enlarged it considerably. In the evening of Wednesday there will be a smoking concert in the Angel Hotel at 9 p.m. This hotel will be the headquarters of the Conference, and on Tuesday and Wednesday lunch will be provided there in the interval between the morning and afternoon sittings of the Conference.

The excursion on Thursday will be to the Forest of Dean. A special train will leave Cardiff at 9.30 a.m. for Lydney, where carriages will be waiting to convey the party to Speech House in the Forest, where luncheon will be provided at 1 o'clock. At 3.30 carriages will take the party on to Symonds Yat, on the river Wye, a point from which fine views of the river are obtained on both sides. Tea will be provided at 5 p.m., and at 5.45 the special train will leave Yat station on the return to Cardiff.

In accordance with the plan now established for some years two books of tickets will be supplied to each visitor of the Conference. No. 1, costing five shillings, will contain tickets for admission to the luncheons and teas on Tuesday and Wednesday, as well as for the steamboat excursion, carriage drives and smoking concert. Book No. 2 will contain tickets for the excursion to the Forest of Dean, including railway fares, coach drives luncheon at Speech House and tea at Symonds Yat, the cost being 10*s.* 6*d.* A ticket (also a lady's ticket) for the Reception and Conversazione on Monday evening will be sent to all members of the Conference who intimate their intention to be present at the meeting not later than the 8th of August.

By special arrangement with the railway authorities, members of the Conference, upon production of evidence of membership, will be able to obtain for single fares return tickets from Cardiff to any place within fifty miles, available for the day of issue or following day. Holders of tourist tickets for Porthcawl, Swansea, Tenby, Aberystwith, Milford, etc., may break their journey at Cardiff for the purpose of attending the Conference. In regard to hotel accommodation early application should be made to Mr. ALFRED COLEMAN. A certain number of beds have been secured at the Angel Hotel, in Westgate Street, which will be the headquarters of the Conference. In addition there are the Grand Hotel, close by the Angel, the Royal Hotel, Queen's Hotel, and Washington Temperance Hotel in St. Mary Street, all conveniently situated, with tramcars and omnibuses passing frequently. For material comfort, therefore, it may be reasonably expected that Cardiff will offer all requisite opportunities, and though the situation is remote for a

meeting of the Pharmaceutical Conference, the peculiar attractions of the town are likely to induce many to make it the centre of their autumn holiday.

The importance of the town of Cardiff is not alone that due to its recent development as a seaport: there is still evidence that at a much more remote period it was a position of sufficient account to have been strongly fortified by the ancient Britons. Some of the earthworks of the castle are of British construction, and other evidence of its pre-Roman existence are to be found in the immediate neighbourhood. As a Roman station the history of Cardiff dates back to the first century; but with the exception of the remains of the castle there is little else remaining to show its antiquity. The prevailing character is given by the remarkable progress of late years. This may best be indicated by the fact that since the census of 1881 the population has increased from 82,761 to 128,849, or more than fifty-five per cent. This is in accord with the fact mentioned by the Registrar-General in his report on the late census that the highest rate of increase in population has taken place in counties where coal mining is the predominant industry. In Glamorganshire the increase has been so great that it sufficed to compensate for the decrease that has taken place in nine of the Welsh counties, and to make the general rate of increase for Wales almost exactly the same as that for England. For several years past Cardiff has been the chief coal exporting port in the world. The extension and improvement of the town have been greatly promoted by the construction of the ship canal and docks, upon which the late Marquis of Bute expended several hundred thousand pounds. At the present time the docks cover an area of $110\frac{3}{4}$ acres, and the total cost of their construction has been nearly four millions sterling. Last year the export of coal from Cardiff amounted to no less than ten million tons. Other industries are also flourishing, especially iron and copper works, such as the new Dowlais-Cardiff works and the Tharsis works. There are besides considerable works for making patent fuel, tin stamping and enamelling works and paper mills.

Amongst the places of interest in the town there are the Free Library, Museum and Art Gallery in Trinity Street; the University College and the Infirmary in Newport Road. Of the churches, the recently restored St. John's in Church Street is a conspicuous feature. It is an ancient and finely proportioned edifice, with a beautiful tower of later date than the body of the church. The Town Hall, Post Office, and principal banks are located in St. Mary Street, together with the new Market House, and many other public buildings. Cardiff is well provided with parks; the Sophia Gardens and recreation fields over the Cardiff Bridge are open daily, and the walks laid out along the side of the river Taff afford charming views of Cardiff Castle and its private grounds The Cardiff Arms Park, in front of the Angel Hotel, is devoted to cricket and football. The Cathays Park and Cooper's Fields, being private parks of the Marquess of Bute, are open only on special occasions. In Roath a new park has recently been presented to the town by Lord Bute, and it is now being laid out by the Corporation at a cost of forty thousand pounds.

The chief places of interest in the immediate neighbourhood of Cardiff are the ancient city of Llandaff, with its cathedral, said to be the oldest Episcopal See in Great Britain; Castell Coch and the ruins and leaning tower of Caerphilly Castle. Penarth is a pretty suburban watering place at the mouth of the Taff. St. Fagan's is a model village and residence of Lord Windsor.

COPPER IN PRESERVED PEAS.

The reports published at pages 78 and 79 would appear to show that the attention of public analysts is again being directed to the presence of copper in preserved peas. The prosecutions that have been instituted under the Food and Drugs Act are of course based upon the assumption that a certain amount of copper present in preserved peas would be detrimental to the health of persons consuming such peas as food. If there be any good ground for that assumption it would certainly be proper that the use of copper salts for colouring peas should be regarded as an adulteration, and that the sale of peas containing copper should be treated as an offence punishable under the Act. But at present it is really somewhat questionable whether there is sufficient reason for doing so. There can be little doubt that copper salts are sometimes used for the purpose of giving a green colour to preserved peas, pickles and other articles of the same kind, but the quantity used is very small, and if a soluble salt of copper be used probably the whole of it is decomposed and the copper is converted into an insoluble form. This was shown by some experiments described in a paper read at the Plymouth meeting of the British Pharmaceutical Conference in 1877,* and the terms of the charge made in the cases of prosecution now referred to are inconsistent with the conclusion arrived at from those experiments. The analysts certified that the peas contained sulphate of copper, but they were not examined as to the mode in which the presence of that soluble salt was ascertained, or it would probably have turned out that the assumed presence of sulphate of copper in the peas was merely based upon the analytical determination of the amount of copper or oxide of copper, and was arrived at by calculation from those data.

* *Pharm. Journ.*, [3], viii., 232.

In connection with this point it is worth mentioning that small quantities of copper have been found in wheat, eggs and other articles of food, and according to ODLING and DUPRÉ this is constantly the case In the animal organism also copper is found, and the proportionately large amount found in the liver and kidneys has suggested the idea that those organs have a capability of accumulating copper introduced into the organism. The amount of copper that has been found in a pound of preserved peas has generally been stated to be equivalent to about 4 or 5 grains of the sulphate, and if the ordinary consumption of the peas by one person at a meal be taken as two ounces, the quantity of copper oxide thus taken will be no more than two-tenths of a grain. Much larger quantities of copper have been known to produce no injurious effects; but at the same time it must be remembered that some persons appear to be highly susceptible to the influence of minute quantities of copper, and have been known to exhibit marked symptoms of metallic poisoning after eating food containing copper. In any case it is desirable that in cases of prosecution under the Food and Drugs Act the grounds of such procedure should be well established, and for the reasons already given there appears to be much doubt attaching to the allegation that preserved peas contain sulphate of copper.

A new edition of the Unofficial Formulary of the B.P.C. has just been published, in which are incorporated the nine formulæ published in the addendum of 1889, with the sanction of the Conference, as well as six other new formulæ which will be found at page 70. The seven formulæ which have been accepted by the General Medical Council and with some slight modification inserted in the official additions to the British Pharmacopœia, 1890, have as a matter of course been omitted from the present edition of the unofficial formulary. The total number of formulæ contained in this new edition is fifty-nine.

* * *

A Bill has been brought into the House of Commons to amend the Sale of Food and Drugs Act, 1875. It bears on the back the names of Mr. Parker Smith, Mr. Donald Crawford, Mr. Arthur Elliot, Mr. Sinclair and Mr. John Wilson (Lanark). The object of the Bill is to empower the Commissioners of Police in Scotland to appoint public analysts with all the powers conferred by the Sale of Food and Drugs Act, and subject to the conditions and consents contained in that Act. Any medical officer of health, sanitary inspector or other officer appointed by the commissioners is to be entitled to exercise the whole powers provided by the principal Act. Prosecutions may be at the instance of such officer as the commissioners may authorize. Penalties recovered are to be applied towards the costs of carrying out the Act, and the whole expenses of carrying it out are to be borne by the police assessment of the place where the Act is adopted.

Transactions of the Pharmaceutical Society.

SCHOOL OF PHARMACY EXAMINATION QUESTIONS.

Forty-Ninth Session.—1890–91.

CLASS OF PRACTICAL CHEMISTRY.

PROFESSOR ATTFIELD.

SESSIONAL EXAMINATION FOR A SILVER MEDAL AND THREE CERTIFICATES OF HONOUR.

Monday, July 20. *Time allowed*—10 *a.m. to* 1 *p.m. and* 2 *p.m. to* 5 *p.m.*

Books and Memoranda permitted.

The following questions were set for this examination:—

1. Analyse "The Medicine" supplied to you and state the names of the substances present.
2. Give the names of the salts labelled, respectively, *a*, *b*, *c*, *d*.
3. Is the "Distilled Water" pure?
4. Ascertain the percentage of ammonia, reckoned as gas, in the "Liquor Ammoniæ."
5. To what extent does "The Seidlitz Powder' differ, either qualitatively or in the quantities of the ingredients, from the official *Pulvis Sodæ Tartaratæ Effervescens?*

NOTE.—*Manipulation as well as results will be scrutinized.*

CHEMISTRY.

PROFESSOR DUNSTAN.

SESSIONAL EXAMINATION FOR A SILVER MEDAL AND THREE CERTIFICATES OF HONOUR.

Part I.—Physics.

July 21. *Time allowed*—10 *a.m. to* 1 *p.m.*

The following questions were set for this examination:—

1. Describe in detail one form of air-pump, and explain how the extent to which a vessel has been exhausted may be measured.
2. 100 grams of water are found to dissolve the following number of grams of potassium nitrate at the given temperatures:—0°, 13·3; 20°, 31·2; 40°, 64; 60°, 111; 80°, 172; 100°, 247. From these data plot the curve of solubility.
3. Give an account of the principal methods of polarizing light. Explain the terms "dextro-rotatory" and "lævo-rotatory." Give examples of bodies having these properties.
4. What are the principal facts known to us about electrolysis? Explain the terms "electrolyte," "electrode," "anion," "kation."

Part II.—Chemistry.

July 21. *Time allowed*—2 *p.m. to* 5. *p.m.*

1. How is sodium thiosulphate prepared? Why is it so named and not "hyposulphite?" Write equations representing its reactions with (i) hydrogen chloride (ii) iodine (iii) a mixture of zinc and hydrogen chloride.
2. Name the impurities which are commonly present in the mercury of commerce. How is the pure metal obtained and how may its purity be ascertained?
3. Distinguish between "equivalents" and "atomic weights." What are the principal facts which are taken into account in fixing the atomic weight of fluorine?
4. How are the following compounds prepared, viz., chloroform, paraldehyde, butyl chloral hydrate, lactic acid, ethylamine?

5. By what reactions may benzoic acid be obtained from toluene, benzene and hippuric acid; and salicylic acid from benzoic acid, phenol and salicin?

6. How are the following compounds inter-related, viz., benzene, pyridine, piperidine, and conine?

BOTANY.

PROFESSOR GREEN.

SESSIONAL EXAMINATION FOR A SILVER MEDAL AND THREE CERTIFICATES OF HONOUR.

Wednesday, July 22.—*Hours from* 10 *a.m. to* 1 *p.m.*

The following questions were set for this examination:—

1. Give an account of the structure and mode of development of Cork. Account for the different kinds of cork which are met with in various trees. What is the relation of cork to bark?

2. Give a description of the general habit and peculiarities of the British plants belonging to the natural order Umbelliferæ. Mention the sub-divisions of the order, pointing out what are marks of each sub-division. What British genera show marked differences from the typical vegetative habit. Mention the particular difference in each case you quote.

3. Describe the arrangements in the flower of Viola to secure cross-fertilization.

4. What is transpiration? Show how it is regulated and what is its purpose in the life of the plant.

Hours from 2 *p.m. to* 5 *p.m.*

1. Make a microscopic preparation of the ovule of Caltha to display to as great advantage as possible the embryo sac. Sketch your preparation and indicate by a few lines of description the condition in which it is with regard to fertilization.

2. What is the morphological nature of the tendrils in the specimen A. Deduce the mode of branching in the plant from which it is taken.

3. Examine the specimens B, C, D, and explain anything you consider abnormal in each.

4. Refer the flowers E, F, G, H to their Natural Orders.

PHARMACY AND PRACTICAL PHARMACY.

MR. INCE.

SILVER MEDAL.

Thursday, July 23. *Time allowed*—2 *to* 5 *p.m.*

The following questions were set for this examination:—

1. Describe the Sapones of the British Pharmacopœia, with full characters and tests. Include a notice of some commercial processes employed in saponification.

2. State, without giving process, in what cases Rectified Spirit is used for extraction, filtration or preservation in Extracta Fluida.

3. Classify official liniments by the presence of (*a*) an essential oil; (*b*) camphor in substance or a preparation thereof; (*c*) glycerine; (*d*) and Spiritus Vini Rectificatus. Make Linimentum Belladonnæ and Linimentum Saponis.

4. Define the terms: Liquor, Lotio, Linimentum, Embrocatio and Pigmentum.

5. Translate into uncontracted technical Latin the sentences given:—

"Dry the soft extract so that a mass may be formed, to be divided into twelve pills."

"Let a dessertspoonful be the dose for an adult, and half for a child three years old."

"In case of difficulty of breathing, or when faint, let the patient repeat the drops."

"The spray to be used inside the throat."

"Send a glass ear syringe with the lotion."

Pharmaceutical Society of Ireland.

EXAMINATION FOR LICENCE TO ACT AS A REGISTERED DRUGGIST.

At an examination, held at the Queen's College, Belfast, on Tuesday, the 14th inst., the following passed:—

Berry, A.	Larne.
Burns, W.	Ballinamore.
Cambridge, R.	Carrickfergus.
Campbell, Margaret	Letterkenny.
Davison, R.	Belfast.
Dobbin, J. M.	Belfast.
Hely, J. E.	Elphin.
Henderson, J. and R.	Belfast.
Long, J.	Belfast.
Maguire, W.	Ederney.
M'Kee, H.	Belfast.
M'Keown, P. J.	Toombridge.
Smith, W. G.	Donaghadee.
Stewart, D.	Belfast.
Taggart, D.	Bushmills.
Wiley, T.	Loughmore.
Williamson, J	Belfast.

Six failed to pass.

Proceedings of Societies in London.

CHEMICAL SOCIETY.

CONTRIBUTIONS TO OUR KNOWLEDGE OF THE ACONITE ALKALOIDS.*

Part I. On the Crystalline Alkaloid of Aconitum Napellus.

BY PROFESSOR W. R. DUNSTAN AND W. H. INCE, PH.D.

(*From the Research Laboratory of the Pharmaceutical Society*).

(*Concluded from page* 58.)

The experiments recorded above had shown that on adding auric chloride to a solution of the impure hydrochloride the impurity is precipitated first. Since the amount of this second substance is very small, we repeated the experiment of fractional precipitation, using a larger quantity of alkaloid in the hope of obtaining from the later fractions aconitine aurochloride in a pure state. Ten grams of the original material were converted into hydrochloride, and sufficient auric chloride was added to precipitate about one-fifth of the base. The precipitate was filtered off and the remaining 8 grams of alkaloid recovered from the filtrate in the usual way. From a solution in a mixture of ether and alcohol the alkaloid crystallized in large, flat, rhombic prisms, some of which were very perfect. These crystals have been measured, and their crystallographic characters described by Mr. A. E. Tutton, to whom our best thanks are due. They melted at 188·5° (corr.), and yielded an aurochloride which, after crystallization from alcohol and drying over calcium chloride, melted at 135·5° (corr.). On combustion this compound, dried at first in a vacuum over calcium chloride and finally at 100°, afforded the following data:—

	Found.	Calculated for $C_{33}H_{45}NO_{12},HAuCl_4$.	Calculated for $C_{33}H_{43}NO_{12},HAuCl_4$.
C . . .	40·16 p. c.	40·12 p. c.	40·2 p. c.
H. . .	4·56 ,,	4·55 ,,	4·36 ,,
Au . .	19·8 ,,	19·96 ,,	19·92 ,,

We have since prepared this aurochloride (m.p. 135·5°) from various specimens of aconitine salts ob-

* Read March 19, 1891.

tained in the course of the investigation, and there can be no doubt that it is a pure substance.

From the aurochloride, the pure alkaloid was regenerated by the following method, the only one which proved successful out of a large number that were tried; the addition of any alkali to aconitine aurochloride causes oxidation of the alkaloid and consequent precipitation of metallic gold. The salt is finely ground with water, in which it is nearly insoluble, and aqueous hydrogen sulphide is added drop by drop, until all the compound has been changed to auric sulphide, and a faint smell of hydrogen sulphide remains permanent; the addition of excess of the precipitant should be avoided. The solution is then filtered, and, if necessary, a slow current of air passed through it to remove any hydrogen sulphide it may contain. Sodium hydrogen carbonate is then added in slight excess, and the liquid extracted with ether.

On combustion, the crystalline base thus recovered from the pure aurochloride and dried at 100°, gave the following result, which is the mean of two determinations :—

	Found.	Calculated for $C_{33}H_{45}NO_{12}$.	Calculated for $C_{33}H_{43}NO_{12}$.
C. . .	61·17 per cent.	61·20	61·39 per cent.
H . .	7·07 ,,	6·95	6·67 ,,

Burned in a Sprengel vacuum with a mixture of copper and copper oxide, 2·2 per cent. of nitrogen was obtained; the formula $C_{33}H_{45}NO_{12}$ requires 2·16 per cent.

Since the crystalline aurochloride can readily be produced even from small quantities of material, and has a definite melting point, its production constitutes a reliable means of identifying aconitine, whilst the pure alkaloid can easily be regenerated from the aurochloride and obtained in a crystalline state for examination.

We find that aconitine itself, as well as its hydrochloride, is able to combine with gold chloride. This compound, which crystallizes well, is obtained by mixing together ethereal or alcoholic solutions of aconitine and auric chloride and concentrating the liquid. Except in presence of excess of auric chloride, crystals separate as the liquid evaporates; but should they not do so the solution is precipitated with water to remove gold chloride, and the precipitate crystallized from alcohol. As this compound is extremely soluble in alcohol and insoluble in water, it may readily be fractionally crystallized from its alcoholic solution by the successive additions of small quantities of water followed by slow evaporation in a desiccator. These remarks also apply to the true aurochloride of the alkaloid.

The crystals of the new compound melt at 129°, that is 6·5° lower than the aurochloride containing hydrochloric acid. The mean result of two combustions of the dry crystals for carbon and hydrogen, and of two determinations of gold and chlorine, were—

	Found.	Calculated for $C_{33}H_{45}NO_{12},AuCl_3$.	Calculated for $C_{33}H_{43}NO_{12},AuCl_3$.
C. . .	41·79	41·7	41·8 per cent.
H . . .	5·30	4·74	4·54 ,,
Au . .	20·4	20·65	20·7 ,,
Cl . . .	10·9	11·21	11·24 ,,

This compound, which we shall call *aconitine gold chloride*, is more stable in solution, especially in presence of water, than the true aurcchloride. This greater stability may be partly due to the absence of hydrochloric acid, which readily induces hydrolysis of the alkaloid.

Aconitine from *Aconitum Napellus* is distinguished by its crystalline character and that of its salts. It may be identified by its melting point (181·5°, corr.), and by the formation of a gold salt from the base itself, as well as from the hydrochloride, the aurochloride ($C_{33}H_{45}NO_{12},AuCl_4$) melting at 135·5° (corr.), and the aconitine gold chloride ($C_{33}H_{45}NO_{12},AuCl_3$) melting at 129° (corr.). The pure base can be regenerated without difficulty from either of these compounds.

Great discrepancy exists among the numbers which have been recorded as the melting point of aconitine. Duquesnel gives 140°, Wright 183–184°, Jürgens 179°. The alkaloid examined by Duquesnel appears from Wright's results to have been impure. The want of concordance of our result (188·5°) with those of Wright and Jürgens may be due, apart from different states of purity and differences in the methods of determination, to the circumstance that if aconitine is slowly heated it melts at a lower temperature than if quickly heated. Our practice has been to determine the melting point in a bath of paraffin long enough to entirely immerse the stem of the thermometer. The paraffin is heated to about 150° before the thermometer, with the thin glass tube attached to it, is immersed. During the whole operation the liquid is well stirred. The results obtained in this way are very concordant.

As regards the composition of aconitine, our data agree best with the formula $C_{33}H_{45}NO_{12}$, which contains two atomic proportions of hydrogen more than that suggested by Wright and Luff ($C_{33}H_{43}NO_{12}$), and two atomic proportions of hydrogen less than the formula proposed by Jürgens ($C_{33}H_{47}NO_{12}$). For convenience of reference, we tabulate here the composition of aconitine as determined by Wright and Luff, by Jürgens and by ourselves, together with that calculated from the three formulæ. In each instance the experimental result is the mean of several determinations.

	Found.		
	Wright and Luff.	Jurgens.	Dunstan and Ince.
C . . .	61·21	61·16	61·17 per cent.
H . . .	6·80	7·26	7·07 ,,

	Calculated for		
	$C_{33}H_{43}NO_{12}$.	$C_{33}H_{45}NO_{12}$.	$C_{33}H_{47}NO_{12}$.
O . . .	61·39	61·20	61·02 per cent.
H . . .	6·67	6·95	7·24 ,,

The nitrogen determinations are not recorded, as they do not help to decide between these formulæ, owing to the small amount of this element which is contained in the substance. The agreement between the three sets of results is very striking; they differ, in fact, only within the limits of experimental error. Jürgens' numbers agree better with the formula to which our results have led us, namely, $C_{33}H_{45}NO_{12}$, than with that he has deduced from them ($C_{33}H_{47}NO_{12}$), whilst the data obtained by Wright and Luff are also in close approximation to it. Our analyses of the aurochloride likewise agree with the formula containing 45 atoms of hydrogen. It should be remarked, however, that when every possible refinement is practised in the process of combustion, it is doubtful whether the operation is competent to detect a difference of two atomic proportions of hydrogen in such a large molecule as that of aconitine. Taking all circumstances into account, however, $C_{33}H_{45}NO_{12}$ seems to us most likely to be the correct formula.

Specific Rotation of Aconitine.

Duquesnel states that aconitine is lævo-rotatory. Jürgens found 3 per cent. alcoholic solution to be inactive when examined in a layer 200 mm. long. He observed, however, the hydrochloride in aqueous solution to be strongly lævo-rotatory $[a]_D = -35·89°$.

The crystalline alkaloid examined by us is markedly *dextro-rotatory*. A 3 per cent. alcoholic solution afforded the following results with Laurent's large "half-shade" instrument:—

a. [23°] + 0·66°; *l.* 2 dm.; *p.* 3·726 gm.; *d.* 25°/25°, 0·805;

whence, $$\frac{100 \times 0{\cdot}66}{2 \times 3{\cdot}726 \times 0{\cdot}805} = [\alpha]_D + 11{\cdot}01.$$

Another determination with a second specimen of purified alkaloid gave
a. [20°] + 0·81°; *l.* 2 dm.; *c.* 2·7464, whence,

$$\frac{100 \times 0{\cdot}81}{2{\cdot}7464 \times 2} = [\alpha] + 11{\cdot}10.$$

The crystalline hydrobromide ($C_{33}H_{45}NO_{12}HBr,2\frac{1}{2}H_2O$) was next examined.* Its aqueous solution was found to be strongly *lævo-rotatory.*
a. [20°] — 3·25°; *l.* 2 dm.; *c.* 5·1832, whence,

$$\frac{100 \times 3{\cdot}25}{5{\cdot}1832 \times 2} = [\alpha]_D - 31{\cdot}3°.$$

The hydrobromide prepared from the alkaloid now under investigation and recrystallized several times from water likewise proved to be lævo-rotatory in aqueous solution, giving a result which agrees with that obtained from Dr. Wright's specimen.
a. [20°]—1·2°; *l.* 2 dm.; *d.* 20°/20°, 1·0098; *p.* 1·95 gram,

whence, $$\frac{100 \times 1:2}{2 \times 1{\cdot}95 \times 1{\cdot}0098} = [\alpha]_D - 30{\cdot}47°.$$

This hydrobromide was now reconverted into the alkaloid, and its specific rotation again determined in alcoholic solution. The following result was obtained, which confirms the correctness of our previous determinations.
a. [20°] 0·35°; *l.* 2 dm.; *d.* 20°/20°, 0·8074; *p.* 2·07,

whence, $$\frac{100 \times 0{\cdot}35}{2 \times 2{\cdot}07 \times 0{\cdot}8074} = [\alpha]_D + 10{\cdot}47°.$$

These results furnish conclusive proof of the remarkable fact that, whilst the alkaloid is dextro-rotatory, its hydrobromide is lævo-rotatory.

Effect of Heat on Aconitine.

In order to ascertain whether aconitine is decomposed when it is heated, the following experiments were made. A weighed quantity of the alkaloid (0·1991 gram) was heated for 2½ hours at 100° in a vacuum; the loss only amounted to 0·0004 and the crystalline alkaloid was readily recovered unchanged. The same quantity of alkaloid was now heated at 120° for two hours in a vacuum; it lost 0·0008 gram, and was little if at all altered. In a third experiment, the same amount of substance was heated until it melted (185–188°), and was kept at this temperature for one hour. The resulting brown varnish weighed 0·1789 gram, that is to say, there had been a loss of about 10 per cent. This substance dissolved almost completely in dilute hydrochloric acid. On regenerating the base from the acid liquid by the addition of sodium hydrogen carbonate, and extracting the alkaline liquid with ether, no crystalline alkaloid, but only an amorphous varnish was obtained. This was dissolved in dilute hydrochloric acid and precipitated with auric chloride. From this salt, which refused to crystallize, the base was regenerated as a varnish. The amount of loss which occurred under these conditions corresponds approximately with that sustained in the conversion of aconitine, $C_{33}H_{45}NO_{12}$, into aconine, $C_{26}H_{41}NO_{11}$, benzoic anhydride being volatilized. The properties of the uncrystallizable base agree with those of aconine.

It appears from these experiments that although aconitine is almost completely decomposed when heated at its melting point, it is not altered by exposure to a temperature of 100–120°.

Experiments were also made to ascertain whether aconitine is decomposed when heated with water or with weak alkaline solutions. About ½ a gram of aconitine was boiled with about ten times its weight of water for four hours. The liquid was then acidified and extracted with ether which, however, removed next to nothing. On the addition of sodium hydrogen carbonate in excess to the acid liquid, nearly the whole of the alkaloid was recovered by extraction with ether, and was left in crystals on the evaporation of the solvent. Further experiments proved that in presence of much larger quantities of water, more than sufficient to dissolve the alkaloid, and after much longer boiling, appreciable quantities of aconitine are resolved into aconine and benzoic acid. Wright and Luff have shown that aconitine is completely decomposed into aconine and benzoic acid by prolonged heating with water in a closed tube at 100°.

When aconitine is boiled for three hours with water rendered alkaline with ammonia there is more change than with water alone, a small proportion of the alkaloid being resolved into aconine. The greater part of the aconitine may, however, be recovered. Solutions of potassium and sodium carbonates were found to act more powerfully, some action occurring even in the cold after prolonged standing, whilst on boiling, nearly the whole of the alkaloid is decomposed into aconine and benzoic acid. Wright and Luff have shown that the caustic alkalis rapidly effect the same decomposition, especially when they are used in alcoholic solution. The mineral acids, particularly hydrochloric acid, induce a similar change.

Formation and Properties of Apo-aconitine or Anhydro-aconitine.

Wright and Luff observed the action of dilute mineral acids to consist, in the first instance, in the splitting off of 1 mol. prop. of water, a new base being formed, to which they gave the name "apo-aconitine," but for sake of uniformity in chemical nomenclature this substance should be called anhydro-aconitine or dehydraconitine,*

$$(C_{33}H_{45}NO_{12} = C_{33}H_{43}NO_{11} + H_2O).$$

When mineral acids are employed this dehydration is rapidly followed by hydrolysis, and the base aconine is formed together with benzoic acid. If, however, the aconitine is heated with a strong solution of tartaric acid dehydration takes place exclusively, and the anhydro-base alone is produced. The existence of this compound has been questioned by later workers, but no experimental proof of its non-existence has been adduced. The results we have obtained place the identity of this alkaloid beyond doubt.

Aconitine was heated at 100° with a saturated solution of tartaric acid in a sealed tube for six hours. On recovering the alkaloid it was evident that it still contained aconitine. The operation was therefore continued for four hours longer at 100–110°. No darkening occurred, and either extracted nothing appreciable from the acid liquid. The base was obtained by agitating the solution with ether after it had been made alkaline with sodium hydrogen carbonate. The colourless ethereal solution left, on spontaneous evaporation, small colourless crystals which melted at 186·5° (corr.),† that is 2° lower than aconitine. Unlike aconitine, this alkaloid cannot be obtained in large crystals from its solution in a mixture of alcohol and ether, but is invariably deposited in minute crystals

* This salt had been prepared by Dr. C. R. A. Wright. It is one of a number of specimens of aconitine compounds which he has very kindly placed at our disposal.

* Since the compound is produced by the *dehydration* of aconitine, the name "dehydraconitine" would seem to be best, and several substances having a similar origin are so named, *e.g.*, dehydracetic acid. On the other hand, it may be convenient to designate a body derived from aconitine by loss of hydrogen "dehydraconitine." We therefore call this alkaloid "anhydro-aconitine." The name "apo-aconitine" does not connote the relationship of the compound to aconitine.

† Wright and Luff record 185–186° as the melting point (? uncorrected).

which cohere together and stick to the glass vessel. In most respects it closely resembles the parent alkaloid. The following is the mean result of two combustions of the substance* :—

	Found.	Calculated for $C_{33}H_{43}NO_{11}$.
C . . .	63·01 per cent.	62·97 per cent.
H . . .	6·98 „	6·87 „

Anhydro-aconitine, like aconitine, forms crystalline salts. We have also obtained a compound of gold chloride with the base, as well as with the hydrochloride. The *aurochloride* has remarkable properties. It is thrown down as an amorphous precipitate when auric chloride is added to a solution of the hydrochloride of the alkaloid. This was readily crystallized from an alcoholic solution, the resulting crystals melting at 133°. In order to determine whether the compound was homogeneous, the crystals were dissolved in absolute alcohol, and fractionally precipitated in the manner described in connection with the aurochloride of aconitine. Two fractions were obtained; the first melted at 135°, and seemed to be identical with aconitine aurochloride, the second fraction melted at 129·5°. It seemed probable that the first fraction consisted of the corresponding aconitine compound, regenerated by the action of water, whilst the second fraction might be the aurochloride of anhydro-aconitine. To ascertain whether this was the case, a fresh quantity of the aurochloride was precipitated and dissolved in absolute alcohol, and the solution was evaporated in a vacuous desiccator over calcium chloride until crystallization commenced. The crystals obtained differed from both those previously obtained in melting at 141°. They were shown by analysis to be the true aurochloride of anhydro-aconitine—

	Found.	Calculated for $C_{33}H_{43}NO_{11},AuCl_4$.
C . . .	40·8 per cent.	40·68 per cent.
H . . .	4·58 „	4·56 „

Another portion of the precipitated aurochloride was also dissolved in absolute alcohol, and was caused to crystallize by the addition of water. The crystals thus prepared melted at 129°. Analysis proved them to be an isomeride of aconitine aurochloride, in all probability the hydrate of the aurochloride of anhydro-aconitine :—

	Found.	Calculated for $C_{33}H_{43}NO_{11},AuCl_4H_2O$.
C. . .	40·01 per cent.	40·12 per cent.
H . .	4·59 „	4·55 „

It was suspected that this compound might readily change into the isomeric aurochloride of aconitine, and this suspicion was found to be justified. On recrystallizing the substance from dilute alcohol, crystals were obtained melting at 135·5°, which analysis proved to be aconitine aurochloride—

	Found.	Calculated for $C_{33}H_{45}NO_{12},HAuCl_4$.
C. . .	40·08 per cent.	40·12 per cent.
H . .	4·66 „	4·55 „

Anhydro-aconitine is thus shown to form an aurochloride melting at 141°. This, in presence of water, yields a hydrated compound melting at 129°, which readily changes into the isomeric aconitine aurochloride melting at 135·5°.

Anhydro-aconitine gold chloride is prepared by mixing alcohol or ethereal solutions of the alkaloid and auric chloride. On evaporation crystals are deposited which melt at 147·5°, and are not altered by recrystallization from alcohol. This compound shows no tendency to pass into the corresponding aconitine salt. Its crystals, dried at 100°, were burned with the following results :—

	Found.	Calculated for $C_{33}H_{43}NO_{11}.AuCl_3$.
C. . .	42·25 per cent.	42·28 per cent.
H . .	4·76 „	4·62 „

Aconine.

Aconine is the name given by Wright and Luff to the product of the hydrolysis of aconitine by mineral acids and alkalis. It is formed, together with benzoic acid, in acordance with the equation—

$$C_{33}H_{43}NO_{12} + H_2O = C_{26}H_{39}NO_{11} + C_7H_6O_2.$$

Aconine is an uncrystalline base, and its salts are also uncrystalline.

The crystallized aconitine which we have examined yielded, on hydrolysis, an amorphous base which is evidently identical with aconine.

Aconitine was boiled for some hours with alcoholic potash. The alcohol was then distilled off, the liquid acidified with hydrochloric acid, and extracted with ether. The ethereal solution was shaken with dilute alkali to remove the acid product of hydrolysis. After this treatment, the ethereal solution was evaporated to dryness, leaving a resinous substance which appears to result from a further action of alkali on aconine. The acid was regenerated from its salt, and, after recrystallization, melted at 120·6° (corr.). Benzoic acid melts at 121°. The silver salt was prepared in the usual way and analysed.

I. 1·1824 gram of salt gave 0·0886 gram of silver = 47·09 per cent.

II. 2·5366 gram of salt gave 0·1194 gram of silver = 47·08 per cent.

Calculated for $AgC_7H_5O_2$ = 47·17 per cent.

The acid solution which had been extracted with ether was now made alkaline, and extracted with chloroform, aconine being insoluble in ether. From this solution was obtained a brown resinous base. By fractionally precipitating a solution in chloroform with ether or light petroleum, the alkaloid is obtained as a last fraction nearly free from colour, but still resinous and friable when dry. It was soluble in water and alcohol, but insoluble in ether, benzene and light petroleum. All attempts to crystallize it were failures. No crystalline salt could be obtained. Aqueous solutions of the alkaloid or its salts were precipitated by the usual alkaloidal reagents, but no crystalline derivative or compound could be prepared.

The aurochloride is a pale-yellow, amorphous precipitate which dissolves in alcohol, and is deposited as the solution evaporates in oleo-resinous films. Contrary to the experience of Wright and Luff, we find this compound, when prepared from pure aconine, to be quite as stable, or even more stable, than the corresponding aconitine salt.

Two combustions were made of the amorphous base dried at 100°, the mean result was

	Found.	Calculated for $C_{26}H_{41}NO_{11}$.
C . .	56·97 per cent.	57·44 per cent.
H . .	8·17 „	7·73 „

The amorphous aurochloride dried at 100° gave the following results on combustion :—

	Found.	Calculated for $C_{26}H_{41}NO_{11},HAuCl_4$.
C . .	34·9 per cent.	35·33 per cent.
H . .	5·09 „	4·75 „
Au . .	22·7 „	22·31 „

These analyses of aconine furnish confirmation of the correctness of the formula $C_{33}H_{45}NO_{12}$ for aconitine, from which the amorphous base is formed in accordance with the equation $C_{33}H_{45}NO_{12} + H_2O = C_{26}H_{42}NO_{11} + C_7H_6O_2$.

The results recorded in the present communication serve to establish the characteristic properties of the

* The analytical data recorded by Wright and Luff do not agree with the formula they suggest, $C_{33}H_{41}NO_{11}$, the hydrogen being 1 per cent. too high.

principal and doubtless the most poisonous alkaloid of *Aconitum Napellus*, and render its future identification comparatively easy. In order to throw light on the nature of the other alkaloids contained in this plant, if other alkaloids there be, an investigation is being made of some valuable roots obtained from specially selected plants.

Our thanks are due to Dr. F. W. Passmore for the assistance he has given us, particularly in verifying and extending some of the later observations recorded in this paper, our further co-operation in carrying on this work being prevented through one of us having been obliged to leave London to take up a provincial appointment.

Parliamentary and Law Proceedings.

The Sale of Wines by Chemists.

Mr. John Merson Grant, chemist, Lothian Road, was on Thursday, July 16, charged in a Justice of Peace Court held in the County Buildings, Edinburgh, with having on February 3 sold three pint bottles of foreign wines without having a licence. He pleaded not guilty.

Mr. Pithie, prosecutor for the Inland Revenue, asked the Justices to adjourn the further hearing of the case until yesterday, in order that a witness might be brought down from the laboratory at Somerset House, London.

Counsel for the respondent asked for the names of the wines complained of, saying that he bought them from wholesale chemists.

Mr. Pithie replied that they were one bottle of Liebeg and Malt Extract, a bottle of coca wine called Vin Mariano, and a bottle of St. Raphael.

The Justices granted the adjournment.

On the case being called subsequently, Mr. Pithie stated that the case had been settled by the respondent paying a fine to the Inland Revenue authorities.

It seems that other Edinburgh cases of a similar kind have recently been settled in a like manner, but without coming into court.—*Scotsman.*

The Sale of Vermin Killer.

On the 14th inst. an inquest was held at Southend touching the death of Mrs. Schmit, aged 52 years. It appeared from the evidence that the deceased was known by her family to be labouring under mental delusions, but had not manifested any suicidal tendency before the occurrence that led to her death. According to her daughter's statement deceased had purchased two packets of vermin killer at "Mr. White's shop," on the plea that there were mice in the cupboard. One packet she was induced to return, but she subsequently died from the effects of swallowing the contents of the other.

Henry White,* of Park Street, Southend, said that on July 8 he supplied Mrs. Schmit with a 3*d.* packet of vermin killer. He sold her two packets, but she brought one packet back. Deceased said she was overrun with mice, and witness told her to be careful where she laid the poison. She signed the poison book.

Medical evidence having been given that the cause of death was strychnine poisoning, the jury returned a verdict of "suicide while suffering from temporary insanity," and added a rider to the effect that more restrictions should be placed upon the sale of such poisons.

* There is no entry corresponding to this name and address in the Register of Chemists and Druggists.—Ed. Pharm. Journ.

Colouring Matter in Tinned Peas.

Important Cases in Leeds and Glasgow.

At Leeds Borough Police Court on Tuesday, before Mr. Bruce, the stipendiary magistrate, William Green and Son, grocers, 51, Briggate, appeared in answer to a summons charging them with having sold tinned peas adulterated with 4·7 grains per pound of sulphate of copper. Burgon and Co., provision dealers, 10, Duncan Street, were summoned for having sold tinned peas containing 3·40 grains per pound of sulphate of copper; and against Thomas Yeardley, grocer, 150, Briggate, a similar charge was made, it being alleged that the peas he sold contained 2·7 grains of sulphate of copper per pound. Sir George Morrison, Town Clerk, prosecuted on behalf of the Sanitary Committee of the Leeds Corporation. The case against Messrs. Green and Son, for whom Mr. Foster, solicitor, appeared, was taken first.

The Town Clerk explained that the information was laid under the third section, sub-section A, of the Sale of Food and Drugs Act, 1875, which made it an offence to mix, colour, stain, or powder, or permit any other person to mix them, with any article of food so as to render that article injurious to health. The facts were simple. Inspector Walker went to the defendants' shop and bought three tins of peas, stating at the time that they would be analysed. He understood that this would not be disputed. The question was as to whether the material with which the peas were mixed, viz., sulphate of copper, was deleterious to health. The Town Clerk then put in the certificate of Mr. Fairley, the borough analyst, showing the quantity of copper in the tin he examined, and proceeded to say that the Corporation was anxious in these matters not to press tradesmen; but was equally anxious, in the interests of the public health, that articles injurious to health should not be sold, the more so in a case like this, because he understood the poison was cumulative.

Inspector Walker then deposed that he bought the peas on May 26. The three tins were all of one brand. One of the assistants in the shop gave him to understand that in consequence of a case which had been heard before his Worship, they wrote to the firm from whom they obtained the peas, and were informed that the peas were "greened" a little, but with nothing injurious.

Cross-examined: He had no particular reason for suspecting the peas, which were, he believed, sold in all the principal shops in the town.

Dr. Cameron, Medical Officer of Health for the borough, said, in answer to Sir George Morrison, that in his opinion the quantity of sulphate of copper found in the peas would be injurious to health.

By Mr. Foster: The question as to whether or not sulphate of copper was injurious had been a matter of discussion, and there were some experts who declared that a small quantity was not deleterious to health. He did not think 4·5 grains to the pound a large amount, but it was dangerous. He had not heard of a case where harmful results had followed the eating of tinned peas, though he knew they were extensively sold. He was, however, aware of plenty of cases in which copper taken in small quantities had done harm. The quantity of copper found by Mr. Fairley would not produce acute copper poisoning, but it would injure the health. It would not be so difficult to detect the exact quantity of copper in the peas as to make it a matter of much consequence. Sulphate of copper was found occasionally in many articles of food, though in very minute quantities. The use of copper vessels in the preparation of food was a fertile source of poisoning. He should say the copper was used to give the peas an unnatural colour, rather than to preserve their natural colour. The question as to whether the use of sulphate of copper was injurious had been thoroughly

gone into by the French Government, the peas coming mainly from France. Until recently the use of sulphate of copper had been prohibited in that country, but the restriction had been removed owing to pressure brought to bear by the manufacturers. He should be much surprised to know that these peas had been extensively sold without any injurious consequences following. The retail dealer could not tell from the appearance of the peas whether or not they had been "greened" by sulphate of copper, because it was possible to have peas of the same colour without the use of this poison.

Re-examined: The poison was cumulative. Five grains of sulphate of copper would kill a dog.

Mr. Thomas Scattergood, Dean of Medicine at the Yorkshire College, stated that in his opinion the peas in question would be injurious to health.

Cross-examined: It would be impossible to say what was the minimum quantity which would be injurious to health. He had not come across patients suffering from poisoning which he attributed to sulphate of copper. It would surprise him to hear that people partook of these peas regularly without suffering any evil consequences. If the peas were taken once they would not necessarily affect a person, but the poison was cumulative.

This concluded the case for the prosecution.

Mr. Foster, in defence, said this was a very important matter for his clients, who occupied a highly respectable position in the town. His instructions were that whatever the peas might have contained, the defendants knew nothing about it. They did all they could to obtain knowledge of the matter, and if he could establish that he thought he should be entitled to ask for the dismissal of the summons under section 5, which provided that no person was liable to be convicted under the 3rd and 4th sections, if he could satisfy the justices that he did not know the article of food was mixed with anything deleterious to health, and had taken reasonable means to obtain such knowledge. According to Dr. Cameron's evidence, the defendants could not tell that sulphate of copper was present from the appearance of the peas. With regard to the point whether sulphate of copper was injurious to health, it was important there should be a judicial decision. If the defendants had known that the peas were in any way injurious to health, they would certainly not have sold them. None of their customers had made a single complaint, however, and the peas had been bought by some of the best families in Leeds.

Mr. Bruce: I suppose they buy them because they are fashionable.

Mr. Foster, proceeding, said the defendants imported the peas from France. They were what were known as the "Globe" brand. Messrs. Green had sold them during the last eight years, and had never heard the slightest suggestion that they contained any deleterious matter until they saw the report of a case which was recently before his Worship. They at once wrote to the people from whom they bought them, and received a reply stating that the peas were subjected to a slight colouring process in order to retain their natural colour, but that the process was recognized as being uninjurious. Upon getting the summons the defendants again wrote. He (Mr. Foster) contended that the taking of these steps showed Messrs. Green's *bonâ fides*, and entitled him to ask for the dismissal of the summons under section 5.

Mr. Bruce pointed out that the defendants might have sent a tin of the peas to an analyst.

Mr. Foster thought that if such a course had to be adopted in these cases, it imposed rather an onerous duty on retailers.

Mr. Bruce: I cannot help that. I have nothing to do with the making of laws.

Mr. Foster, in conclusion, said that his clients would take care that the peas were not sold in their shop again.

Mr. Wm. Green having given formal evidence in support of Mr. Foster's statements,

Mr. Bruce summed up the case, and said that if it was put to him as a question of law, he did not think that the defendants had taken reasonable steps to find out whether the peas contained any deleterious matter. They wrote to the persons from whom they got the article, asking whether it was a proper article to sell, and that was a course which might suggest itself to tradesmen; but they ought to have made further investigations before proceeding to sell the peas. It was common knowledge that Messrs. Green were a respectable firm. He should convict; but he thought it would be sufficient if he ordered the defendants to pay a nominal fine of 1*s.* and costs. He wished it to be understood that if others were summoned after this warning they must expect to be fined considerably more than 1*s.*

The Town Clerk: Will your Worship make an order for the destruction of the peas.

Mr. Foster: We will give an understanding that they shall be destroyed.

After a short discussion, Mr. H. Thornton Pullan who appeared for Messrs. Burgon and Mr. Yeardley pleaded guilty in the other cases, and similar fines were imposed.

Mr. Bruce remarked that for this state of affairs the public were themselves very largely to blame. As long as people would have green peas out of season, they would find ingenious people ready to supply them.

In Glasgow, on Tuesday, before Sheriff Birnie, James Brown, grocer, 325, New City Road, was charged with having sold a tin containing 1 pound of preserved green peas, the same being mixed, coloured, or stained with copper or sulphate of copper to ·0045 per cent. or thereby of copper, which was equivalent to 1·26 grains or thereby of sulphate of copper per pound of peas, and so rendered injurious to health.

Mr. Brown pleaded not guilty.

Evidence having been led by the sanitary inspector as to the purchase of the peas, and also as to the report made by the analyst that they contained the quantity of copper charged, Professor Charteris said he regarded copper as a poison. When taken in large doses the symptoms generally were vomiting and diarrhœa, and in small doses weakness and general bad health. He thought it was more dangerous to take small quantities for a long time than a single dose, causing acute poisoning, because when taken for a long time the poison accumulated, and the person taking it was not aware till it was too late.

Dr. Russell, medical officer of the city, gave somewhat similar evidence; and, on being questioned by Mr. Borland as to whether he knew any person who had been injured by taking green peas in the manner described, replied that he knew only the result as regarded himself.

Professor Dalziel, Anderson's College, said that a pound of green peas containing 1·26 grains of sulphate of copper, if taken for a considerable period, would produce chronic poisoning.

The Sheriff found accused guilty, and imposed a penalty of £4.

Poisoned Sugar.

Several actions have been raised in Glasgow to decide the responsibility for damages in respect to injury caused to various persons by the use of sugar that had become contaminated by coming into contact with a patent "weed-killer" during railway transit. The actions have been brought against the grocers who sold the sugar, the railway company that carried it, and the manufacturers of the "weed-killer."

Obituary.

Notice has been received of the death of the following:—

On the 7th of July, Mr. William Turton, Chemist and Druggist, St. Peter's Street, Leeds. Aged 67 years.

On the 11th of July, Mr. Langshaw Rowland, Chemist and Druggist, High Street, Wrexham. Aged 30 years. Mr. Rowland was an Associate in Business of the Pharmaceutical Society.

On the 12th of July, Mr. William Henry Barrett, Chemist and Druggist, Brigg, Lincs. Aged 45 years.

On the 16th of July, Mr. William Hough, Chemist and Druggist, Corn Market, Doncaster. Aged 42 years. Mr. Hough was an Associate of the Pharmaceutical Society.

On the 19th of July, Mr. John Wood, Chemist and Druggist, Drake Street, Rochdale. Aged 45 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Preliminary Examination.

Sir,—It strikes me that in the discussion now going on as to the Preliminary examination one or two fundamental ideas are in danger of becoming ignored, and as usual the more protracted the talk the more do the important issues first raised become obscured by increasing whiffs of dust.

"Education," a word most prominent in these wordy times, is used but seldom in its true and proper sense, namely, the educing, or drawing-forth, or development of the mental powers. The working man is the individual needed in the ranks of pharmacy as in every other intellectual calling, and the production of a working man is the true province of education. Minus education we may get a good looking, hardy, omnivorous biped, but not a man for all that; whilst by its beneficent influence we get a being able to learn anything and do anything that may with justice be demanded of him. To such a being alone belongs in truth the name of man.

With respect to our "Preliminary," surely it's little use to make it, or regard it, as a mere preliminary indicating test of whether certain ones have really imbibed a certain amount or kind of knowledge. The desiderata seem rather these, what the actual character and condition of the budding intellect? is there good promise of a fairly vigorous plant? is it healthy and well developed and likely ere long to produce a good independent thinker and worker? this the ideal, the most effective mode of realization being matter for deliberation and contrivance.

It seems a matter of very small moment whether we prefer to speak of getting "a better class" or of getting "better men from the same class." What we do really want is to impress upon the candidate and his surroundings the fact that if he is good enough for any other professional calling he may be good enough for us; but if not fit for the medical, legal or ecclesiastical, he had better not try it on with the pharmaceutical.

And, Sir, as to the prominence given in this connection by some of your correspondents to the subject of dispensing. Surely a trifle more reflection will show that the idea of much advantage being derived from the institution of a school of dispensing is mere moonshine.

Every practical dispenser of much experience knows that his art, far from being reducible to a set of rules, however elaborate and well arranged, is, in reality, an ever shifting unknown quantity in the problem of his pharmaceutical career. "Physicians' Prescriptions Accurately Prepared" demands more than ever it did the spontaneous application of a man's all-round acquirements. To be true to one's profession one must be ready to apply at any given moment the resultant of his previous acquisitions in various departments of knowledge. English and Latin, with as many foreign tongues as he has been bold enough to grasp, together with diagnostic power over the various forms of doggerel and slang with which these all are so often defaced; arithmetic, beyond a surface knowledge thereof, for woe to him in future times and oft if this his sole mathematic lore is not fortified with some substantial algebra, and both these supported by a foundation of elementary geometry; chemistry, botany, physics, including statics, dynamics and hydro-statics, heat, light and electricity. Speak with rapture of the various industries, arts and sciences involved in the manufacture of a brass pin! Why these are not to be named by the side of the requirements that are demanded at any moment to meet at once in the same individual who is daring enough to build up a silvered pill, with due regard to the wishes and safety of all concerned.

But to drop now all kind of appearance of levity. Do, Sir, use your powerful influence on behalf of an old and trusty friend. Why ever should some speak of discarding Cæsar's splendid work just because a few mistaken individuals have ruined their poor brains by the wicked effort of committing parts thereof to memory? We may depend upon it our revered ancestors had a shrewder motive than we are apt to credit them with for the introduction of Cæsar as our great Latin classic. Why not in these days of advancement and of increased facilities for gaining knowledge rather push on instead of go back, and give the whole of Cæsar right through, and no longer confine attention to Book I., De bello Gallico? because apart from the great educational value of such substantial, manly, Latin prose, the prospect of a universal pharmacopœia published in this language renders it of great and growing practical importance to the coming pharmacist.

Anyhow, it is most desirable that some more conclusive test—a test, if possible, of some good mental vigour in the candidate, a test commensurate with the ease with which mere knowledge is picked up and thrown away again in these advanced times, and the wholesale production of uncandid candidates facilitated—be contrived without delay. By such means we should be able to eliminate at the outset those miserable specimens who regard an exam. or two as the goal, rather than a fresh starting point in the disciplinary career.

West Marylebone. J. C. Hyslop.

More Mysterious Letters.

Sir,—Like Mr. Corder, I have been the recipient of several mysterious letters, evidently from the same quarter. At first I acted as the worthy examiner suggests, but finding that did not extinguish the writer's desire to distinguish himself, I was eventually compelled to ask him to discontinue the annoyance he was occasioning me, and I think I have been at last successful.

John W. T. Morrison,
London. *Div. Sec. W. St. Pancras.*

Communications, Letters, etc., have been received from Messrs. Umney, Oxen, Martin, Robinson, Wilson.

"THE MONTH."

Europhen.

It is known that by the action of iodine upon bodies of the phenol series in the presence of alkalies, compounds are produced that are claimed to possess antiseptic properties. The best known of these is the "dithymol-iodide," which has been introduced into medical practice under the name "aristol." It is now stated that similar properties are possessed under more advantageous conditions by certain compounds formed in a like manner from substitution derivatives of homologues of phenol, and one of these has just been described under the name "europhen." This substance is said to be produced by the action of iodine upon isobutylortho-cresol, which is itself a product of the action at a high temperature of isobutyl alcohol on cresol in the presence of chloride of zinc. In composition europhen is said to contain 27·6 per cent. of iodine, corresponding consequently to one atom of iodine to two molecules of isobutylcresol. At first it was thought that this was a case of simple condensation of two benzole residues, with the substitution of an atom of hydrogen in one of the cresol hydroxyls by an atom of iodine. It is now, however, explained that the simultaneous presence of iodine, alkali and water would be a condition favourable to the formation of hypoiodous acid, HIO, the oxygen of which combining with the hydrogen from the hydroxyls of two molecules of cresol would give rise to the splitting off of water, the reaction being represented by the following somewhat doubtful equation:—

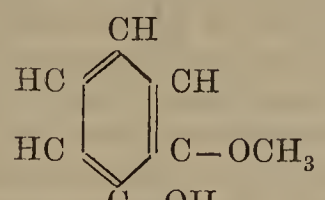
$$HIO + \begin{matrix} HO-C_6H_3\langle^{C_4H_9}_{CH_3} \\ HO-C_6H_3\langle^{C_4H_9}_{CH_3} \end{matrix} = HI\langle \begin{matrix} O-C_6H_3\langle^{C_4H_9}_{CH_3} \\ O-C_6H_3\langle^{C_4H_9}_{CH_3} \end{matrix}$$

Isobutylcresol. Europhen.

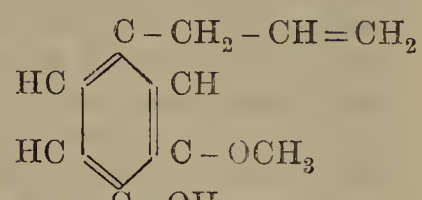
Europhen is described as being an amorphous yellow powder, resinous to the touch and adhering to the mucous membrane or intact cuticle much more readily than iodoform. It is stated to have a peculiar aromatic odour, recalling that of *o*-cresol and also of saffron. In water and glycerine it is insoluble, but it is freely soluble in alcohol, ether, chloroform, collodion, traumaticin and fixed oils. A solution in oil is said to be useful for subcutaneous injection in various affections, but it should be filtered before use. The europhen action seems to be similar to that of iodoform, by slow liberation of iodine in contact with pus, but it is claimed that the new compound presents the advantage of being comparatively free from odour, non-toxic, and so light that a given weight of europhen will cover five times as much wound surface as the same quantity of iodoform. The selection of a trivial name for this novelty can hardly be deemed a happy one, since "europhen" is sufficiently near to "euphorin," the designation recently applied to phenyl-urethane, to provide for a considerable amount of confusion should both compounds come into general use.

Benzoyl and Cinnamyl Eugenol.

It is reported that in the search for remedies for tuberculosis experiments are now being made with the benzoyl and cinnamyl esters of eugenol (*Pharm. Centralh.*, June 25, p. 365). It will be remembered that oil of cloves has already been recommended in the treatment of tuberculous affections, and Dr. Koch has suggested the internal administration of eugenol, its chief constituent, to patients undergoing the tuberculin treatment. Probably the use of the eugenol esters has been suggested by the introduction of the corresponding esters of guaiacol under the names "benzosol" and "styracol." The relation will be seen if eugenol be represented as guaiacol (the methyl ether of pyrocatechin), in which an atom of hydrogen in the para position to the hydroxyl group is replaced by an allyl group.

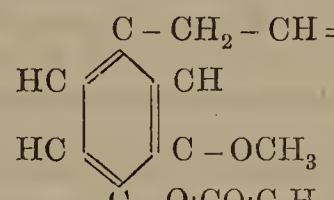


Guaiacol.

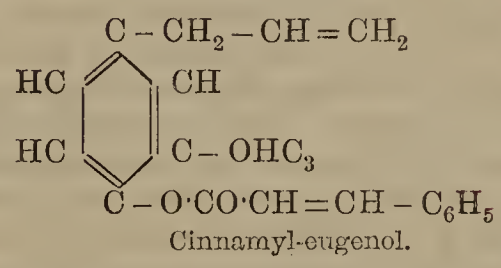


Eugenol.

The benzoyl and cinnamyl ethers of eugenol might then be represented by the formulæ—



Benzeugenol.



Cinnamyl-eugenol.

Benzeugenol is described as crystallizing in colourless and odourless needles, having a weak bitter taste, being neutral in reaction and melting at 70·5° C. It is almost insoluble in water, and freely soluble in hot alcohol, chloroform, ether and acetone. With concentrated sulphuric acid it gives the purple-red colour characteristic of eugenol, this reaction distinguishing it from benzosol, which gives only a pale yellow colour. Cinnamyl-eugenol forms shining needles, which are colourless, odourless and tasteless, neutral in reaction and melt at 90°–91°. It is scarcely soluble in water, but freely in hot alcohol, chloroform, ether and acetone. With concentrated sulphuric acid it gives a purple-red colour like benzeugenol, but it may be distinguished by the different melting-point. Both compounds are readily saponified with alcoholic potash.

Another Antipyretic.

Another addition to the long list of antipyretics and antineuralgics is announced (*Pharm. Centralh.*, July 23, p. 433). It is described as an oxyquinoline derivative, or, more precisely, as ortho-oxethyl-ana-mono-acetylamido-quinoline. The process of preparation is said to be by boiling ortho-oxyquinoline with halogenethyl and sodium hydroxide in alcoholic solution and treating the ethyl ether so obtained with nitric or nitrosulphuric acid. A mononitro compound so produced, in which the nitro group is in the "ana" position, is precipitated from an acid solution by ammonia, then reduced to an amido compound by means of tin and hydrochloric acid, and finally has the acetyl group introduced by boiling it with acetic anhydride. The new com-

LIBRARY ST BARTHOLOMEW'S

pound is described as melting at 155°; also as dissolving freely in hot water, alcohol and dilute acids, and with difficulty in cold water.

Dermatol.

Referring to the recent introduction as a substitute for iodoform of a basic gallate of bismuth, under the name "dermatol" (before, June 27, p. 1169), Dr. B. Fischer points out that such a compound can be prepared by dissolving 15 parts of bismuth nitrate in 30 parts of glacial acetic acid, diluting with 200 to 250 parts of water, filtering and adding to the filtrate a warm solution of 5 parts of gallic acid in 200 to 250 parts of water. The resulting yellow precipitate, after settling, is separated by decantation, and washed on a filter until the wash-water no longer shows a nitric acid reaction with diphenylamine, and then dried at 100° C. (*Pharm. Zeit.*, June 27, p. 400).

Quinine Lactate.

The use of a solution of one part of lactate of quinine in four parts of water for hypodermic injections was recommended some time since by M. Vigier (*Pharm. Journ.* [3], xvi., 187), but has been found open to the objection that the commercial crystallized salt is not soluble in that quantity of water. In fact, M. Vigier has found that although a solution of 1 in 5 keeps well, if the salt be crystallized from the solution it is no longer soluble in less than fifteen or twenty parts of water (*Journ. Pharm. Chim.*, July 1, p. 5). He therefore now recommends a titrated solution, prepared by suspending the quinine hydrate freshly precipitated by ammonia from 21·5 grams of sulphate (representing 16 grams of quinine) in 100 grams of hot distilled water, keeping it at a water-bath temperature and adding lactic acid a little at a time until it is in slight excess (nearly 4·25 grams), cooling, filtering and making the product up to 100 grams. Each 5 grams of this solution will contain 1 gram of lactate of quinine.

Tuberculin.

So far as has been authoritatively made known tuberculin is a glycerine extract of a pure cultivation of the tubercle bacillus, and in the opinion of Dr. Koch its therapeutic value is due to one active principle that is present in it to the extent of only a fraction of 1 per cent. But an investigation by Dr. William Hunter has yielded results indicating that the characteristic symptoms following the injection of tuberculin are due to three constituents at least, and that it may be possible, by modifying the mode of its preparation so as to eliminate one or other of these constituents, to exercise more control over the effects produced when it is injected into tuberculous patients (*Brit. Med. Journ.*, July 25, p. 169). Preliminary experiments upon the composition of tuberculin led to the conclusion that its principal constituents are albumoses (chiefly protoalbumose and deuteroalbumose, together with some heteroalbumose and occasionally a trace of dysalbumose), alkaloidal substances, extractives of unrecognized nature, mucin, inorganic salts, glycerine and colouring matter. It seemed probable, therefore, that any remedial effect or symptoms produced must be due to the albumoses, the alkaloidal substances or the extractives, and an attempt was made to separate them and test their activity. In the first place tuberculin was treated with absolute alcohol, and the precipitate, consisting principally of albumoses, removed by filtration; this was named provisionally "modification A." The filtrate from A was then evaporated at a temperature not exceeding 40° C., and the residue was taken up in half-per-cent. solution of carbolic acid. This solution contained all the constituents of tuberculin, but in reverse proportion to the quantities present in A, the salts and other soluble substances being relatively in excess and the amount of albumose relatively small; it was called provisionally "modification C." When tested clinically, it was found that both these modifications possessed remedial properties, causing absorption and disappearance of tuberculous tissue. While, however, in the case of A this was attended by decided local inflammatory reaction, even with small doses, though with little or no fever, the remedial action of C was attended by no local inflammation but by high fever. These results seemed to point to the presence of a fever producing constituent in tuberculin apart from the remedial agent, and as this constituent occurred to a high degree in modification C, it seemed most probably connected with the salts present in it in increased proportion. Modification B was therefore prepared by precipitating the whole of the albumoses of tuberculin by means of ammonium sulphate and removing the precipitant by dialysis, and the product obtained in this way was found to possess in an eminent degree the power of inducing local reaction, followed by healing change around tuberculous lesions, unaccompanied by any constitutional disturbance whatever. In like manner a successful attempt was made to separate the constituent producing local inflammation. This was done by submitting to dialysis the filtrate after treating tuberculin with absolute alcohol, and the modification so obtained (CB) proved capable of inducing very distinct local improvement unattended with fever or scarcely any noticeable inflammatory reaction. It would appear, therefore, that the remedial and inflammatory actions of tuberculin are connected with the presence of certain of its albumoses, whilst the fever producing properties are chiefly associated with substances of a non-albuminous nature that are removable by dialysis. It is also believed that the power of favouring recurrence with which tuberculin is credited is partly connected with these non-albuminous substances.

Chloride of Zinc in Tuberculosis.

Considerable interest has also been excited during the past month by a communication made to the French Academy of Medicine by Professor Lannelongue on a method of treating tuberculosis by injections of chloride of zinc (*Lancet*, July 11, p. 94). The treatment is based upon the property possessed by chloride of zinc, when injected in sufficiently small quantity to avoid its escarhotic action, to set up a process of induration in healthy tissue. Advantage is taken of this to attempt to invest the tuberculous formation with a sheath of sclerotic tissue, and thus to limit, if not destroy, the activity of the bacilli by a kind of encapsulation.

Tetanus Antitoxin.

The fact having been established that blood from animals made immune to tetanus is capable of rendering inactive the toxalbumin of tetanus outside the organism, Messrs. Zizzoni and Cattani have been induced to continue their investigations as to the properties of the antitoxic constituent (*Apot.-Zeit.*, July 11, p. 379). It has been found that the blood

serum from tetanus-immune animals, collected pure and preserved in the dark at a low temperature (15° C.), retains its antitoxic properties several days unaltered. A rise of temperature to 60° does not appear to affect its activity, but half an hour's exposure to a temperature of 65° decreases it to a considerable degree, whilst the same exposure to 68° removes it entirely. Experiments in dialysis showed that the antitoxin does not pass through a membrane. After treatment of the blood serum with ammonium sulphate to saturation, the active substance was found in the precipitate, which being freed from ammonium sulphate by dialysis, showed itself active against tetanus infection. The addition of 1 drop of hydrochloric acid to 10 drops of serum destroyed its antitoxic power completely, as also did 3 drops of lactic acid to 5 drops of serum, but smaller admixtures left the tetanus antitoxin unaltered. The precipitate thrown down by alcohol from the blood serum, collected after two days and dried in a vacuum, showed itself active when taken up with water or extracted with glycerin; but the activity of the two preparations was not equal, two or three weeks being required to obtain a glycerin of full activity. The tetanus antitoxin appears to be an albumenoid, the principal characters of which correspond to those of an enzyme; it is, however, not identical with the fibrin ferment of the blood.

Hypnotics and Digestion.

Observation of gastric disturbances that occasionally follow the administration of chloralamide, paraldehyde, urethane and sulphonal has led Dr. J. Gordon to test the influence these compounds may exercise upon digestion (*Brit. Med. Journ.*, July 18, p. 115). The method adopted was to submit fibrin stained with carmine to the action of pepsin in the presence of the hypnotic, the progress of the digestion being indicated by the liberation of colour from the fibrin. For this purpose half a gram of stained fibrin was placed in a test tube, together with 2 decigrams of pepsina porci, 2 c.c. of 2 per cent. hydrochloric acid and 15 c.c. of water, and the hypnotic added. The results of the experiments showed that when more of chloralamide than 0·2 gram was added it retarded the digestion of fibrin in the ratio of the quantity employed, but that less than 0·2 gram exercised no perceptible influence. Similar results were obtained with urethane and sulphonal, and none of the three retarded decomposition. On the other hand paraldehyde added in large quantities considerably accelerated the digestion of fibrin, and generally the rate of acceleration was in ratio with the quantity used. Putrefaction also was prevented by large proportions of paraldehyde and delayed by smaller proportions. So far therefore as inferences can be drawn from results obtained outside the organism the diarrhœa that sometimes follows the exhibition of paraldehyde is not referable to direct interference with digestion.

Menthol in Hay Fever.

In a note published in the *British Medical Journal* (July 18, p. 124) Dr. Lennox Wainwright states that he has found menthol, mixed with carbonate of ammonia and used as smelling salts, the most useful remedy that he has tried out of the great number that have been recommended from time to time. The patients say that all irritability disappears, and in many cases they get no return of the symptoms.

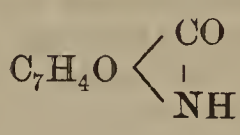
Salicin in Influenza.

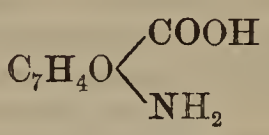
Dr. E. B. Turner records (*Lancet*, July 18, p. 121) the results of treating two hundred cases of influenza with salicin. He states that, given in doses of 20 grains every hour at first, it will in the course of a few hours reduce the temperature to the normal condition, and convalescence is established as a rule in twenty-four hours. He also considers that it reduces the infectiousness of the disease. The sooner the remedy can be given after the first onset of the symptoms, the sooner do the symptoms abate, and if a case is treated at once after the first shiver, a normal temperature and freedom from pain are ensured in about six hours. In the whole series of cases treated by Dr. Turner no complication, such as bronchitis or pneumonia, occurred.

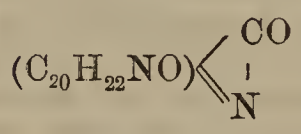
Strychnine.

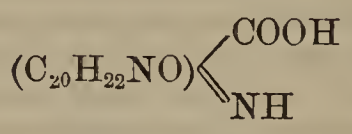
Since the discovery of strychnine by Pelletier and Caventou, and its recognition as the most important alkaloid of the strychnos genus, this base has been the subject of a number of investigations. But although its empirical formula has been satisfactorily demonstrated to be $C_{21}H_{22}N_2O_2$, and several characteristic substitution products have been prepared, the results of oxidation or distillation experiments have not as yet been sufficiently definite to allow any conclusions to be drawn with regard to the arrangement of the carbon atoms, or the position of the nitrogen and oxygen atoms in the molecule. A detailed study of the action of methyl iodide and of water upon strychnine has now furnished Dr. Tafel with sufficient data to throw some light upon the construction of at least a part of the strychnine molecule. It will be remembered that Stahlschmidt prepared a crystalline base from the methyl iodide addition compound of strychnine (methyl-strychnium iodide), by successive treatment with sulphate of silver and baryta water, and this he considered to be a simple methyl derivative of strychnine, although apparently it possessed entirely different physiological properties. Tafel showed (*Berichte*, xxiii., 2731) that this body is a secondary product of the action of baryta upon methyl-strychnium sulphate, produced by the intermolecular re-arrangement of the ammonium base, $C_{21}H_{22}N_2O_2CH_3(OH)$, and that it is capable of being reconverted into salts of the latter by the action of acids. Unlike strychnine, "methylstrychnine" possesses no bitter taste, is readily soluble in water and insoluble in benzene, and moreover yields a well characterised nitrosoamine, which proves it to be a secondary base, *i.e.*, to contain an imido (NH) group, whilst strychnine itself is a tertiary base in which all the valencies of both nitrogen atoms are combined directly to those of carbon atoms. Further investigation of "strychnol," the compound obtained by Loebisch and Schoop by the action of alcoholic soda upon strychnine, shows that it is formed by the addition of a molecule of water to strychnine, and may be represented by the formula $C_{21}H_{24}N_2O_3$. Its name was suggested by the phenol-like character attributed to it from its solubility in alkalies, precipitation from alkaline solution by carbonic acid, and ready oxidability, but Tafel's experiments indicate the presence of an imido (NH) and a carboxylic (COOH) group, and prove that strychnine is the anhydride of strychnol. The relation between strychnol and strychnine is therefore the same as that between isatic acid and

isatin, so that it is proposed to rename it strychnic acid.


Isatin.


Isatic Acid.


Strychnine.


Strychnic Acid.

The nitrogen atom concerned in this change has been found to be the first attacked by methyl iodide, becoming pentavalent and yielding the addition product methyl-strychnium iodide, from which methyl-strychnium hydroxide may be prepared. The latter body is, as already remarked, readily convertible into methylstrychnine by the action of alkalies and conversely methyl-strychnium salts are formed in the presence of acids. This chemical behaviour admits of an explanation of the physiological action attributed by Stahlschmidt to methylstrychnine, which corresponds with that observed by Brown and Fraser for methyl-strychnium salts. As Stahlschmidt in his biological experiments introduced methylstrychnine into the stomachs of rabbits, it is possible that sufficient acid was present to effect a conversion into a methyl-strychnium salt. This assumption is borne out by some experiments made at Tafel's suggestion by Dr. D. Gerhardt, who found that a subcutaneous injection of an aqueous solution of methyl-strychnine produced unmistakable symptoms of strychnine poisoning (*Annalen*, cclxiv., 33).

Constituents of Rhizoma Podophylli.

A communication upon the constituents of *Rhizoma Podophylli*, which may be regarded as a continuation of Podwyssotzki's investigations on the active principle of podophyllin (*Pharm. Journ.*, [3], xii., 217, 1011) has been recently published by R. Kürsten (*Archiv*, May 25, p. 220). It may be remembered that Podwyssotzki isolated the active amorphous substance podophyllotoxin, now a commercial article, from which by treatment with alkalies he obtained the crystalline but less active pikropodophyllin and an amorphous pikropodophyllic acid. Kürsten considers the amorphous podophyllotoxin prepared according to Podwyssotzki's directions to be an impure body, since different preparations yielded varying analytical results. By fractional precipitation of a chloroformic solution with petroleum ether, Kürsten obtained a crystalline body possessed of great physiological activity, which he has since been able to prepare direct from the rhizomes by extraction with chloroform and subsequent treatment of the chloroform residue with benzene. The yield is about 0·2 per cent. of the root employed, and the term podophyllotoxin is retained for it. It crystallizes most readily from proof spirit and benzol, and the crystals melt at 93° to 95° C., and are but slightly soluble in cold water, whilst the alcoholic solution is strongly lævorotatory. The results of analyses suggest the formula $C_{23}H_{24}O_9 + 2H_2O$ for the crystals, and this corresponds with the molecular weight determined by Raoult's boiling-point method. From the action of fuming hydriodic acid it is concluded that three methoxy (OCH_3) groups are present in the molecule, but the unsuccessful attempts to prepare an acetyl or benzoyl derivative negative the supposition of an hydroxyl group. Oxidation with permanganate of potash in alkaline solution yielded carbonic acid and a new crystalline acid, podophyllic acid, melting at 158-160° C., easily soluble in alcohol, less so in warm water and ether. Analyses of the free acid and of a crystalline copper salt led to the formula $C_{20}H_{24}O_9$ for the acid, and to the following equation as a representative of the oxidation process, $C_{23}H_{24}O_9 + O_6 = C_{20}H_{24}O_9 + 3CO_2$. A third oxidation product, obtained in small prismatic crystals melting at 190°, dissolves in alkalies with a beautiful blue fluorescence, but its identity with Kunz's chrysatropic acid or scopoletin could not be established. No further positive evidence as to the constitution of podophyllotoxin could be gathered from oxidation and reduction experiments, but from other observations Kürsten considers the presence of a cinnamyl nucleus in the molecule to be extremely probable. Pikropodophyllin, prepared from both amorphous and crystalline podophyllotoxin by warming the alcoholic solution with ammonia, was found by Kürsten to possess the physical properties described by Podwyssotzki, with the exception of a slightly higher melting-point (227° C.); but from the results of analyses it was proved to possess the same empirical formula and molecular weight as podophyllotoxin, and is therefore isomeric with the latter. Besides the great difference in the melting-point, pikropodophyllin is distinguished from podophyllotoxin by its inactivity towards polarized light, its comparative insolubility in most solvents and indifference towards Millon's reagent. It yields the same oxidation and reduction products as podophyllotoxin, and the cause of isomerism is probably to be sought in the altered position of one or more methoxy groups. Podwyssotzki's pikropodophyllic acid was found in the chloroform extract from which the crystalline podophyllotoxin had been removed, and from the examination of a small portion obtained in a crystalline and nearly pure condition it is thought to be identical with the oxidation product $C_{20}H_{24}O_9$. The remainder of Kürsten's memoir is occupied with the investigation of podophylloquercetin, a crystalline product isolated by Podwyssotzki, which bears considerable resemblance to quercetin. Kürsten ascribes to it the formula $C_{23}H_{16}O_{10}$, and states that six acetyl or benzoyl groups may be introduced into the molecule, a molecule of water being taken up at the same time.

Vermifuge Principle of Male Fern.

Numerous investigations of the ethereal extract of male fern have been made, both with a view to the isolation of the active constituent and of a purely chemical nature. The subject has also acquired toxological interest of late years owing to the occurrence of several fatal cases of poisoning accompanying the therapeutic employment of the extract. Although most investigators are agreed that the vermifuge action is to be attributed to filicic acid rather than to an essential oil or any resinous body, the toxic properties of filicic acid are still disputed, owing to the frequent occurrence of cases in which it appears inert. Recent investigations have, however, indicated that the crude precipitated acid is incomparably more active than the pure crystalline product, which, indeed, has been administered in doses of 1½ grams without any toxic action being observed. Herr Poulsson, in a com-

munication from the Pharmacological Institute at Strassburg (*Archiv f. exp. Path. u. Pharmakol.*, July 3, p. 1), says that if the pure, crystalline, completely inactive filicic acid be dissolved in alkalies and reprecipitated by any acid, the amorphous precipitate so obtained possesses exactly the poisonous properties of the extract. He further shows that these two physiologically different modifications of filicic acid also differ in chemical relations, and that there is little doubt that the inactive crystalline body is an anhydride or lactone of the amorphous filicic acid, and is better termed filicin. Filicin melts at 184·5° C., filicic acid at 125° C.; the latter is much more soluble in alcohol, and can be readily converted into filicin by allowing the ethereal solution to stand several days. Concerning the constitution of filicic acid but little is at present definitely known, with the exception that phloroglucinol and isobutyric acid are two of its components. Analyses and Raoult determinations by Poulsson led to the formula $C_{35}H_{42}O_{13}$ for the acid and $C_{35}H_{40}O_{12}$ for filicin. From experiments upon frogs it appears that filicic acid affects the central nervous system, the heart and muscles. With rabbits the fatal dose was found to be 0·10 gram when injected subcutaneously, but 0·50 gram when administered by the stomach, since it is absorbed very slowly by the intestine. Doses of 1·5 gr. filicin introduced into the stomach of rabbits produced no toxic symptoms. Whether this inertness of filicin depends upon the chemical constitution, or whether it is to be attributed to its insolubility in aqueous fluids, is difficult to decide. In any case the filicic acid appears well adapted for therapeutic use, since it it easily dissolved, held in solution in the intestines, and is only absorbed very slowly, thus effecting the expulsion of parasites without injuring the organism of the part. These results accord with experience, as they explain why a freshly prepared extract is much more active than an older preparation. Not only may the extracts from different sources vary in percentage of filicic acid, but the same extract varies according to its age, owing to the gradual separation of the crystalline anhydride. The usual requirement of textbooks, that a good extract must be permeated with white granules of filicic acid, does not prove that the extract is good, but rather that it has been so.

Aspidium athamanticum.

The rhizome of *Aspidium athamanticum*, which has long been used in South Africa as a remedy for tapeworm, and is known under the name "Uncomocomo," has been examined histologically and chemically by R. Kürsten (*Archiv*, p. 258). The author describes it under the name "Rhizoma Pannæ." The rhizome presents considerable resemblance in structure to that of male fern, but is larger in size, and the structure of the glands found inside the intercellular cavities is sufficiently distinct to enable the two rhizomes to be distinguished by means of the microscope. The active principle of the root appears to be a body closely resembling filicic acid, but not identical with it. It is found both outside and inside the glands in spirituous preparations of the rhizome. To this body Kürsten has given the name "pannic acid." It is almost insoluble in cold and only slightly in boiling water, easily soluble in strong alcohol, ether and hot glacial acetic acid. The alcoholic solution has no marked flavour, but produces a strong, persistent, burning sensation on the tongue. It also dissolves easily in alkalies and is precipitated in an amorphous condition from alkaline solutions by acids. It crystallizes in thin, shining, rectangular-linear prisms of a light yellow colour, which have a somewhat greasy feel and melt at 187°. It differs from filicic acid (1) in being easily soluble in strong alcohol, in which filicic acid is almost insoluble; (2) in subliming at 80° C.; and (3) in isobutyric acid not being split off when it is heated in a sealed tube with water.

The Fat and Essential Oil of Sabadilla Seeds.

Little attention has been paid to the chemical substances accompanying veratric acid and the alkaloidal constituents in sabadilla seed. Pelletier and Caventou observed the presence of a peculiar fatty acid, which they termed sabadillic acid, and which was thought by Wright and Luff to be identical with the angelic (methyl-crotonic) acid resulting from the decomposition of cevadine. In the preparation of veratrine a large quantity of fat is obtained as a bye-product, and this has been subjected to thorough investigation by Herr E. Opitz (*Archiv*, June 22, 265). The sabadilla fat yielded by distillation with steam a considerable quantity of essential oil, and the residue contained, besides oleic and fatty acids that were separated by means of their lead salts, over 4 per cent. of cholesterin, a sufficiently large percentage to suggest that its preparation from this relatively worthless material would be remunerative. The proportions of the other constituents of the non-volatile portion of the fat were estimated as 50 per cent. oleic acid, 36 per cent. palmitic acid, and 10 per cent. glycerine. The freshly prepared essential oil appears to be composed of the methyl and ethyl esters of oxymyristic and veratric acids, of several aldehydes of the lower fatty acids and of polyterpenes with high boiling points. The volatile sabadillic acid of Pelletier and Caventou was not observed, and Herr Opitz considers that these investigators had in their hands a mixture of the oxidation products of the aldehydes with traces of oxymyristic and veratric acids. As the esters of veratric and oxymyristic acids are easily saponified, it may be concluded that spontaneous decomposition occurs during storage, since older seeds both lose their odour and fail to yield volatile esters upon distillation with steam. It is also probable that the aldehydes present are gradually oxidized in the seeds to the respective acids. Thus it will be understood that the amount and character of the essential oil and fat of sabadilla seeds varies much, but good fresh seeds yield in the average about 13 per cent. fat and 0·32 per cent. essential oil.

Adulteration of Saffron.

Two more new adulterants must now be added to the long list of substances mixed with saffron for venal purposes. M. Collardot has detected (*L'Union Pharm.*, July, p. 294) the presence of fine shreds of onions dried and coloured artificially, and also the powder of "sweet cayenne," or paprika, made adherent to the styles by some agglutinating agent, which he believes to be honey. The second adulterant he has found to the extent of 60 or 70 per cent., or in some samples even more.

The singular vegetable production known as "*Pachyma Cocos*," found on the roots of fir trees in China, Japan, Carolina, and recently also in Switzerland, has been generally supposed to be the

sclerotium of some species of fungus, but the group of fungi to which it probably belongs has not hitherto been indicated. In an article by E. Fischer ('Hedwigia,' 1891, p. 61), the author mentions that the *Polyporus sacer*, Fr., of Madagascar, grows out of a similar sclerotium, which was named *Pachyma malaccense* by Schröter, and states that the sclerotium known as *Pachyma Cocos* agrees with it in so many particulars that he holds it probable that the latter is also the sclerotium of a *Polyporus*. But as it is not proved that the same structure in a sclerotium invariably gives rise to a similar fungus, he prefers to suggest that it is at all events the hardened mycelium of a hymenomycetous fungus. It may be hoped that Dr. Henry or Mr. C. Ford, of Hongkong, may have the opportunity of clearing up this interesting problem in China, either by cultivating the *Pachyma* in a warm moist atmosphere, or by examining the base of any *Polyporus* found on fir tree roots to ascertain if it arises from the *Pachyma*.

Pachyma Cocos.

An important paper on methods of preventing and checking the attacks of insects and fungi is published in the Journal of the Royal Agricultural Society of England, No. vi., p. 217, in which various recipes are given by Mr. C. Whitehead for the preparation of insecticides. These contain, as a rule, some poisonous ingredient such as Paris green (arsenite of copper), London purple (containing arsenious acid, lime, etc.), white hellebore, sulphate of copper, etc. Chemists who reside in agricultural districts would probably find the article repay perusal from a business point of view. A correspondent of the *Gardener's Chronicle*, July 18, p. 77, mentions the use of a small fragment of camphor placed among the upper leaves of the plant as very successful in driving away the aphides. In an editorial note in the *Lancet*, July 18, p. 137, it is pointed out that copper hydrate, formed by the mixture of lime and sulphate of copper, now used with success as an insecticide or germicide, appears to act on fungi like a weak solution of perchloride of mercury, without affecting the growth or life of the plant, and its action may possibly be akin to that which takes place when it is added to solutions of peptone albumen, with which it forms an insoluble compound.

Insecticides in Agriculture.

Various epidemics of lead poisoning that have occurred in towns in Lancashire and Yorkshire have been associated with the use of moorland water, and have been attributed among other causes to the action upon the lead service pipes of an organic acid present in the water, though no free acid has yet been isolated. The results of some experiments made by Dr. John Brown, of Bacup, have led him to the conclusion (*Brit. Med. Journ.*, July 25, p. 180) that the acidity may be due to an acid salt, probably a double salt of alumina and iron, and that oxygen held in solution is also an important factor in the plumbo-solvent action of moorland water. The solvent action was found to be lessened with an increase in the temperature of the water, probably because the quantity of gas held in solution diminishes as the temperature rises. It can also be lessened, if not entirely prevented, by treatment of the water with powdered chalk or bicarbonate of soda.

Moorland Water and Lead Pipes.

Messrs. Otto and Drewes describe (*Archiv d. Pharm.*, May 25, p. 179) a double salt of magnesium iodide and lead iodide corresponding to the chlorine salt, $PbCl_2,2MgCl_2+13H_2O$, recently prepared by them. To a hot saturated solution of magnesium iodide so much dry lead iodide as would go into solution was added, the solution filtered and allowed to cool. The yellowish crystals obtained gave analytical results corresponding to the formula $PbI_2,2MgI_2+16H_2O$. The double salt loses its water of crystallization at 140° C., decomposes with elimination of iodine at 150°, and is so hygroscopic that it deliquesces in the air to a solution of magnesium iodide in which lead iodide is mechanically suspended. Both the chloride and iodide crystals belong to the hexagonal system.

Double Salt of Lead and Magnesium.

ON NITRIFICATION.

BY R. WARINGTON, F.C.S.

The author, being compelled for the present to discontinue his researches on nitrification, has communicated to the Chemical Society a memoir, in which he has gathered together the principal unpublished results that he has obtained. These are arranged under headings covering the distinction between the production of nitrates and nitrites, the isolation, properties, form and nutrition of the nitrous organism, and the production of nitrates. The paper is altogether too long to reproduce here in its entirety, but the gist of it may be given in the author's own words by quoting the sections on the theory of nitrification and the summary:—

The Theory of Nitrification.

The time at my disposal has not allowed any complete study of the origin or properties of the nitric organism; only a few of its salient properties have been pointed out. It may be said that I have not even satisfactorily proved that the organism I have experimented with was derived from soil, though of this there can be little doubt. With the experience now gained it may be pretty safely predicted that if a series of cultures be made in an inorganic nitrite solution, such as I have employed, starting with soil as the seed for the first culture, a point will soon be reached at which only the property of converting nitrites into nitrates will be retained, while the power of oxidizing ammonia will be lost. Such a process would run parallel with that already established for the separation of the nitrous organism; here a series of successive cultures in solutions of ammonium carbonate determines a loss of all power to oxidize nitrites, while the power of oxidizing ammonia to nitrites remains.

Does soil contain both a nitrous and a nitric organism: or does the original organism embrace both properties, and lose a part of its power when cultivated in unsuitable media? The cultivations on gelatinous silica, which Winogradsky has initiated, will supply the most decisive answer to this question, for this method will allow of the separation of the organisms directly from the soil, and the testing of their powers without their previous cultivation for many months in a liquid medium. The evidence at present, however, seems to point very clearly to the existence of two organisms of very different properties, but belonging to the same class.

In support of this view, we may remark that there is no apparent reason why the power of oxidizing nitrites should be lost during the process for obtain-

ing the nitrous organism, as in every culture in ammonium carbonate nitrites are produced, and an opportunity given for the exercise of the function possessed by the nitric organism. The reason why successive cultivations in ammonium carbonate finally eliminate the nitric organism is apparently to be found in the hindrance to its development presented both by ammonia and by an alkaline condition of the solution,* unless the alkali is present as a supercarbonate of calcium or sodium.

There is perhaps more reason for assuming that the power of oxidizing ammonia may be lost during successive cultivations in liquids in which ammonia is absent; but the loss of this power occurs so speedily, that it is more natural to assume that the nitrous organism fails to grow when ammonia is absent.

The facts observed during the nitrification of ammoniacal solutions by soil also point to the existence of two agents. A purely nitric nitrification occurs, we have seen, only when the ammoniacal solution is weak. When the solution is stronger, much nitrous acid is at first produced; indeed, when a small quantity of soil has been added, it is quite frequent that nearly the whole of the ammonia should be converted into nitrite before the production of nitrate begins. Frequently, too, there is a long pause after the oxidation of ammonia to nitrite before the oxidation to nitrate commences. This pause is probably a true incubation period, the nitric organism not beginning to develop till the ammonia had greatly diminished or disappeared.

We may here remark that in a soil the conditions are quite different from those occurring in one of these cultures. The nitric organism is there present at starting in large quantity, and is not required to develop under adverse circumstances. Moreover, the proportion of ammonia present at any time is extremely small, and the alkali is always a supercarbonate.

The actual dislike of the nitric organism for ammonia, and the fact that it cannot oxidize it, are points of difference from the nitrous organism so great that it is difficult to believe that they are merely the result of successive cultivations in a solution containing nitrites in place of ammonia.

The points of similarity between the nitrous and nitric agents are also numerous. Both belong to a class flourishing in inorganic solutions. Both are aided in their work, probably in their nutrition, by the presence of supercarbonates. The agreement in their attitude towards acetates is not so certain, the nitrous organism being apparently more benefited than the nitric. The development of both is greatly hindered or prevented by the presence of neutral alkali carbonates. Neither of them, apparently, will grow on gelatin. Lastly, the form of the two organisms is, apparently, similar. It it hazardous to make such an assertion before the nitric organism has been satisfactorily isolated; but as the cultures which convert nitrites into nitrates, and fail to oxidize ammonia, are full of small, round cocci, which appear perfectly to resemble those which occur in the pure cultures of the nitrous organism, it is at present difficult to escape from such a conclusion.

A further study of the nitric organism should be of great interest. What is its action upon organic matter? Is this, or the nitrous organism, the agent in the conversion of iodides into iodates, and bromides into bromates, which Müntz has shown to be accomplished by soil? These and other questions belonging to this interesting subject I must now leave to others.*

I must not close this paper without expressing my great indebtedness to Dr. E. Klein, F.R.S., for the cordial assistance and advice he has at all times given me in the bacteriological work: without this advice I should many times have gone astray.

Summary of Results.

1. The nitrification occurring in a mass of aërated soil, or produced by seeding with soil a cold, weak, ammoniacal solution, is purely nitric in character. If the ammoniacal solution is strong, or the temperature raised, a large quantity of nitrous acid is produced, which is finally converted into nitric acid. Soil readily converts a solution of nitrite into nitrate.

2. Pasture soil produces nitrites more readily than arable soil.

3. A clay subsoil, down to 4 feet from the surface, was found to produce nitrates.

4. In 1878 ammoniacal cultures were obtained (a third or fouth from one seeded with soil), yielding only nitrites, which remained permanent. Subsequently other cultures were in the same condition.

5. Such nitrous cultures produce nitrites alone in solutions of ammonia, asparagine, urine and milk. Their action is not altered by cultivation in shallow liquids with abundant aëration, or by a temperature of 30°.

6. It is difficult to prove that no trace of nitric acid is produced by this nitrous agent, from the want of a sufficiently good analytical method. If a small quantity of nitrate is formed it must be as a bye-product, as the nitrous agent does not oxidize nitrites.

---

* If the latter part of this explanation is true, the development of the nitric organism in an ammonium chloride solution should be more injured by the addition of disodium carbonate than is the case with the nitrous organism. This has not yet been made the subject of experiment.

* Since writing this paper I have seen the communication made by Müntz to the French Academy on May 19, on the production of nitrates in soil. He now regards the work of the nitrifying organism as confined to the oxidation of nitrogenous matter to nitrites, and believes that the conversion of nitrite into nitrate is not the work of an organism, but is brought about by the joint action of carbonic acid and oxygen. He states that in a weak solution of calcium nitrite the joint action of carbonic acid and air determines a conversion into calcium nitrate.

Whether or not the conversion of nitrite into nitrate in soil can possibly take place by a simple chemical reaction such as Müntz has described, it is quite evident that such a theory is incapable of accounting for the facts I have narrated in the present paper.

1. We have seen that the production of nitrites only, or of nitrates, in an ammoniacal solution, can be determined by the character of the culture with which the solution is seeded.

2. We have abundant evidence that in a solution of potassium nitrite conversion into nitrate can be determined by the introduction of the "nitric organism."

I have not enumerated in my paper the many blank experiments which formed part of the various trials; it has been stated, however, that in the attempt to isolate the nitric organism by the dilution method, no change occurred in eight of the nitrite solutions, a sufficient proof that no spontaneous conversion of nitrite to nitrate took place.

The action of carbonic acid upon my potassium nitrite solution was made the subject of experiment before this gas was employed in the trials I have described. Before commencing the cultures of November 29, a current of carbonic acid was passed for about an hour through some of the nitrite solution about to be employed; to this solution a little of Trommsdorf's reagent (zinc iodide and starch) had previously been added. No blue coloration appeared; and it was consequently concluded that no nitrous acid had been set free.

I have not tried the action of carbonic acid upon calcium nitrite. This salt has been produced in all cases in which ammonia has been oxidized by the nitrous organism in the presence of calcium carbonate. Calcium nitrite solutions thus produced are quite permanent. I have in two cases added the nitric organism to such cultures, and succeeded in turning the nitrite into nitrate.

7. It was at first thought that the age of the culture was the factor which determined the loss of the power of producing nitrates, but this idea was negatived by subsequent experiments. Successive cultivations in an alkaline solution (as ammonium carbonate) were found to be a certain method of obtaining the purely nitrous agent.

8. The production of nitrites by the above-mentioned agent is not due to a process of reduction; it readily takes place in inorganic ammoniacal solutions.

9. After the nitrification of an ammoniacal solution, if not too weak, gelatinous flocks frequently appear at the bottom of the vessel. If precipitated calcium carbonate has been introduced, it assumes a curdled appearance, and when treated with acid the gelatinous matter is left. When highly magnified, the jelly is seen to consist of highly refractive, circular corpuscles.

10. A large number of organisms, from many sources, obtained as pure cultures on gelatin, were introduced into ammoniacal solutions, but no nitrification was in any case obtained.

11. Successive cultivations, the first seeded with soil, were made in an inorganic ammonium carbonate solution, supplied with phosphates, etc.; the product became wholly nitrous at the second culture.

12. The organisms seen in these ammonium carbonate cultures were chiefly cocci, oval or round, the latter the smaller, and staining most deeply.

13. When such ammoniacal cultures were spread on gelatin, or on agar-agar, no such cocci appeared, although the composition of these media had been specially contrived to agree with that of well-known nitrifiable solutions. From several of the ammoniacal cultures only a single species of bacillus was obtained by cultivation upon gelatin or agar-agar.

14. None of the growths obtained on gelatin from nitrified solutions were found to produce nitrification when introduced into suitable liquid media, nor when placed on marble moistened with an ammoniacal solution.

15. Broth, and broth with solution of ammonium carbonate, were seeded with the nitrified cultures, and examined microscopically. The bacilli present in the cultures used as seeds were greatly developed in the broth; besides these, only small, dark points were seen in the stained preparations. The mixture of broth and ammonium carbonate readily nitrified.

16. Three series of trials to separate the nitrifying organism by the dilution method failed; a fourth, in which an ammonium chloride solution with calcium carbonate was the culture liquid, succeeded. Out of twenty solutions, ten nitrified, and of these three gave no growth on gelatin.

17. The organism thus separated oxidizes ammonia to nitrous acid only; it is, in fact, the nitrous agent studied in my early experiments. Solutions of a nitrite seeded with this organism do not yield nitrate.

18. The nitrous organism grown in broth containing calcium nitrate did not reduce the nitrate to nitrite.

19. The nitrous organism does not grow on gelatin, or on agar-agar. It grows slowly in weak broth, but without impairing its transparency, or producing any other visible change.

20. The pure nitrous organism is capable of producing nitrous acid in solutions of asparagine, milk, urine and urea; the last mentioned was apparently the most difficult to attack. The nitrification of the milk and asparagine made slow progress. All the cultivations of the pure organism were free from turbidity.

21. The nitrous organism occurs as nearly circular corpuscles, varying from minute points up to nearly 1·0 μ in diameter, sometimes double when division is approaching; these circular organisms stain deeply. It may also occur as oval cocci, the length frequently exceeding 1·0 μ, and the ends not unfrequently more or less truncated. There may also occur very irregular and broken (?) forms which take stain but feebly.

22. When the mixed organisms of soil are present in an ammoniacal solution, nitrification is hindered by the presence of a tartrate.

23. The nitrous organism will readily develop, and oxidize ammonia to nitrous acid, for apparently an unlimited number of successive generations in solutions to which no organic matter has been added, but phosphates are essential for this development. Winogradsky has supplied quantitative proof that the organism produces organic matter from inorganic materials, and finds on an average about 35 parts of nitrogen oxidized for 1 part of carbon assimilated from ammonium carbonate. The energy developed by the oxidation supplies apparently an explanation of this otherwise improbable reaction.

24. In pure cultures of the nitrous organism in ammoniacal solutions, the addition of carbonic acid, monosodium carbonate, or calcium acetate facilitates nitrification, the addition probably supplying carbonaceous food. Disodium carbonate greatly hinders nitrification.

25. Results obtained in 1880–81 revealed the existence of an organism which energetically converted nitrites into nitrates, but was apparently unable to oxidize ammonia.

26. In 1886 and 1890, attempts were made to separate the active organism from the 1881 cultures by growth on gelatin and potato; none of the organisms thus separated had any power of oxidizing ammonia or nitrite.

27. Recent results show that the nitric organism develops in inorganic solutions, and energetically converts nitrites into nitrates, especially if supercarbonates are present. Monosodium carbonate, 1—4 grams per litre, exerted a favourable influence, 6 grams a retarding influence. Disodium carbonate greatly hinders its action.

28. The nitric organism produces neither nitrites nor nitrates in ammoniacal solutions, even when carbonic acid, or monosodium carbonate, or calcium acetate is supplied.

29. The presence of ammonia is apparently a hindrance to the action of the nitric organism on nitrites, even when monosodium carbonate is present.

30. The dislike of the nitric organism for ammonia explains the course of nitrification when comparatively strong solutions of ammonium salt (1 gram per litre) are seeded with a small quantity of soil; much nitrous acid is then produced, and the formation of nitric acid sets in only when the ammonia has greatly diminished in quantity.

31. An attempt to isolate the nitric organism by the dilution method failed, but apparently only one other organism, a stout bacillus, growing on gelatin, was present in some of the cultures. The stained preparations from these cultures contained an abundance of the minute circular organisms observed in pure cultures of the nitrous organism; the form of the two organisms is thus apparently similar.

32. The nitrification effected by soil is thus explained as performed by two organisms, one of which oxidizes ammonia to nitrites, while the other oxidizes nitrites to nitrates. The first organism is easily separated from the second by successive cultivations in solution of ammonium carbonate. The second is (probably) separated as easily from the first by successive cultivations in solution of potassium nitrite containing monosodium carbonate.

33. In soil, the nitric organism is equally active as the nitrous, since soil never contains any but extremely weak solutions of ammonia, and supercarbonates are always present.

ALKALOIDS OF THE ROOTS OF SANGUINARIA CANADENSIS AND CHELIDONIUM MAJUS.*

BY G. KÖNIG.

The roots of *Sanguinaria canadensis*, a native of North America, and the sanguinarine of commerce, contain several alkaloids, including *chclerythrine*, which is present in greatest quantity, *sanguinarine*, *γ-homochclidonine*, and *protopine*.

Chelerythrine crystallizes with a molecule of alcohol, which is not separated at a temperature of 150°; the formula is $C_{21}H_{17}NO_4 + C_2H_6O$; melting point 203°. It is identical with the alkaloid which the author separated from the celandine, *Chelidonium majus*. The *aurochloridc*, $C_{21}H_{17}NO_4,HAuCl_4$, melts at 233°; the *platinochloride* is $(C_{21}H_{17}NO_4)_2,H_2PtCl_6$; the *hydrochloride* crystallizes out of aqueous solution with five mols. H_2O, and from alcohol with four mols. H_2O. The salts are lemon-yellow.

Sanguinarine, $C_{20}H_{15}NO_4$, is very similar to chelerythrine in its properties; it crystallizes with ¼ mol. H_2O, and melts at 211°; its salts are red. The *hydrochloridc*, $C_{20}H_{15}NO_4,HCl + 5H_2O$, the *nitratc*—

$$C_{20}H_{15}NO_4,HNO_3 + H_2O,$$

the *aurochloride*, $C_{20}H_{15}NO_4,HAuCl_4$, and the *platinochloride*, $(C_{20}H_{15}NO_4)_2,H_2PtCl_6$, were prepared.

The base which the author has named *γ-homochelidonine* is probably identical with that separated by Selle from *Chelidonium majus*, and its formula is probably $C_{22}H_{21}NO_4$. Its behaviour with alkaloid reagents resembles that of Selle's γ-homochelidonine. The fourth alkaloid, *protopine*, was prepared from *Chelidonium majus*, *Sanguinaria canadensis*, and from opium, all the three specimens being identical. Its formula is $C_{20}H_{17}NO_5$, and it melts at 204°; the *platinochloride*, $(C_{20}H_{17}NO_5)_2,H_2PtCl_6 + 3H_2O$; and the *aurochloride*, $C_{20}H_{17}NO_5,HAuCl_4$, melting at 182°, were prepared; the *hydrochloride*, $C_{20}H_{17}NO_5,HCl$, crystallizes in two different forms, and appears to be free from combined water.

* *Chem. Centr.*, 1891, i., 321-322; from *Zeit. Naturwiss Halle*, lxiii., 369-426. Reprinted from the *Journ. Chem. Soc.*, July.

SUBERIN AND CORK CELLS.†

BY F. A. FLÜCKIGER AND GILSON.

Kügler (1884) showed that suberin contained an appreciable amount of fat and extracted stearic acid; he also isolated the crystalline phellonic acid, which, however, does not belong to the fatty series. Gilson (1890) maintains that suberin is that part of cork texture which is insoluble in neutral liquids, and is not taken up either by concentrated sulphuric acid or by ammonio-copper oxide solution, but is dissolved by alcoholic potash, and with nitric acid yields suberic and other fatty acids soluble in ether and alcohol. He finds the colouring matter of cork to be very soluble in sodium carbonate solution, which scarcely attacks suberin even on prolonged boiling. After treating finely divided cork with sodium carbonate, the suberin is extracted by a 3 per cent. alcoholic potash solution. The solution filtered hot gives a precipitate on cooling, which, after washing with water and recrystallization from alcohol, consists mainly of potassium phellonate. The alcoholic filtrate freed from alcohol, diluted with water, and treated with hydrochloric acid, gives a semi-fluid deposit; the decanted liquid yields glycerol. Gilson dissolves the deposit in ether, washes out the hydrochloric acid with water, expels the ether, dissolves in alcohol, and boils with potassium carbonate, when the addition of an alcoholic solution of magnesium chloride precipitates phloionic acid; the solution on further treatment yields suberinic acid. Kügler gives $C_{22}H_{42}O_3$ as the formula for phellonic acid, whilst Gilson prefers $C_{22}H_{43}O_3$. The latter gives the melting-point as 102°. When heated at 105° with hydrochloric acid, the anhydride $C_{44}H_{84}O_5$ is obtained. *Phloionic acid*, $C_{22}H_{44}O_8$, is insoluble in cold water, but dissolves in hot water, forming crystalline needles on cooling; it is very soluble in alcohol, but only slightly in ether and in chloroform; it melts at 62-63°. *Potassium phloionate* is very soluble in ether, less so in alcohol. *Silver phloionate* is rapidly decomposed in the light, whilst the corresponding phellonate is only slowly coloured. *Magnesium phloionate* forms a crystalline precipitate when an alcoholic solution of a magnesium salt is added to a solution of phloionic acid. *Suberinic acid*, $C_{17}H_{30}O_3$, when gently warmed, forms a liquid miscible with alcohol, ether, and chloroform, but not with light petroleum. Its alkaline salts are soluble in water and alcohol; in the alcoholic solution no precipitate is produced either by magnesium or barium acetate. When heated without access of air, suberinic acid gradually forms a transparent, elastic mass, for which no solvent has yet been found. No water appears to be separated; the change appears rather to be due to polymerisation. *Potassium suberinate* is soluble in water and alcohol, but not in ether. The silver salt is rapidly decomposed. Gilson has observed a characteristic test for phellonic acid, which consists in the beautiful reddish-violet colour produced on moistening the acid with a very dilute, alcoholic iodine solution, and adding sulphuric acid (sp. gr. 1·8); the reaction succeeds best with potassium phellonate, and may be obtained with iodine in aqueous solution of potassium iodide, or with iodine in zinc iodide. The foregoing relates entirely to cork from *Quercus suber*. Gilson has, however, glanced at that from *Ulmus campestris* var. *suberosa*, and finds that this is much poorer in suberin. It yielded phellonic and suberinic acids, but neither phloionic acid nor glycerol.

† *Arch. Pharm.*, ccxxviii., 690–700. Reprinted from the *Journ. Chem. Soc.*, April.

TINCTURE OF MUSK.*

BY M. VAN DER VOORST.

The various pharmacopœias which I have been able to consult differ so greatly in their directions for making tincture of musk, not only in the proportion of the substance, but in the alcoholic strength of the solvent, that I have thought it advisable to call your attention to the anomalous discordances.

The Belgian Pharmacopœia and the French Codex direct 1 part of musk to 10 parts of alcohol of 80°.

The German, Russian, and Danish Pharmacopœias direct 2 parts of musk, 35 parts of alcohol of 92°, and 67 parts of water.

The U.S.P. directs 10 parts of musk, 45 parts of alcohol of 92°, and 45 parts of distilled water.

Musk, according to the analyses of Geiger and Reimann, contains in 100 parts—

Non-saponifiable fat	1·1
Cholestearin, containing non-saponifiable fat	4·0
Bitter resin	4·0
Alcoholic extract, lactic acid, and salts.	7·5
Aqueous extract and salts soluble in water	36·5
Dirt and insoluble residue	0·4
Water ammonia, etc.	45·3
	100·0

From these figures it is evident that the portion of musk soluble in water is far larger than that soluble in alcohol. In other words, if we prepare a tincture of

* *National Druggist*, from the *Journal de Pharmacie d'Anvers*.

the substance according to the Belgian Pharmacopœia with alcohol of 80°, and another with alcohol of 50°, the first will be found to be less coloured, less odorous, and less charged with extractive than the latter.

From this I conclude that in order to obtain a tincture carrying the highest possible percentage of the active principles of musk it is necessary that we use alcohol of not more than 50°.

In conclusion, I would remark that the tincture of musk of the P.G. contains only one-fifth of the amount of the musk contained in ours (the Belgian). It follows that a prescription for this article written by a German physician or for dispensation by German pharmacists should receive only one-fifth as much of the article when filled or compounded in Belgium, using our tincture. The mere difference in cost of a tincture made with a proper menstruum which exhausts a drug that costs from 4 to 5 francs a gram, and one that exhausts only one-fifth of it, is quite an object, especially in a place where competition from German pharmacists is so strong.

DETECTION OF COTTONSEED OIL IN OLIVE OIL.*

Professor Dioscoride Vitali furnishes some new contributions towards the problem of detecting cottonseed oil in olive oil. We quote from *L'Orosi* (13, 361, after *Chem. Centralbl.*):

On mixing pure olive oil with twice its volume of ether, a yellowish solution is obtained. If now a few drops of a mixture of equal parts of concentrated sulphuric and nitric acid be added, a brisk reaction is started, after the termination of which the liquid becomes almost colourless.

Cottonseed oil, under the same circumstances, becomes distinctly yellow, and this colour also appears in a mixture of both oils, so that a quantity of 10 to 15 per cent. of cottonseed oil may still be recognized in a mixture.

About 5 c.c. of the suspected oil is put into a test tube, mixed with 10 c.c. of ether, and to this there is added about 5 drops of the acid mixture. When the reaction ceases, the mixture will be colourless if the oil was pure olive oil. But if from 10 to 15 per cent. of cottonseed oil be present, the mixture is also at first nearly colourless, but on addition of 15 drops more of the acid it will assume a permanent yellow tint. This tint is due to the oxidation of a constituent of the cottonseed oil, probably its colouring matter, for still better results are obtained by treating the ethereal solution of the oil with chlorinated soda and diluted hydrochloric acid.

The same test will detect oil of sesame, which behaves in the same manner.

But cottonseed and sesame oil differ in this, that the latter becomes colourless, and remains so, when treated with chlorinated soda and hydrochloric acid. Peanut oil, on the other hand, behaves towards chlorinated soda like olive oil. These two oils, however, can be distinguished by the following behaviour: on dissolving olive oil in ether, and carefully [!] treating this with potassium chlorate and sulphuric acid, there results a colourless ethereal layer, and below it an aqueous, somewhat turbid and whitish layer. In the case of peanut oil the ethereal layer is yellowish-white, while the aqueous one is turbid and reddish-brown. Cottonseed oil yields a yellow ethereal layer, and a colourless aqueous one. In the case of oil of sesame the latter is green. Sweet oil of almonds behaves like olive oil, but differs from the latter by becoming coloured when treated with the acid mixture, and becoming yellow with chlorinated soda and hydrochloric acid.

* From the *American Druggist*, July 15.

ROOT TUBERCLES OF THE PEA.

The very extensive literature of this subject is epitomised by Herr A. Prazmowski in a very useful paper in the reports of the *Landwirthschaftliche Versuchs-Stationen*, in which he includes also reports of further observations of his own. Herr Prazmowski regards these structures as of a truly symbiotic character, since it is only plants provided with these tubercles —belonging exclusively to the Leguminosæ—that can acquire nitrogen from the free nitrogen of the atmosphere, by the intervention of the tubercle-bacteria. The host plants can derive benefit from the symbiosis only when it has overpowered the bacteria, the resorption of the products of the bacteria being the main cause of the increased vigour of the plant from that time, while in earlier stages it is frequently weak and sickly. Starch is present in the tubercles in considerable quantities, and is taken up directly by the bacteria.

FLOWERS AND INSECTS.

The controversy is still being carried on as to the part played by insects in the fertilization of flowers. Mr. Thomas Meehan, of Philadelphia, believes that this has been greatly exaggerated by botanists of the Darwinian type, and that flowers do not abhor their own pollen. He affirms that no flowers are so surely fertile as those that are cleistogamous, while those which are fertilized before the corolla expands are also invariably fertile. Plants wholly dependent on insects for their fertilization are, he states, all perennials; and an innumerable number of the flowers of these plants fall unfertilized. All annuals, on the other hand, though in some cases so constructed that cross-fertilization may occur, can fertilize themselves when cross-fertilization fails. In almost all cases annuals have every flower fertile. In a paper in the *Annals* of the Buitenzorg Botanic Garden, Java, Herr F. Rosen argues in the same direction. From the phenomena connected with cleistogamic flowers, and others in the vegetable kingdom, he argues that crossing does not play so important a part in the maintenance of species as has been supposed by most recent writers. Even with many anemophilous plants, such as *Carex* and *Festuca*, inbreeding appears to be the rule. Herr A. G. Kellgren, on the other hand, in a paper contributed to the Students' Natural History Society of Upsala, enumerates thirty-three species of flowers growing on the Omberg, an isolated mountainous region of North Germany, which are pollinated by the agency of Lepidoptera. They all belong to the order Leguminosæ.

DISTRIBUTION OF THE ORGANIC ACIDS IN SUCCULENT PLANTS.

According to the observations made by M. J. Aubert, chiefly on *Sedum dendroideum*, *Crassula arborescens*, and *Sempervivum tectorum* (the house-leek), malic acid is the only acid found in the free state in succulent plants, except occasional faint traces of tartaric. Observations made on the house-leek showed that the quantity of malic acid varies greatly in different leaves of the same rosette, and in the same rosette at different ages, being most abundant in the outer leaves. In the stem and leaves the quantity is greatest at an early age, decreasing as the parts grow older. The accumulation of the acid is greatly affected by external conditions; its proportion is smallest in that portion of the leaf which receives most light, both heat and light causing its destruction. As a general rule, there is also a connection between the presence of the acid and the process of transpiration, the amount of acid present being in inverse proportion to that of aqueous vapour given off.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, AUGUST 1, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE SALE OF MILK OF SULPHUR.

SOME months ago a prosecution was instituted under the Food and Drugs Act by the Vestry of St. James, Westminster, against a seller of milk of sulphur containing sulphate of lime. It was contended that the term "milk of sulphur" means pure precipitated sulphur, and that the presence of sulphate of lime should be regarded as the result of adulteration. If that view were correct the sale of the article commonly known as "milk of sulphur" would undoubtedly be unlawful and a punishable breach of the Food and Drugs Act. However, the real question to be decided is whether that view of the matter is a correct one. In regard to that question opinions differ, as shown by the correspondence that took place at the time referred to; but as pointed out by the magistrate before whom the case for the prosecution was heard, it is mainly a question of fact that has to be considered. Is there such a thing as milk of sulphur known to the public which is different in its composition from precipitated sulphur? Judicially it has been decided that there is such an article, and so far as that decision settles the matter it is clear that when the article so known is supplied to persons asking for "milk of sulphur" there is no breach of the provision of the Food and Drugs Act that articles supplied in retail trade shall be of the nature and quality demanded. But practically this judicial decision has proved insufficient to prevent the occurrence of much trouble and inconvenience to persons selling milk of sulphur. Certain public analysts, adhering to the opinion that the term milk of sulphur should be regarded as synonymous with the term precipitated sulphur, insist upon the sale of milk of sulphur containing sulphate of lime being treated as an offence under the Food and Drugs Act, even when milk of sulphur is asked for. The case to which reference is now made was of this nature. The person prosecuted was not a chemist and druggist, but an apothecary, who, in addition to practising as an apothecary, kept an open shop for the sale of drugs, and the final result was an adjournment of the case *sine die*. That result may be regarded as a practical endorsement of the decision given by the magistrates in the Knutsford case; but so long as public analysts continue to act upon the opinion above mentioned there is still a possibility of prosecutions being instituted for the sale of milk of sulphur containing sulphate of lime, and chemists will be exposed to the risk of having to appear as defendants against a charge of selling an adulterated article.

Under these circumstances it appears desirable to refer to this subject again, and there is a special inducement to do so since Dr. EDMUNDS, the analyst at whose instigation the above mentioned prosecution was instituted by the Vestry of St. James, has been so good as to favour us with an early copy of his annual report to the Sanitary Committee of that body. The subject of milk of sulphur is there dealt with, and in reference to the recent case it is stated that the real strength of the defendant's position lay in the fact that in some previous cases the magistrates had refused to convict, or the conviction had been overruled by Quarter Sessions. It is further stated that those cases had been prosecuted in a perfunctory way, while the defendants had fought the question with great skill and tenacity. Upon that view Dr. EDMUNDS advised the Committee that the decisions would probably be reversed if the matter were carried to a higher court, and if public policy required their reversal. This opinion has not been verified by the prosecution that was instituted for the purpose. Mr. HANNAY, the magistrate who heard the case at Marlborough Street, was disinclined to overrule the previous decision of Quarter Sessions, and he was unable to see how a question of law could be raised to go to a superior court. On the other hand, the defendant in the case was content with its dismissal, though he had to pay his costs, and he has not applied again for a decision and tendered evidence to rebut the presumption raised by the evidence of the public analyst. This leaves the matter in an unsatisfactory position, for while Dr. EDMUNDS anticipates that the prosecution will have the effect of probably preventing the future sale as "milk of sulphur" of the article containing sulphate of lime it is, in our opinion, still more probable that its sale will continue to be carried on much the same as hitherto.

In the report Dr. EDMUNDS has presented to the Sanitary Committee of St. James' Vestry he states that in his opinion there is no excuse in law for the sale of anything but pure precipitated sulphur when "milk of sulphur" is demanded. In support of that opinion he refers to PEREIRA as having so long ago as 1849 put this question quite clearly, and defined "milk of sulphur" as meaning precipitated sulphur. But with all deference to Dr. EDMUNDS, and without any disrespect to PEREIRA,

we must point out that this was merely an academic dictum, and by no means an authoritative decision. Those who remember PEREIRA'S lectures will recall the zest with which he seized any opportunity of introducing into them an element of romance, and with a poetic licence becoming such treatment of a subject he was in the habit of enforcing his objection to milk of sulphur containing sulphate of lime by the suggestion that persons who took it would be likely to get a plaster of Paris cast of their stomachs. When Dr. EDMUNDS speaks of the presence of sulphate of lime in milk of sulphur as being a "miserable adulteration of a medicine which is largely used among poor people," his remark appears to us to come within the same category as PEREIRA'S suggestion of a plaster of Paris cast. It is, in fact, merely an expression of his opinion, and that opinion we believe to be entirely unfounded. Our readers will know that there is with many a decided preference for the milk of sulphur containing sulphate of lime, and that many will not be persuaded to take precipitated sulphur in lieu of it. And as regards the general question as to the propriety of supplying the preparation containing sulphate of lime when milk of sulphur is asked for it may safely be affirmed that it is an article known to and appreciated by the public. If precipitated sulphur were supplied when milk of sulphur was asked for there would in fact be an infringement of the Food and Drugs Act, for the two things are as essentially different as the names by which they are known. As to the action of public analysts in this matter, we do not wish to suggest that it has been instigated by other than worthy motives; but we do not hesitate to say that it is very injudicious, and calculated to bring their office, as well as a possibly very useful Act, into undesirable discredit.

A General Order relating to methylated spirit has just been issued by the Inland Revenue authorities, according to which the spirit must in future contain not less than three-eighths of one per cent. by volume of "mineral naphtha" of a specific gravity not less than ·800. Spirit so mixed will not remain clear when mixed with water. No further definition of "mineral naphtha" is given; but it is stated that before being used to mix with spirit it must be approved by the Board. It is probably requisite for the purposes of the Excise that there should be the considerable latitude thus provided for as to the nature of the admixture by which spirit is to be rendered unfit for use as a beverage. A further regulation relates to the addition of essential oil or other flavouring material to methylated spirit. That must not be done without express sanction from the Board. Retailers of methylated spirit must not sell or have on their premises for sale methylated spirit containing any essential oil or other flavouring material, nor any which does not contain mineral naphtha and remain clear when mixed with water. If it be deemed desirable, a retailer may be required to keep an account of his stock in accordance with the terms of section 126 of the Spirits Act, and the local supervisor is to report any circumstances that may call for such an account being kept. The regulation as to the addition of mineral naphtha is to come into force on January 1, 1892, and the present stocks of ordinary methylated spirit for retail sale are to be disposed of before that date. The other regulations in the general order will come into operation on the 1st of September next. A copy of the general order will be delivered to every retailer of methylated spirit. It would appear from the terms of these regulations that the recent parliamentary references to the subject of methylated spirit have had the effect of compelling the Excise authorities to exercise a stricter supervision of the use and disposal of such spirit with a view to prevent improper application of it. For a time some inconvenience may thus be caused, but it must be remembered that the permission to use methylated spirit at all was conditional, and that it involved the application of conditions for preventing misuse by anyone.

* * *

For the last fifty years the regulation of the practice of pharmacy in the colony of Tasmania has been vested in a court of medical examiners, without whose licence no person could either practise medicine or carry on business as a chemist and druggist. Since 1868 the Court has accepted evidence of possessing the Minor qualification of the Pharmaceutical Society of Great Britain in lieu of examination, and more recently the certificates of other pharmaceutical societies in the colonies have been received. The Court now shows a disposition to hand over to pharmacists themselves the duty of examining for the licence to dispense, and to facilitate this transfer a Pharmaceutical Society has been formed, of which Mr. Miller is the first President, and Mr. Fairthorne, Vice-President, whilst Messrs. H. T. Gourd, J. T. Weaver, F. Holmes, and Carl Eberbard have been elected examiners. The Preliminary examination, which will be on the lines of that obtaining in this country, will be conducted by the University of Tasmania, and the qualifying examination is intended to be equal to the English Minor. For those who have been engaged in the business for not less than three years a "modified" examination has been arranged. It may also be useful to add that the English Minor examination certificate will continue to be accepted in lieu of the colonial examination. The Medical Court will not altogether abandon its control, but will be represented at the examinations by its President or one of its other members.

* * *

It is pleasant to learn, just as the Conference time is approaching, that one of its former Honorary Secretaries, Mr. Sidney Plowman, during a visit to Hobart Town, gave active assistance in the formation of the new Tasmanian Society, in recognition of which the Council, at its first meeting, elected him an Honorary and Corresponding Member. Arrangements have also been made for a course of lectures, and Mr. Plowman is expected to deliver the inaugural address to the students.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

July 9, 10, 14, 15, 16, 17, 21, 22, 23, 24, 28, 29 *and* 30, 1891.

Present on the 9th.—Mr. Bottle, Vice-President; Messrs. Blunt, Bowen, Corder, Davies, Druce, Fletcher, Gerrard, Greenish, Holmes, Ransom, Saul, Symons, Tanner and Taylor.

Present on the 10th, 14th, 15th, 16th, 17th, 22nd, 23rd, 24th, and 30th.—Mr. Carteighe, President; Mr. Bottle, Vice-President; Messrs. Blunt, Bowen, Corder, Davies, Druce, Fletcher, Gerrard, Greenish, Holmes, Ransom, Saul, Symons, Tanner and Taylor.

Present on the 21st.—Mr. Carteighe, President; Mr. Bottle, Vice-President; Messrs. Blunt, Bowen, Corder, Druce, Fletcher, Gerrard, Greenish, Holmes, Ransom, Saul, Symons, Tanner and Taylor.

Present on the 28th and 29th.—Mr. Carteighe, President; Messrs. Blunt, Bowen, Corder, Davies, Druce, Fletcher, Gerrard, Greenish, Holmes, Ransom, Saul, Symons, Tanner and Taylor.

Dr. Stevenson was present on the 10th, 14th, 17th, and 28th, on behalf of the Privy Council.

MAJOR EXAMINATION.

9*th.*—*Eight* candidates were examined. *Five* failed. The undermentioned *three* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Ames, John Charles .....Bath.
Atkinson, Joseph Andrew.....Spilsby.
Baugh, John William Mahanoora...Boston.

10*th.*—*Eight* candidates were examined. *Four* failed. The undermentioned *four* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Clarke, William Edward .....Foxholes.
Drabble, Thomas Lambe .....Holbeach.
Elliott, Edward Matthews ...Walsall.
Garner, William Luscombe ..London.

14*th.*—*Eight* candidates were examined. *Three* failed. The undermentioned *five* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

George, David .....Cardigan.
Harrison, Edward Frank .....Holloway.
Hoile, William Bonny .....Sandgate.
Lee, Ernest Harry .....London.
Plowright, John .....Ryde.

15*th.*—*Eight* candidates were examined. *Three* failed. The undermentioned *five* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Bates, Josiah Herbert .....Stoke-on-Trent.
Garnett, Henry .....Evesham.
Hart, John Henry .. ..Strangford.
Riches, Frank Fraser.....Torquay.
Taylor, Thomas Morley.....Bath.

21*st.*—*Eight* candidates were examined. *Five* failed. The undermentioned *three* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Cowley, Robert Charles.....Douglas.
Reynolds, William Colebrook..Harrogate.
Shakespear, William .....Birmingham.

22*nd.*—*Eight* candidates were examined. *Four* failed. The undermentioned *four* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Holford, Samuel Skinner .....Godley.
Mason, Joseph Edwin .....Bexley Heath.
Neville, Egbert ....Banbury.
Perrett, Frederick James .....Weston-super-Mare.

MINOR EXAMINATION.

9*th.*—*Twenty-four* candidates were examined. *Sixteen* failed. The undermentioned *eight* passed, and were declared qualified to be registered as Chemists and Druggists:—

Baxendale, George.....Congleton.
Beckett, Ernest James .....Lowestoft.
Benton, William .....Loughborough.
Bindloss, Herbert Meynell ...London.
Bowden, William .....London.
Bray, George Robert .....Launceston.
Bullivant, Walter .....Boston.
Carlton, Herbert.....Horncastle

10*th.*—*Twenty-one* candidates were examined. *Fourteen* failed. The undermentioned *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Beale, Frederic Owen ... .Leicester.
Carne, Herbert Ensel.....Spilsby.
Carter, Thos. Jos. Walmsley...Fulwood.
Caunt, John William .....Derby.
Conroy, Arthur John ....Newport, Mon.
Copp, William Risdon .....Southampton.
Cox, Edmund George.. .....Sheffield.

14*th.* — *Twenty-two* candidates were examined. *Fourteen* failed. The undermentioned *eight* passed, and were declared qualified to be registered as Chemists and Druggists:—

Balmford, John Archibald ...Huddersfield.
Beale, Horace Sharman.....Cambridge.
Crawley, William Pashler.....Oundle.
Crisp, Wallace William .....King's Lynn.
David, Archibald Sinclair.....St. Clears.
Doble, Arthur Glendower .....Tavistock.
Evans, David Llewelyn .....Llandyssul.
Hughes, Henry John .....Reading.

15*th.* — *Twenty-four* candidates were examined. *fifteen* failed. The undermentioned *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Downing, James.....Penzance.
Elliott, Smith ....Oswald Kirk.
Evans, David William .....Llansadwrn.
Flatman, Frederick John .....Cambridge.
Flowerdew, Frederick Philip...London.
Franks, Frank Richard .....London.
Frost, John Arthur..... ... ..Derby.
Geary, Samuel..... ....Leicester.
Hughes, John .....Birmingham.

16*th.*—*Thirty-one* candidates were examined. *Twenty* failed. The undermentioned *eleven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Belcher, Standley ..... Birmingham.
Davies, Roger Edward ..... Corwen.
Gilbart, Sidney Frederic .....London.
Green, Joseph William ....Nunhead.
Griffiths, John Herbert .....Little Brighton.
Hankinson, William .....Stockport.
Hay, Roderick..... .....Dingwall.
Hayward, Walter Edwin .....Pudsey.
Hedges, William Ross .....Leicester.
Heppenstall, Percy.....Hull.
Vernon, Walter .....Middlesborough.

17*th.*—*Thirty* candidates were examined. *Twenty-two* failed. The undermentioned *eight* passed, and were declared qualified to be registered as Chemists and Druggists:—

Goodwin, Francis Arthur .....Hampton Bishop.
Holmes, Willmot ..... .Liverpool.
Hopkinson, Walter John .....Leicester.
Hornsby, James William .....Darlington.
Islip, Frank .....,Dartford.

Roberts, Thomas John ..... Ruthin.
Smith, Sidney Frederick .....Strood.
York, Frank.....Richmond.

21*st.*—*Twenty-five* candidates were examined. *Thirteen* failed. The undermentioned *twelve* passed, and were declared qualified to be registered as Chemists and Druggists:—

Ames, William Ralph .....Bath.
Bell, William Arthur.....Uttoxeter.
Casewell, Richard Hazledine..Ludlow.
Davies, Oliver.....Pontypridd.
Goodwin, George Ebenezer ...London.
James, David Isaac .....Cardigan.
Jefferson, John .....Carlisle.
Johnson, Frederick.....Chatham.
Keys, Sydney Hudson .....Boston.
King, Edgar James .....Wootton Bassett.
Landor, William Ernest .....Weymouth.
Lawrenson, George.....Manchester.

22*nd.*—*Twenty-four* candidates were examined. *Fifteen* failed. The undermentioned *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Davies, John Bridge .....Abergele.
Downing, Samuel .....Braintree.
Evans, Morgan Davies .....Llandilo.
Jones, Matthias .....Swansea.
King, William Bealby ..... Gainsborough.
Lee, Charles Henry .....Melton Mowbray.
Maclean, James ... .Jedburgh.
Smith, Alfred .....Forest Hill.
Thomas, James .....Whitland.

23*rd.*—*Twenty-nine* candidates were examined. *Twenty* failed. The undermentioned *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Mayne, James.....Carn Brea.
Michell, Saml. Clase Fredk....St. Austell.
Middlemass, George Robert...Stockton-on-Tees.
Miles, William Henry .....Portishead.
Morgan, Llewellyn.....Merthyr Tydfil.
Mousley, William Joyce .....Redditch.
Neale, Charles Albert .....Stamford.
Nidd, John Henry .....Boston.
Thomas, James Morris .....Whitland.

24*th.*—*Twenty-nine* candidates were examined. *Seventeen* failed. The undermentioned *twelve* passed, and were declared qualified to be registered as Chemists and Druggists:—

Gadd, Henry William .....Exeter.
Goldthorpe, Arthur..... ..Doncaster.
Miller, David .....Brechin.
Oswell, William Henry ..... Corwen.
Parkin, Frederic Brooks .....Ripon.
Pater, Joseph Brewster.....Christchurch.
Peck, Thomas Whitmore .....Birmingham.
Powell, Frederick William ...Margate.
Price, Richard Cameron .....Minsterley.
Pursey, George Foreman .....London.
Rae, Alexander David .....Aberdeen.
Randall, Bruford Henry .....Wareham.

28*th.*—*Twenty-nine* candidates were examined. *Twenty-two* failed. The undermentioned *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Nicholson, Gilbert ..... Tunbridge Wells.
Reilly, Alfred ....Bracknell.
Roadnight, Joseph Rees .....South Norwood.
Simpson, Stewart Richard ...Llandilo.
Smith, Edwd. Chas. Henson...Hull.
Tayler, Ernest Walker .....Tewkesbury.
Thomas, William .....Portobello.

29*th.*—*Thirty* candidates were examined. *Twelve* failed. The undermentioned *eighteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Cole, William Henry ... .Bristol.
Jones, William Owen.....Market Drayton.
Smallman, Fredk. Richard ...Ludlow.
Smith, Percy Dolph ....Brighton.
Softly, Alfred Ernest..... London.
Soper, Henry .....Plymouth.
Stevens, William Goyne .....London.
Stratford, Horace Oliver .....Margate.
Stuckey, William George .....Clevedon.
Sumner, Henry Alfred .....Birmingham.
Swinn, Charles Arthur .....Manchester.
Sykes, Frederick John .....Halifax.
Thomas, William Owen.....London.
Toyne, Charles Robert .....Hull.
Watson, John Robert.....Newport, Mon.
White, Arthur James.....Cardiff.
Wilkinson, Arthur Molyneux..London.
Williams, Cuthbert Ford .....Leicester.

30*th.*—*Thirty* candidates were examined. *Nineteen* failed. The undermentioned *eleven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Jones, William Samuel.....Aberdare.
Troupe, George Robert .....Middlesborough.
Tupman, Herbert Wyke .....Teignmouth.
Varnam, Charles.....Appleby Magna.
Wellings, Arthur.....Buxton.
Wharmby, Walter Frederick...Mansfield.
Whitaker, Albert .....Nottingham.
White, John William ..... Stony Stratford.
Whitehouse, John William ...Bradford.
Wilson, Luther .....Keighley.
Workman, Benjamin Lester...Leytonstone.

PRELIMINARY EXAMINATION.

29*th.*—Certificates by approved examining bodies were received from the undermentioned in lieu of the Society's examination:—

Brookes, Henry James .....London.
Cooling, William Arthur .....Newark.
Cooper, Samuel .....Manchester.
Davies, Herbert Paget .....London.
Evans, Arthur Edward.....Moretonhampstead
Francis, John .....Merthyr Tydfil.
Hall, Howard .....Luton.
Harby, William .....Lincoln.
Holl, George..... .....London.
Hope, Thomas.....Westhoughton.
James, Ernest ....London.
Knight, William Arthur.....Leicester.
Llewellyn, James Howell .....Pembroke Dock.
Snow, Leonard H. .....Ramsgate
Thompson, Thomas ....Ulverston.
Umney, Ernest Albert .....Sydenham.
Webster, Bertram .....Uttoxeter.
Wilson, Robert .....Glasgow.

The Report of the College of Preceptors on the Examination held on July 14 was read.

Three hundred and ninety-six candidates had presented themselves for examination, of whom *two hundred and six* had failed.

The following *one hundred and ninety* passed, and the Registrar was authorized to place their names upon the Register of Apprentices or Students:—

Aitken, Robert Douglas .....Spalding.
Alderman, Henry Cole .....Copley.
Anderson, Alexander.....Aberdeen.
Anderson, James.....Dundee.
Andrews, George Genge .....Norwich.
Aspinall, Isaac ..... Ashton-in-Makerfield.
Barlow, Samuel .....Truro.
Barnes, Arthur Swaby .....Barnsley.
Bastide, Ernest .....Elland.
Baylis, Arthur Edward.....Redditch.
Beckwith, Ernest .....Brighton.

Bell, Charles .....Wolverhampton.
Bennett, Frederick.....Chester.
Bennison, Ernest Carr .....Stockton-on-Tees.
Bland, John William.....Birmingham.
Bland, William Rowland .....Blackpool.
Broad, Herbert Charles .....Southampton.
Brook, Edward .....Slaithwaite.
Brown, Charlie Stratford.....Leominster.
Brown, John Gilbert.....Newcastle-on-Tyne.
Brown, John Thomas.....Stoke-on-Trent.
Brown, Tom.....Newcastle-on-Tyne.
Browning, Kate E.....Weymouth.
Bruce, Lancelot .....Brechin.
Bunbury, Mervyn Wm. R.....London.
Burgess, Frederick William...Bradford.
Buxton, Arthur .....Lincoln.
Cain, John Ceasar.....Ramsey.
Campbell, Andrew Turnbull...Dumbarton.
Carpenter, George Reginald...Bridgwater.
Chafer, James William .....Doncaster.
Champ, Agnes.....London.
Clark, Alexander .....Forres.
Clark, Peter S.....Irvine.
Clarkson, James S..... .....Whitby.
Clements, Charles Frederick...Kidderminster.
Cole, Reginald.....Congleton.
Collins, Walter Cornell ... .Ipswich.
Comrie, William Reid .....Gravesend.
Cooke, Wallace Ernest .... London.
Cooper, George .....Glasgow.
Crawhall, Thomas Currah.....Stanhope.
Cruickshank, Lewis Davie ...Aberdeen.
Davies, Caradoc ....Tal-y-bont.
Davies, Charles Sidney .....Southborough.
Davies, John Henry .....Llanfair.
Davies, Richard .....Manchester.
Davies, Thomas Timothy .....New Quay.
Davis, Sidney .....Gloucester.
Douthwaite, John .....Prudhoe-on-Tyne.
Dudgeon, Tom Skipsey.....Ripon.
Duncan, Arthur .....Glasgow.
Duncan, Robert .....Leeds.
Duncan, Samuel John .....Greenock.
Edwards, Frederick George ...Chester.
Edwards, George Nelson .....North Elmham.
Edsall, John Henry .....Wimborne.
Elliott, Eva Emma.....London.
Enoch, David .....New Quay.
Evans, Samuel.....Burnley.
Evans, Walter Games.....Cardiff.
Farnill, Thomas Bentley .....Goole.
Fenton, David.....Forfar.
Forrest, James Lindsay.....Edinburgh.
France, John Richard .....Huddersfield.
Gardner, Charles Albert .....Sheffield.
Gibbs, Samuel John .....Torquay.
Gibson, William Robert.....London.
Glaister, Robert ....Lanark.
Golightly, Alfred Welch .....Sunderland.
Good, William, junr. .....Ludlow.
Goodchild, Frank Joshua.....Sturminster Newton.
Gow, Adam .....St. Andrews.
Green, John Holt .....Netherton.
Greig, Frank Cameron .....Edinburgh.
Hall, John Lawson Shaw .....Scarborough.
Harmer, John David .....Towcester.
Harries, Frank R. Nicholas ...Narberth.
Harrison, Robert Fairbrother..Liverpool.
Hart, Frederick .....London.
Helsby, Thomas Henry.....Sheffield.
Heron, John.....Glasgow.
Hill, Philip Robert.....Weymouth.
Hitt, Thomas Gabriel.....Long Eaton.
Howes, Thomas Septimus.....Cambridge.
Hoyle, Herbert John .....Landport.
Hughes, Walter Bayly .....Northwich.
Hughes, William.....Llanelly.
Ives, Herbert Edward .....Ixworth.
Johnson, George Percy .....London.
Jones, Ernest Parry .....Birkenhead.
Jones, Harry Percy .....Horncastle.
Jones, Robert Frederick .....Hull.
Kerby, William Albert .....Southsea.
Kershaw, James .....Rochdale.
King, John William S. .....London.
Lamplugh, Robert Wright.....Bridlington.
Last, George Valentine C.....Liverpool.
Lealand, Harold Edward .....Birmingham.
Llewellyn, David.....St. Clears.
Lloyd, Henry Bright .....Cheltenham.
McQueen, Sween Duncan .....Longside.
McMaster, Peter .....Dumbarton.
McMurray, James Dickson ...Newton Stewart.
Martin, Johnson .....Great Lever.
Maundrell, Henry Tuckey.....London.
Melville, David Gordon.....Dumfries.
Metcalfe, Frank .....Bradford.
Mill, John, junr. .....Holsworthy.
Moody, William Edmondson...Barnsley.
Mortimer, John Hamilton.....Cardiff.
Napper, Ernest Henry .....Manchester.
Ness, William A.....Aberdeen.
Nicholson, John Edward .....Durham.
Nicklinson, Thomas Arthur ...Cromford.
Nunn, Earnest Albert .....Colchester.
Nurshaw, Edward .....York.
Oates, Cleophas Henry .....Bedworth.
Oldbury, Richard Thomas.....Knighton.
Ough, Mary .....Liskeard.
Owen, Samuel Arthur .....Bristol.
Pae, Archibald Thomas.....Norham-on-Tweed.
Peace, Ira..... ...Rochdale.
Peat, Samuel .....Mansfield Woodhouse.
Pell, Herbert .....Louth.
Pine, William Wilkinson .....Landport.
Pitcher, James Frederick .....Princes Risborough.
Plant, Richd. Dean Halkings...Stamford.
Potter, Thomas Burbidge .....Leicester.
Prince, Herbert .....Lincoln.
Ralph, Owen Geo. Colyer .....Lowestoft.
Rawlins, Francis William .....Bridgwater.
Richards, David Lewis .....Llandilo.
Roberts, Hugh Pierce.....Llanrwst.
Roberts, William.....Kingsthorpe.
Robertson, George Farrie .....Edinburgh.
Robertson, James .....Huntly.
Robertson, Thomas Millar ...Glasgow.
Robinson, Percy .....Norwich.
Rook, William Arthur .....Lower Edmonton.
Ross, Alexander .....Inverness.
Rugman, Albert Thomas .....Clevedon.
Saltmer, Alfred .....Huddersfield.
Sanderson, John .....West Hartlepool.
Savage, George Smith .....Bradford.
Shand, John Johnston .....Aberdeen.
Sharp, Ernest Thompson .....Loughborough.
Silver, Sydney Ward.....Long Melford.
Sisam, William .....Alcester.
Sleggs, William Arthur..... ...Seacombe.
Smedley, Clarence ....Hyson Green.
Smith, Albert ....Wareham.
Smith, Jonathan.....Fraserburgh.
Smith, Samuel Bilton .....Cullompton.
Smith, William George .....Taunton.
Smith, William Lloyd .....Carmarthen.
Smout, William Henry .....Coseley.
Snowden, Arthur Sydney ..... Scarborough.
Stewart, Alexander M. .....Lochee.
Stewart, Alexander Rust .. ...Arbroath.
Stewart, Charles.....Aberdeen.
Stoddart, Thomas .....Todmorden.
Sunderland, Percy .....Peterborough.

Sutherland, John Y. .....Aberdeen.
Suttie, Joseph Hy. Cole .....Broughty Ferry.
Thomas, James .....Abergavenny.
Thomas, Mary.....Bristol.
Thomas, Sephen Griffith .....Narberth.
Thompson, James Atkinson...Middlesborough.
Thorp, William Blackburn ...Blackley.
Tildesley, William James.....Wokingham.
Truscott, Gilbert Edgar.....Southampton.
Turton, Arthur Clarence .....Huddersfield.
Turton, Herbert .....Manchester.
Tytler, William W.....Arbroath.
Ullett, Frank .....Ilminster.
Uttley, John Richard Sellars..Masborough.
Wain, William Spensley .....Ripley.
Warneford, Fredk. William...Brighton.
Waterhouse, Percy.....Hull.
Watson, Ernest William .....Bradford.
Watts, William .....Dumfries.
Webster, George Hy. Brown...Lancaster.
Whitehead, Thomas .....Northallerton.
Wilkinson, John Feather .....Leeds.
Wilson, William Donald .....Aberdeen.
Withers, William Matthew ...Douglas.
Woods, Benjamin Archibald...Kings Lynn.
Woor, George .....Bengeworth.
Wren, John .....Blackburn.

The questions set at this examination were published in the *Pharmaceutical Journal* for July 18, p. 51.

The following is a list of the centres at which the examination was held, showing the number of candidates at each centre and the result:—

	Candidates.				Candidates.		
	Examined.	Passed.	Failed.		Examined.	Passed.	Failed.
Aberdeen	15	11	4	Jersey	1	0	1
Aberystwith	1	0	1	Lancaster	4	1	3
Birmingham	15	10	5	Leeds	20	12	8
Brighton	2	2	0	Lincoln	8	5	3
Bristol	12	6	6	Liverpool	20	7	13
Cambridge	5	1	4	London	45	14	31
Canterbury	3	0	3	Manchester	29	14	15
Cardiff	6	3	3	Newcastle-on-T.	8	5	3
Carlisle	8	2	6	Northampton	3	2	1
Carmarthen	12	8	4	Norwich	10	7	3
Carnarvon	7	4	3	Nottingham	14	6	8
Cheltenham	6	3	3	Oxford	4	1	3
Darlington	9	5	4	Penzance	3	1	2
Douglas	4	2	2	Peterborough	9	3	6
Dundee	14	7	7	Plymouth	4	1	3
Edinburgh	18	5	13	Sheffield	10	7	3
Exeter	9	5	4	Shrewsbury	3	3	0
Glasgow	25	9	16	Southampton	9	9	0
Hull	11	5	6	Worcester	2	0	2
Inverness	4	2	2	York	4	3	1

SCHOOL OF PHARMACY EXAMINATION QUESTIONS.

Forty-Ninth Session.—1890–91.

MATERIA MEDICA.

MR. H. G. GREENISH.

PRIZE EXAMINATION.

SILVER MEDAL.

Friday, July 24.—*Hours from* 10 *to* 1.

The following questions were set for this examination:—

1. A sample of "Starch Powder" is given you. You are required to pronounce an opinion on its source and purity.

2. You are required to prepare transverse and radial sections of the drug given you, and describe them fully, accompanying your descriptions with explanatory sketches, and giving the reasons that lead you to such conclusions as you may draw.

Hours from 2 *to* 5.

1. Describe the macroscopic and microscopic characters by which belladonna, henbane, stramonium and digitalis leaves may be distinguished from one another. What are the active principles of each?

2. Give the names, natural orders and habitats of the plants yielding Storax and Balsam of Peru respectively. How are these balsams obtained? Give what information you can of the chemical composition of each of them.

3. In what drugs (or dietetic articles) do theine and theobromine occur? Give the names, natural orders, and habitats of the plants yielding them. State what part of the plant each is and what proportion of active principle it contains.

4. What are the distinguishing characteristics of male fern root? What is its active constituent? Describe the structure or structures in which it is contained, accompanying your description with an explanatory sketch.

5. What are galls, and how are they produced? Describe the official galls. What are the active constituents and what proportion of them do galls of good quality contain?

6. To what bodies do the following drugs owe their pungent taste: 1. White mustard seed. 2. Black mustard seed. 3. Capsicum fruit. 4. Ginger. 5. Black pepper. Describe the nature of each of these pungent principles and, where necessary, the chemical changes which take place in its production.

British Medical Association.

FIFTY-NINTH ANNUAL MEETING.

The fifty-ninth annual meeting of the British Medical Association commenced in Bournemouth on Tuesday morning last, the general meeting of the members being held in the Town Hall. There was a good attendance of members. The proceedings commenced by Dr. W. F. Wade, of Birmingham, the President of the Association during the past year, vacating the chair in favour of Dr. J. Roberts Thomson, of Bournemouth, the President-Elect.

The Annual Report.

In the report of the Council, which was taken as read, it was stated that 973 new members were enrolled last year, and that the total membership was now 13,333. The revenue for the year had amounted to £31,815, and there was a surplus in the year of £2,376. The excess of assets over liabilities was £41,333.

Speaking on the report of the Parliamentary Bills Committee, Mr. Ernest Hart referred to the injustice which the law of mortmain inflicts upon hospitals and medical charities, adding that many charitably disposed persons were in doubt as to whether they could leave property to a hospital or not. A Bill drafted upon the lines of a memorandum drawn by the Speaker and Sir John Simon having been submitted to the Committee was introduced into the House of Lords by Lord Herschell, and before long the mortmain grievance would be remedied.

Dr. Bucknill, speaking on that part of the report which related to legislation for inebriates, strongly opposed such legislation. Inebriety was, he said, a vice and not a disease, and he proposed that the committee appointed for furthering such legislation be not reappointed.

Sir Walter Foster, M.P., who followed, congratula-

ted the Association on the fact that the prolonged efforts of the Association through its Parliamentary Bills Committee, to obtain substantive rank for Army medical officers, which rank was impaired by the warrant of 1887, had at length been crowned by a large measure of success, the Minister for War having promised to grant substantive rank and compound titles and redress several minor grievances which marked a stage in the evolution of the Medical Staff into a Royal Medical Corps. He also expressed gratification that the clause in the Factory and Workshops Bill, by which it was proposed to abolish factory surgeons, had been thrown out. The Midwifery Bill, which never advanced beyond the initial stage, he characterized as a ridiculous attempt at legislation, and he hoped a like fate would attend any similar attempt. With regard to the Public Health (London) Amendment Bill they could not be otherwise than satisfied, for it placed medical officers of health on a much more independent footing. It made them independent of other bodies, and would enable them to do what was scientifically and hygienically right without reference to considerations which must affect other public bodies. A report of the committee on the exclusion of Irish and Scotch diplomates from hospital and other appointments was read, and a resolution was passed approving of the recommendation of the Council to write to those institutions which refused to accept diplomates from Scotland and Ireland, pointing out the hardship and expressing the hope that the difficulties would be removed.

During the afternoon an excursion was made to Christchurch Priory, the features of interest in connection with which were pointed out by the vicar, the Rev. T. H. Bush. At 4 o'clock a special service was held in St. Peter's Church, Bournemouth, at which an impressive sermon was preached by Canon Wilberforce to a crowded congregation.

The General Meeting was resumed in the Town Hall in the evening, when Dr. Roberts Thomson delivered the following—

Presidential Address.

After expressing the welcome extended to the Association by all classes, Dr. Thomson reviewed the growth and development of Bournemouth. He said: The place in which you find yourself would not, a few years ago, have been large enough for the annual meeting of our Association. The history of Bournemonth does not go back into the dim and distant past. There are those among us, by no means very far advanced in years, who can remember when it was little more than a village, and when the nearest station—then called Christchurch Road, now Holmsley—was twelve miles off. Now we are within two hours and a half of London, and three lines of rail find a terminus here. By one route you may travel to Birmingham, York, Bradford, without change of carriage; by another, Shrewsbury, Chester, even Birkenhead, may be reached without leaving the carriage in which you began your journey. Comparatively a few years ago Bournemouth was but a tiny place, now the population of the borough and the immediately surrounding district exceeds 40,000. What are the causes which have brought about this large increase? We have had but little enlightened action on the part of the large owners of property. It is true that on more than one estate there has of recent years been a wiser policy pursued of meeting public wants, and anticipating to some extent the needs of an advancing population; but this has been the exception. It is not in consequence of encouragement from the landowners that the place has grown and flourished. How, then, is it that this has taken place? A locality may increase in consequence of the large-hearted action of the ground landlords—parks laid out and presented to the people, estates developed in a wise and generous spirit, public movements and public institutions fostered and lavishly helped; or, on the other hand, there may be a development from the nearness of large manufacturing populations, which, as a result of their growth and prosperity, cause vigorous offshoots to spring up and expand; but here you have none of those things. No large-hearted action on the part of landlords tended, in the first instance, to cause Bournemouth to develop. There are no centres of large manufacturing interests at all near us to cause an overflow into our town. Whence, then, has this great expansion arisen? The answer is threefold. (1) The medical results of residence during the winter and spring months in Bournemouth have been so satisfactory that invalids have returned here winter after winter and have brought their friends. Doctors in less favoured climates have been so satisfied with the effects of a sojourn here on such patients as they may in the first instance have sent, that they have recommended the place to others, and so a large and ever-increasing winter population has come here. (2) The discovery which people have made for themselves, that though a mild winter climate, it is also a delightful summer climate, and thus we have had a steadily progressive summer season. When I first knew Bournemouth the summer season was very small. Go to Bournemouth in July! "Why you could cook chops in the sand," was the exclamation which would be made. But people now know that this is the reverse of the truth, that it is, in reality, a cool and bracing seaside change for the south coast in summer, and now we have, as I have said, a large and steadily-increasing summer population. (3) That care has been taken to preserve, and when possible to improve, the natural advantages of the district. I have spoken of the apathy which, more especially in the earlier history of Bournemouth, existed on the part of the owners of the land, and therefore it is in large measure to the action of the governing body of the town that this care in its development is due. For many years the government was carried on by a Board of Commissioners, a well-abused, but, for the most part, an earnest and hard-working set of men. In November last we blossomed into the full-blown dignity of a mayor and corporation, and it will be a matter of some pride for the town in future days to remember that the most important event of the first year of the municipality was the visit of the British Medical Association. The President then gave a brief enumeration of the attractions of the place, both natural and provided, for the benefit of visitors. After dwelling on the importance of climatology as a matter of study, Dr. Thomson remarked: As a winter resort for the phthisical patient and for all those invalids whose vitality gets lowered by confinement to the house, Bournemouth offers many advantages. There are many to whom a journey is an impossibility, or who dislike the separation from home and friends which going, say, to the Riviera involves. They do not escape an English winter by coming here, but they will get the driest climate which England has to offer, and they will thus be able to get a large amount of out-of-door exercise. The climate of Bournemouth is influenced by the geological formation on which the town is built, by the geographical position, and by the pine woods which surround the district. The geological formation is sand and gravel of the most porous character. The sand lies on top of the clay, but the clay is from 100 ft. to 120 ft. below the surface. The natural drainage is therefore admirable, and the surface of the soil is dry very soon after the heaviest rain. Our geographical position also influences the amount of cloud. With the sea to the south, two rivers to the east of us, the Purbeck Hills and the inland waters of Poole Harbour to the west and north-

west, the clouds get attracted away from the town, and we often are, as it were, in a basin with little cloud, while there may be a considerable amount of cloud all around us. Less cloud, of course, means more sun, and if there is one line of meteorological record in which we excel more than another it is in the absolute amount of sunshine which we have. Being in a deep bay, also, we are out of the sweep of the Channel, and so escape the fogs which hang more over the swift tidal current. When they come from the south-west (as they often do) the Purbeck Hills form an effective screen and frequently detain them, giving us a clear atmosphere on the further side. The pine woods affect the climate by giving shelter without drawing damp. We know nothing about the fall of the leaf; it always seems dry under fir trees, and they also medicate the air by their balsamic exhalations. During the spring months, when the shoots are being formed, and under the influence of the sun's rays, a very large amount of terebinthinate vapour is given off. The peculiar tides—or, rather, absence of tides—makes the bay a most excellent place for bathing. There is no period of the day when bathing may not be indulged in so far as the tide is concerned, and the absence of currents makes it, of course, additionally safe. To sum up briefly, we offer a climate which in the winter is, for England, dry, with a fair amount of sun and sheltered from all quarters except the south. Invalids, therefore, get out a great deal, and can in the inner roads escape the wind while still keeping in the sunshine. In the summer we have a beach available at all times for bathing, shade to an extent which can seldom be found at the seaside, also, as the result of being in a bay, we always have a breeze in warm weather. Where is there a seaside resort in England with more trees, and the climate, because of the dryness, not relaxing? It follows, of course, from all this that there are classes of cases for which our climate is not suitable, and which do not get on well here. Those bronchial cases, with very irritable cough, which require a moister and more soothing climate, are better elsewhere. Many throat cases, with very irritable mucous membrane, also do better in moister climates, and away from the sea. And there are some forms of neuralgia which seem to be aggravated either by the dry air or by proximity to the sea. But this short list has nearly exhausted the forms of invalidism which may not receive benefit from a sojourn here. When I first began work in Bournemouth a very large majority of the patients one saw were cases of lung trouble. Now we see persons broken down in health from every possible cause. Even with an extended experience, I do not feel called upon to enlarge the list of cases unsuitable. And it will be evident that the direct salutary influence on many chronic maladies—such, for instance, as Bright's disease—is very marked, and may be confidently looked for. After referring to various Bournemouth hospitals, the President proceeded to refer to the present position of medical officers of health in England, and to the working of the most recent legislation in this matter as found in the Local Government Act of 1889, which established county councils throughout the land. He continued: An investigation of the present position will convince us, I think, that so far as the English Act is concerned the result is not satisfactory. Local government has been very largely extended by that Act, and there is no doubt that, as time goes on, the powers given to county councils will be very much increased. So far as the appointment of medical officer of health is concerned, the power is optional, and consequently the result is as yet practically nothing. In the Act for Scotland, the section says the council shall appoint a medical officer of health. In the Act for England, the section says may. Let us inquire what is the effect of that one word. A few months ago I sent a letter containing a few queries to forty-eight county council authorities. This was done, not with any idea that we might discuss the question to-night, but to get information for the guidance of the council of Hampshire, which was considering the question. In thirty-seven counties nothing whatever was being done; in four counties the subject was under consideration; in seven counties appointments had been made under the Act, at salaries from £800 a year, and £200 allowance for expense, in Staffordshire downwards. It cannot therefore be said that the county councils have, for the most part, taken any active steps; in most cases we have shown that they have taken no steps whatever in the direction of appointing county medical officers of health. This apathy may have a triple cause. It may arise from (1) a want of interest about sanitary work; (2) satisfaction at the present state of sanitary supervision and the present position of medical officers of health; or (3) from the feeling that the powers vested in the councils are not such as to make it worth while to appoint any such officials. After showing the lack of enthusiasm which prevailed in country districts and small towns in sanitary work, and that sanitary administration has been linked with the Poor Law with the result that sanitary matters are dealt with by persons having no special knowledge of the subject, he suggested the following modifications for consideration:—1. That the appointment of medical officers of health by county councils be obligatory in England as it is in Scotland. 2. That these appointments once made shall not be upset, except by the central authority, as has been provided by the Public Health Bill for London. 3. That the salaries attaching to such office be sufficient to attract highly-educated and efficient men, and who shall be called upon to devote their whole time to the duties of their office. 4. That every part of the kingdom be brought into sympathetic communication with the central board, upon which the medical element shall have real and substantial power. In conclusion the President said: On the medical officer of health depends in a very large degree the motive power of sanitation, and for this purpose he should not only be highly trained, but he should be appointed over an area large enough to require his whole time, and he should occupy a position independent of all local jealousies, and freed from such restraints as the present uncertain tenure of his office inevitably causes. It is not Utopian to declare that with improved organization, and increased scientific control, zymotic diseases would in a few years be reduced to very small proportions, and every district in the land would be relieved from ever-threatening causes of trouble and distress. Is there any disease that would excite a greater interest, were a case exhibited at our meeting, than one of leprosy? Yet there was a time when leper hospitals in England were numbered by the hundred, and at the Priory Church of Christchurch, not five miles off, you will see a leper's squint. Let us look forward to the time when many of these maladies will be as rare as leprosy is now. One of the most powerful means in bringing this to pass will be the wise application, through sanitary legislation, and through an improved medical officer of health service, of those advances of scientific knowledge which are being gained by the patient and painstaking researches in preventive medicine.

Meetings of the Sections.

On Wednesday morning, at ten o'clock, the sections commenced their proceedings. These are nine in number, dealing with medicine, surgery, obstetric medicine and gynæcology, public medicine, psychology, pathology, ophthalmology, diseases of children and therapeutics.

The address in MEDICINE was delivered by Dr

Lauder Brunton, in the Town Hall, at 3 p.m., and was largely attended. The subject taken was the advance made during the last quarter of a century in the condition and status of the medical profession, and the discoveries and changes in medical science. He said that formerly any man, however idle or ignorant he might have been in general education, could enter the profession; but in 1861 the regulations of the General Medical Council came into force, under which students had to pass a Preliminary examination in general knowledge. Though this had improved the profession it had greatly increased the struggle for existence within it, many having been attracted by the improved social status it conferred. Dealing with advances in knowledge and teaching during the quarter of a century, due to the experimental method, Dr. Brunton showed that great progress had accrued in the knowledge of the nature, causation and treatment of disease, and expressed the opinion that still greater advantages would result from it in the future. The greatest advance had been in the direction of the treatment of fever and diseases of the nervous system. We hope to have an opportunity of quoting from this address more fully.

In the PUBLIC MEDICINE SECTION the address was delivered by Dr. J. Burn Russell, of Glasgow, the subject being the ticketing system adopted in Glasgow to prevent overcrowding.

This was followed by a paper, by Dr. Alfred Carpenter, on diphtheria, in which he showed that fifty years ago the disease was unknown in this country, but he said that for the last thirty-five years cases had been under his personal observation in country places. Between 1860 and 1870 cases were common in rural towns, and between 1870 and 1880 the towns became affected. The difference between the two cases was that in the rural districts the outbreaks were limited to one or two, whereas in the towns the number was more widespread. Some cases were caused by the distribution of infected milk, some by contagion in schools; but many of the isolated cases had nothing to do with the infection of milk. In some cases it had been found that when cesspools were cleared away and the basement of houses rendered dry and damp-proof the disease had disappeared. He also showed that warmth and moisture and absence of light were necessary agents for the propagation of diphtheria.

Dr. Franklin Parsons then read a paper on "The Influenza Edipemics of 1889–90–91, and their Distribution in England and Wales." He showed that in 1889, when the epidemic broke out, the majority of medical men were unacquainted personally with epidemic influenza, and many were not prepared to recognize as such a disease in which catarrh was often absent. The name influenza, he thought, should be retained for the epidemic disease, and not applied to severe cases of ordinary catarrh. He showed that it was more than a year between the time that it appeared in Russia and reached some remote parts of the world. Its general course in the northern hemisphere was from east to west; in the southern hemisphere from south to north; in England and Wales the general course was from east and south to west and north. Influenza was present in London in December, 1889, and became epidemic about January 1, and it did not reach some outlying places in hilly districts in the west and north until March. Market towns were commonly attacked before villages, and neighbouring villages were not necessarily attacked at the same date. In suburban places city-going men were usually the first to suffer, and among railway servants clerks suffered in higher proportion than engine-drivers, though the latter are more exposed to the air. Deep-sea fishermen and lightship keepers at sea almost entirely escaped. Medical men and nurses suffered in large proportion, but the disease showed little tendency to spread among patients in hospitals. The epidemic of 1891 began in March at Hull, and spread thence to other towns, reaching London about six weeks later. It was more protracted and more fatal in London than that of the previous year, but was less rapid in its development. This was attributed to the extra Christmas intercourse which was going on at the time when the previous epidemic began. The experience of the two epidemics showed that one attack of influenza was not a complete protection against another; whether it was in any degree protective was doubtful. The author considered that there was no ground for connecting the influenza epidemic with any kind of weather conditions, that there was no proof that it travelled faster than human beings, or began with a large number of simultaneous attacks, or that it attacked persons isolated from their fellows. He regarded human intercourse as the essential factor in the spread of the disease. The rapid development of an epidemic he explained by the shortness of the incubation period of influenza and the widespread susceptibility to it. He thought it probable, however, that some favouring conditions were necessary to its spread besides the importation of contagion, and that some mediate infection was probable.

In the PSYCHOLOGY section Dr. P. Maury Deas, in his address, dwelt on the scope and working of the Lunacy Act of 1889. Tracing the history of lunacy legislation and reform in this country during the past hundred years, he pointed out the defects which he considered to exist in the latest lunacy enactments, giving it as his opinion that the tendency of the latest attempt to consolidate legislation on this subject was distinctly retrograde, mainly by casting unnecessary suspicion upon those who had the care of the insane and by arousing in the minds of patients distrust and unrest. The beneficial effects of sound treatment were thereby frustrated. He classified the enactments of the lunacy legislation into three divisions:—(1) Those which seemed to be good and useful; (2) those which seemed to be unnecessary or useless; (3) those which seemed to be positively hurtful and objectionable; and indicated the directions in which he thought reform should go.

Dr. Clifford Albutt opened a discussion on the hospital treatment of the insane. He advocated a system which would reduce all asylums to a number of inmates not exceeding 1000, together with an increase in the efficiency and pay of the assistant staff, and the breaking up of asylum buildings into detached villas with cheerful surroundings.

Dr. F. H. Walmsley also read a paper on the advisableness of throwing open to medical students and medical practitioners the large asylums of the kingdom for purposes of study and post graduate courses.

In the section for THERAPEUTICS, Dr. W. Vicary Snow took for the subject of his address Koch's treatment of tuberculosis.

In the section for DISEASES OF CHILDREN, Dr. Goodhart took for his theme "the child is father to the man."

In a paper read by Dr. Henry Ashby, on the feeding of children up to their first dentition, it was insisted that no artificial preparation of food whatever could at all approach the mother's milk in value.

Next Place of Meeting.

At the second general meeting, held in the Town Hall previous to the delivery of the address in medicine, an invitation was received from the Midland Counties Branch for the Association to hold its next meeting in Nottingham. On the motion of Dr. W. Withers Moore, seconded by Sir Walter Foster, M.P., the invitation was accepted, and Dr. Joseph White, of Nottingham, was chosen President-Elect.

In connection with the meeting there was the usual "Annual Museum," one section of which was devoted to exhibits of food and drugs.

Provincial Transactions.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

On Wednesday afternoon, July 15th, the members of the Dundee Chemists' Assistants and Apprentices' Association visited Mr. David Nicoll's aërated water works at Fleuchar Craig. They were met by Mr. J. A. Wilson, the manager, who conducted them over the extensive premises, and explained the operations of the machinery and appliances. These are of the most improved description, many of the details being the invention of Mr. Nicoll and his manager. The carbonic acid gas is pumped from the generators and purifiers into silver-lined cylinders, where it is stored at high pressure and conducted to the various machines by means of block tin piping, thus preventing any possible contamination from lead or other causes. The great demand for aërated waters had induced the proprietor to introduce the most efficient machinery, and the works are fitted with plant of a most complete character. A specially attractive feature of the visit was the inspection of the two machines which have just been introduced. By a continuous action these machines syrup, fill, charge, and deliver the bottles of aërated waters automatically at a surprising rate. The spring water used is of the purest description.

The visit proved most interesting and instructive, and before leaving votes of thanks were awarded to Mr. Wilson for his courtesy and to Mr. Nicoll for his kindness in granting the privilege to visit the works.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Methylated Spirit.

Sir,—In a paper read before the British Pharmaceutical Conference last year by myself and Mr. Stark, attention was drawn to the probable early alteration in the constitution of methylated spirit by the Inland Revenue authorities. This has just been determined, and the following portion of a general order, dated July 20, issued by the department will be of interest.

"An authorized methylator must in the presence of the proper officer of Inland Revenue mix with and dissolve in all methylated spirit to be supplied to a retailer of methylated spirit for sale by him a quantity not less than three-eighths of 1 per cent. by volume of mineral naphtha of a specific gravity of not less than ·800."

This addition of petroleum oil will cause all methylated spirit in future to become turbid on addition of water, when the offensive odour is at once apparent. I find that the quantity is too small to be noticeable in those B.P. liniments in which methylated spirit is permitted to be employed by the Excise. Compound soap and compound camphor liniments will, however, be troublesome, as the dilution in each case is just sufficient to render the preparation milky.

Although pharmacists generally may have small reason to complain of the proposed alteration, it is not so with the manufacturers of fine chemicals. Samples of the mineral naphtha will have to be submitted to the chemists at Somerset House by the methylators, as at present is done with the wood naphtha. There is no indication in the regulations as to the purity of the petroleum oil, beyond a vague reference to its specific gravity, and as we mentioned in the above paper in describing the proportion of acetone usually present in methylated spirit, the tendency of the authorities is to pass samples according to their nauseousness and non-miscibility with water rather than according to their purity. It would therefore not be at all surprising to find that the mineral naphtha employed contained considerable quantities of residual "tailings," which by their particularly offensive and retentive odour on evaporation will render methylated spirit in future useless as a solvent for active principles or the crystallization of salts.

E. J. Millard.

Unqualified Assistants.

Sir,—I read a letter in a recent issue of *British and Colonial Druggist* in reference to above question, and I shall be glad if you will allow me space in your Journal for a few remarks thereto. I agree with "North of England" in his remarks, and, like him, I trust I am not without sympathy for unqualified persons; but I would ask, who should suffer, the qualified, or the unqualified? What right to consideration has the unqualified man? The Pharmacy Act has been in force years, and the unqualified man knows and knew this fact. He allowed his chance to slip away and had no sympathy for himself. I fear the bulk of the trade are as much to blame for the deplorable state of things as the unqualified men, inasmuch that they have taken as apprentices, and for filthy lucre sake, lads incapable of passing even the rudiments of education, and thus have "flooded" the pharmaceutical market with ignorant and therefore unscientific labour.

With regard to prosecutions by the Society, we have not had half enough. It is well known there are scores of unqualified men and half-educated apprentices employed selling poisons. The mass of chemists have very little respect for themselves, or true interests of pharmacy or trade, as the following extracts prove from some replies received by a qualified gentleman to an advertisement some time ago, and likewise manifesting where opposition to the well directed efforts of the worthy President of the Society spring from, also showing the character and principles of those who issue the hypocritical appeal on behalf of "the poor unqualified assistant."

"Salary 30*s.*, out; hours 8 to 10, Saturday 11.30. 'Wesleyan' in preference," etc.

"Hours 7.30 to 9.30; terms, out, 28*s.* (?); a 'Christian' essential," etc.

"Terms 32*s.*, out; hours 8.30 to 8.30, Saturday 11. Easy (?) berth; no half-holiday," etc.

"Hours 8 to 8, Saturday to 10, one evening off 6 p.m., terms 30*s.* out. 'Baptist' preferred," etc., etc.

I add that it is disgusting and shameful that men professing Christianity and connected with so-called "religious movements" should exhibit a want of common honour by offering such terms, etc., as the above to qualified men. May the qualified men see the great need for combination is the wish of

"Pharmacy."

"How do I Stand?"

Sir,—Having still for gratuitous disposal some hundreds of the above volume, in addition to about 500 returned to us, owing to insufficient address, we should be obliged if you would announce to your readers that we shall be pleased to send a copy to any chemist, whether registered or not, either in this country or abroad, who may not have already received one.

Mawson, Swan and Weddell.

J. Bond.—As we have no information as to the "specific property" or composition of the ointment, we are unable to advise you how to change its colour.

Student.—Aconitum variegatum.

W. B. Dougall.—(1) *Carex ampullacea.* (2) *C. hirta.* (3) *C. vulgaris.* (4) *C. stellulata.* (5) *C. flava.* (6) *Scirpus multicaulis.*

G. H.—The Sale of Medicated Wines.—We are not aware of any case in which the Inland Revenue authorities require a licence for wine that is sufficiently medicated to be unsuitable for use as a beverage.

G. W. Sargent.—Your letter appears to be unsuitable for publication.

Communications, Letters, etc., have been received from Messrs. Ward, Sawer, Bennett, Intendant, Dorrien.

A STUDY OF COCA LEAVES AND THEIR ALKALOIDS.

BY O. HESSE.

In consequence of the attack made by Liebermann upon the paper published in this Journal, it becomes my duty in regard to the Pharmaceutical Society to reply to and correct the assertions that have been put forward by him in a manner calculated to excite distrust.

This is evident at the outset in the paragraph relating to cocamine. In referring to my original note on the alkaloids of coca leaves, Liebermann quotes several passages in which cocamine is stated to have the same empirical formula as cocaine, and formulæ are given for some of its salts, but he ignores the fact that the first platinum salt he thus refers to was not prepared from cocamine at all. Only a few lines after that formula is given in the original note it was stated that the amorphous material from which that salt was prepared was evidently not homogeneous, as might be inferred from the circumstance that I was able by fractional precipitation to separate from it a distinctly characterized base, to which I gave the name of cocamine. It was the second platinum salt mentioned in the passage quoted by Liebermann that was the cocamine salt, as may be clearly seen by reference to my paper. The preparation, characters and decomposition of the base to which I gave the name of cocamine were only briefly described by me, and I distinctly reserved to myself its further investigation.

Liebermann's attempt to excuse his invasion of the field of investigation which I believed I had fully reserved to myself is astounding. He states that he did not become acquainted with my published notice until after his investigation was far advanced, and he explains that by saying he is not in the habit of reading the *Pharmaceutische Zeitung*, in which my reservation of the subject was made known. But Liebermann obtained the material upon which he operated from Giesel, and to him at least the notice was known, as I may infer from other circumstances. Moreover, since Liebermann found in his analyses of the original material on the average 67·31 per cent. carbon, 7·21 per cent. hydrogen, and 5·10 per cent. nitrogen, but for the purified substance partially dried in a vacuum, 67·93 per cent. carbon, 7·27 per cent. hydrogen, and 4·89 per cent. nitrogen, and that substance also corresponded in other respects tolerably well with cocamine, the obligation was cast upon him, if he were desirous of avoiding a breach of honour, either to have waited until the results of my investigation were published or else—as there was in the background a probably important patent—to have inquired of me what progress I had made in the investigation. At that time I was closely occupied in the dispute with de Vrij and his colleagues as to the quality of quinine, and since I had not undertaken the investigation of cocamine and the other coca bases with the object of gain, I should certainly have met his inquiry by giving up to him the investigation, as I have done in several instances with others. But from the manner in which Liebermann has acted I cannot now consent to give up to him the right in this matter that belongs to me.

It is established that the formula of air-dry cocamine is $C_{38}H_{46}N_2O_8 + H_2O$. The fact that I had adopted the half of that formula for cocamine, previously to the first publication by Liebermann, was justified by my observations of cocamine hydrochloride made in 1886 and 1887. For a novice in such work, and possibly also for Liebermann, this may appear insufficient, but that does not by any means justify him in discrediting this proceeding, so far as I am concerned. Cocamine is precipitated from solutions in dilute acids and from the hydrochloride on the addition of ammonia, soda, etc., and then, when the precipitate is dried by exposure to the air or at the normal temperature in an exsiccator, it contains one molecule of water. The mixture termed isatropylcocaine or truxilline has just the same composition. It is true that the determination of the water in these substances is difficult, but it can be effected, as I have shown in reference to the mixture of cocamine and homococamine. By the use of an air pump such as Liebermann has at his disposal the water determination may perhaps be carried out rapidly as well as accurately. Under these circumstances, however, it would have been more honourable of Liebermann to have determined the water in his isatropylcocaine and in the synthetically prepared cocamine than to select the questionable course of endeavouring to excite distrust.

In regard to the basic decomposition product of cocamine, namely, ecgonine, Liebermann assumes that I have forgotten having stated that I did not succeed in obtaining the characteristic platinum salt of that substance. This ridiculous suggestion is evidently due to the circumstance that in the note referred to the description given was not quite correct, in consequence of printers' errors. With somewhat greater circumspection Liebermann might have discovered that. As I did not ask the editor of the *Pharmaceutische Zeitung* to correct these misprints, to which I referred at page 1112, they were widely circulated.

The melting point data given in my paper for cocaic acid and homococaic acid will, I hope, be confirmed in time even by Liebermann, notwithstanding the several hundred determinations which he now says he has made with those acids, with the uniform respective results of 274° C. and 206° C. It is worth mentioning in this respect his own statement that Neumark has found the boiling points of the hygrine bases much lower than Liebermann did.

There is no foundation for the statement that I had described the mixture to which I applied the name of cocaidine as being an absolutely pure substance. It was only described as having been obtained perfectly free from hygrine; but the question whether the alkaloid was a definite pure substance was left to be decided by further experiments. In the meantime this question has ceased to be of interest. The fact that I recognized the presence of cinnamic acid among the decomposition products of the coca bases was made known by me about three months before the appearance of Frankfeld's paper, in a society at which Professor Hell and Professor V. Schmidt were present. It is therefore unnecessary to enter into any further discussion of this point with Liebermann.

The reason given by Liebermann for adopting the term truxilline to represent the mixture of bases to which he applied that name does not hold good. The statement that it was chiefly present in Truxillo coca leaves is not correct, for on the one hand the

Paris coca leaves, which were not the Truxillo sort, yielded me nearly 0·6 per cent. of cocamine, the one constituent of truxilline, or almost as much as the total alkaloid present in Truxillo leaves. Further, the East Indian coca leaves, and especially those from Java, contain truxilline in considerable amount. Since the name cocamine had already been applied to a distinct alkaloid that was an ingredient of the mixture called truxilline, and since there was no ground for an alteration of that name, the procedure of Liebermann in this respect is altogether unjustifiable. This alteration of name can only lead to confusion.

Liebermann also endeavours to throw discredit upon my statements respecting ecgonylcocaïc acid, homococaic acid and homoisococaic acid. However, since these acids can be easily prepared, it is probable that they may be the subject of further investigations, and as I have no doubt of the accuracy of my observations I rely upon their being confirmed.

Lastly, as regards the base named hygrine, Liebermann's remarks evidently relate to the base described in Giesel's recent communication to the *Pharmaceutische Zeitung*. According to that, Giesel distinguishes between the fluorescent substance previously obtained by me and that prepared by Lossen. This latter substance is represented as consisting of a mixture of several bases, and is said to be contained in the mother liquors of crude cocaine. The fluorescent base is said to be found in Java coca leaves, and sometimes in small quantity in Truxillo coca leaves. However, I have not yet been able to detect this fluorescent hygrine in Java coca leaves. Giesel states that he is able not only to obtain the hygrine of Lossen by the hundredweight, but also to determine the amount of it in the smallest samples of leaves. It would be desirable that Giesel should make known the process by which this quantitative determination, or at least the qualitative detection of this hygrine, is to be effected. This information is the more necessary since I have treated the mother liquors of raw cocaine with soda to saturation, or salted them out, as Giesel expresses himself, but still without obtaining the base in question, and therefore I still adhere to my statement as to the non-existence of hygrine in coca leaves.

TWENTY-FIVE YEARS OF MEDICAL PROGRESS.

BY T. LAUDER BRUNTON, M.D., F.R.S., ETC.

The following is an extract from the "Address in Medicine" delivered by Dr. T. Lauder Brunton to the British Medical Association at Bournemouth on the 29th ult.:—

New Methods.—The rapid increase in our knowledge has been due not merely to the constant use of old methods, but to the introduction of new ones, and more especially to the general recognition of the fact that the same strategy which has often proved so successful in war is to be applied in attacking complex problems. They are to be separated as far as possible into their several components and each of these is to be overcome in detail. As presented to us by observation at the bedside, the problems of disease are too complex for us to solve, and we are only succeeding in doing it by examining the various factors one by one in the laboratory. The greatly increased powers of the microscope and the better methods of illumination have been of the greatest service, but their utility would be very much less than it is had it not been for the general introduction of the microtome and the invention of new methods of staining. When I was a student the microtome was only used for cutting sections of wood in the class of practical botany. About that time it was employed by Mr. Stirling, Professor Goodsir's assistant, in the preparation of animal tissues, but I believe that we owe its general introduction to Professor Rutherford. The facility with which sections are made by it has made microscopical research much less tedious, and has enabled trained histologists to do more work in a given time, and medical students to acquire knowledge more rapidly. But without the method of staining introduced by Weigert and Ehrlich, we should, even with the best microscopes, be unable to recognize most of the microbes which are so important in the causation of disease.

Good out of Evil.—It is very interesting to see how good may come out of evil, and a striking illustration of this is afforded by the history of medicine in the period we are now considering. For it seems to me that we can trace a great part of our knowledge of disease germs and of the antiseptic remedies we use in treatment to the cupidity and stupidity of the Spaniards of the Cordilleras. Their cupidity led them to cut down the cinchona trees of the Andes in order to fill their pockets with the gold they received in exchange for the precious bark, while their stupidity prevented them from planting new trees to replace those which they felled. The consequence of this was that quinine became so dear that it was evident that anyone who could produce it artificially would make his fortune. Amongst others Perkin tried to do this, and, although he failed, yet in the attempt he discovered the aniline dyes, whose staining powers have not only helped us so much in ordinary histological research, but have made it possible to distinguish disease germs which without them would have been invisible. But the discovery of the aniline colours was only one outcome of the attempt to make quinine synthetically, for the impulse which it gave to the study of aromatic compounds has led to the production of salicylic acid and acetanilide, antipyrin, phenacetin and all the other antipyretic remedies whose number is probably legion, and whose names already have become so numerous as to be troublesome. Here we see good has arisen out of evil; for if the price of quinine had not been so high, the researches which have proved so useful might not have been begun even yet.

Small and Great, Foolish and Wise.—In looking at another of the greatest advances which medicine has made—namely, the knowledge of infective disease—we can see how enormous results can arise out of very small beginnings, and the safety of nations may be consequent upon a research which many men would have termed useless or even frivolous. I can hardly fancy any better illustration of St. Paul's observation about the foolish things of this world confounding the wise than Pasteur's researches on tartaric acid; for what could seem more foolish to the so-called practical man than the question, "Why does a crystal of tartaric acid sometimes take one shape and sometimes another?" Yet from an attempt to answer this question has arisen the whole of Pasteur's work on fermentation in general, and on that of wine, beer, and vinegar in particular, whereby he has been able to save millions to his country by accelerating the production of vinegar and preventing the souring of wine and beer. His observation that tartaric acid sometimes turned the ray of polarization to the right, sometimes to the left; that, indeed, there were two crystals apparently alike, but really different; and that these could be combined so as to form a symmetrical crystal having no power of rotation, led him to

look to life and living beings as the source of asymmetry. He tried to produce this asymmetry in salts of tartaric acid by fermentation, and found that during the process an organism developed which eats up the dextro-tartaric acid, and leaves the lævo-tartaric acid behind. This led him to investigate such minute organisms, and, by simplifying the soil in which they grew, and separating the organisms one from another, he learned the conditions of their growth, and showed that most processes of fermentation were due to the presence of living organisms. It is true that while Pasteur was still a boy at school, Payen and Persoz had shown that the liquefaction of starch and its conversion into sugar was due to diastase, and that Dumas in a report on a paper by Guérin-Varry had pointed out that, although unlike diastase, the active principle of the gastric juice had not been isolated, it was probably a ferment of a somewhat similar kind. Dumas classed yeast as a ferment along with diastase, and the fact that such a process as conversion of starch into sugar could be effected without a living organism naturally rendered it all the more difficult for Pasteur to prove his thesis that most fermentations were due to living organisms.

Chemical and Biological Views of Fermentation.—The two views of the action of ferments—namely, the chemical and the biological—may, I think, fitly be likened to Pasteur's two kinds of tartaric acid, each by itself being lopsided and incomplete, forming a symmetrical whole only when united. There can be no doubt of the truth of the chemical view that diastase is not a living organism, and yet converts starch into sugar. There can be as little doubt of the biological view that yeast and other organisms which cause fermentation are living bodies, and that without the presence of these living bodies alcoholic, acetic, and other forms of fermentation would not exist.

Microbes and Enzymes.—But recently we have come to recognize that these living organisms may produce their effect by manufacturing chemical ferments, and that these ferments may occasionally do the work, although the organisms which form them may be absent. It is quite true that it is difficult—perhaps impossible—to get fermentation from the dead yeast plant, but we may find a parallel for this in the fact that the pancreas of the higher animals sometimes yields an active ferment and sometimes not. Nor need we wonder that the ferments produced by microbes have but a slight action compared with those of the microbes themselves, if we remember how very little power of digestion a dead pig's stomach has as compared with the amount which can be digested not by the live animal itself only, but by the herds of swine consisting of its "fathers and mothers, its brothers and sisters, its cousins and its aunts," during all the term of their natural lives; for in the process of fermentation microbes are growing, fermenting and dying with great rapidity, and many generations occur in a fermenting fluid in the space of a few hours, so that the total effect they produce will be out of all proportion to any which can be got from the microbes themselves at a single instant.

Microbes and Disease.—From organisms as a cause of fermentation and of the diseases of wine and beer, Pasteur went on to investigate their action as causes of disease in living beings—first in the silkworm, next in the lower animals, and, lastly, in man. He established the dependence of the silkworm disease and of anthrax upon the presence of specific microbes which could be transmitted and communicate the disease, and by destroying the infected eggs of the silkworm he eradicated the disease and restored the silk industry to France.

Weakening of Disease Germs.—But while this investigation is interesting to us as illustrating the probable cause of the disappearance of typhus fever, to which I have already alluded, Pasteur's researches on anthrax are still more important as bearing upon the question of protective inoculation; for he found that the disease germ could be cultivated outside the living body and grown in flasks under varying conditions, some of which were favourable and others unfavourable to its growth. High temperature enfeebled the virus, so that it no longer killed an animal with the same certainty, and by inoculating first with a weak virus and then with one successively stronger and stronger, he found that animals could be completely protected either from inoculation by the strongest virus or by infection from other animals suffering from the actual disease.

Increase in Virulence of Disease Germs.—Another extraordinary fact which he made out was that the virus thus weakened so that it will not kill a guinea-pig a year old, and still less a sheep or ox, may again be rendered most potent by inoculating a feeble animal, such as a guinea-pig a day or two old, from this older and stronger guinea-pig's, the strength of the disease germs increasing with every inoculation, until finally sheep and cows may be killed by it. We can thus see how an epidemic of disease beginning sporadically and attacking weak individuals may gradually acquire such strength as to attack and carry off the strongest.

Pure Cultures.—Pasteur's plan of growing disease germs outside the body in broth, although of the utmost value, did not allow a convenient separation of different germs; but this can now readily be done by Koch's plan of sowing them, not in a liquid medium but on solid gelatine spread on glass plates, so that the growth of the germs can be daily watched under the microscope and inoculations made from single colonies on other plates until pure cultures have been obtained. By thus isolating the different microbes we learn their life-history, the mode in which their growth is influenced by differences of soil, of temperature, of moisture, by the addition of various substances which either favour or retard their growth, and, last but not least, the effect which one microbe has upon another when they are grown together at the same time.

Struggle for Existence amongst Microbes.—For even amongst these minute organisms the struggle for existence and the survival of the fittest exists, like that which Darwin pointed out so clearly in the case of higher plants and animals. When two microbes are growing together, one may choke or destroy the other, just as weeds in a garden may choke the flowers, or, on the other hand, successive generations of one microbe may render the soil suitable for another, just as decaying algæ and mosses may furnish mould in which higher plants can grow.

Struggle for Existence between Microbes and the Organism.—But it is not merely between different species of microbes or different cells in an organism that this struggle occurs. It takes place also between the disease germs and the cells of the organism which they invade, and the result of the struggle may be determined, not by some powerful agency which weakens or destroys either the organism or the microbe, but by some little thing which simply inclines the scale in favour of one or the other. Thus, in the potato disease the victory of the invading microbe and the destruction of the potato, or the death of the microbe and the health of the tuber, may depend upon some condition of moisture or possibly of electrical change in the atmosphere which aids the growth of the microbe disproportionately to that of the potato. These atmospheric conditions need not necessarily be antagonistic to the potato, they may even in themselves be advantageous to it; but if they help the microbe more than the plant, the microbe will gain the victory and the plant be destroyed.

Fight between Cells in Higher Organisms.—The fight

between the organs which Æsop describes in his fables actually occurs between the cells in some vertebrate animals, and the schism predicted by St. Paul as the result of such a fight actually takes place. For in the tadpole, at one stage of its existence some of the cells at the base of the tail begin to eat up others, with the result that schism occurs and the tail falls off.

Phagocytosis.—This struggle for existence between the cells of an organism and microbes has been beautifully shown by Metschnikoff in the daphne or water flea, where the process of the cells eating up the microbes or the microbes destroying the cells can be actually observed under the microscope. This process of phagocytosis is now regarded by many as only a small part of the struggle between an organism and a microbe; but it is impossible to see one part of a microbe half digested by the cell in which it is imbedded, while the outside part remains unaltered, without believing that the process is one of great importance. At the same time, it seems that the process of phagocytosis, where the microbe and the cells meet in close confiict, bears about the same relationship to the total struggle that a bayonet charge bears to a modern battle. The main part of the fight is really carried on at some distance by deadly weapons; by bullets in the case of the soldier, and by ferments, poisonous albumoses, and alkaloids on the part of the cells and the microbes. In some of Metschnikoff's observations we can almost see this process, for he has figured leucocytes dead, and apparently burst by the action of conidia, lying close to but yet outside them, as if these conidia, like the dragons of fable, had spit out some venom which had destroyed them.

Venom of Microbes.—Within the last few years attention has been gradually becoming directed less to microscopical examination of the microbes themselves and more to chemical investigation of the ferments and poisons which they produce; yet, strangely enough, the very moment when chemistry is becoming more important than ever has been chosen to minimise the teaching of it in medical schools, and examination in it by licensing bodies. It is now possible to separate the albumoses and poisons from the microbes which produce them either by filtration, or by destroying the microbes by graduated heat; for, as a rule, they are destroyed by a lower temperature than the albumose or poisons which they form.

Microbes and Enzymes.—As the albumoses produced by microbes are nearly allied, chemically and physiologically, to those formed in the alimentary canal of the higher animals by digestive ferments, it is natural to suppose that microbes, like the higher animals, split up proteids, starches and sugars by enzymes, which they secrete, and which in both cases may be obtained apart from the living organisms which produce them; that, in fact, we should be able to isolate from microbes bodies which correspond to pepsin or trypsin, just as we can isolate these from the stomach or pancreas of an animal. In some, although not in all cases, this attempt has succeeded.*

Poisonous Albumoses.—The albumoses produced by microbes resemble those formed during normal digestion in being poisonous when injected directly into the circulation, although they may not be so greatly absorbed from the intestinal canal. One of the most remarkable discoveries in regard to albuminous bodies is the fact that some of them which are perfectly innocuous, and, indeed, probably advantageous to the organism in their own place, become most deadly poisons when they get out of it. Thus the thyroid and thymus glands, which are perfectly harmless and probably useful, were found by Wooldridge when broken up in water to yield a proteid which instantaneously coagulated the blood if injected into a vein, so that the animal died as if struck by lightning, while Schmidt-Mühlheim, under Ludwig's direction, found that peptones had an exactly opposite effect, and prevented coagulation altogether.

Neutralization of Poisonous Albumoses.—Perhaps the analogy is too vague, but we seem to find here something very like Pasteur's two kinds of tartaric acid, one rotating polarized light to the right, the other to the left, but, when united together, having no action at all; for here we have two bodies, one of which destroys coagulability entirely, the other increases it enormously, while many albuminous bodies have no action upon coagulation whatever. This view would lead us to suppose that one form of albumose may neutralize the action of another, thus rendering them both completely innocuous, whilst either one or other alone might be a deadly poison. The albumoses formed by microbes appear frequently, if not always, to have a double action, destructive and protective, on the higher animals. Pasteur's treatment of hydrophobia is based on the idea that the spinal cord of rabid animals contains a virus, and its antidote. Koch's tuberculin may be similar in this respect, and may yet, by suitable alterations, fulfil the hopes of its able and single-minded discoverer.

Zymogens and Enzymes.—Perhaps a similar process of splitting up and recombination may explain the formation and disappearance of the enzymes, such as pepsin and trypsin, by which digestion is carried on. The pancreas of a fasting animal will not digest albuminous bodies, like fibrin, while the pancreas of an animal killed during full digestion will do so rapidly. Yet the fasting pancreas contains the zymogen, or mother substance, which yields the digestive ferment, and, as Kühne has shown, by treating it first with acid and then with alkali, it becomes active. Again, to recur to the analogy of Pasteur's tartaric acid, we seem to find that the inactive, and possibly symmetrical, albuminous substance of the fasting pancreas is split up by this treatment after death, or during the process of digestion in life, and yields the lopsided and active pancreatic ferment. But if this be so what becomes of the other half which has been split off? We do not at present know, but curiously enough Lépine has lately shown that while the pancreas is pouring into the digestive canal a ferment which will form sugar, it is at the same time pouring into the circulation another ferment which will destroy sugar.

Immunity.—We must be very careful in our speculations, and test them by experiment, but such observations as these may tend to throw some light upon the nature of immunity. Immunity is probably a very complex condition, and is not dependent altogether upon any single factor; but we can now understand that if a microbe has gained an entrance into an organism, and produces a proteid or an albumose poisonous to the organism which it enters, it may grow, thrive, and destroy that organism, while the injection of some other proteid which would neutralize the poison might save the animal while the microbe would perish.

Cure of Anthrax.—Thus Hankin has found that while a mouse inoculated with anthrax will die within twenty-four hours, a rat resists the poison altogether; but if the mouse after being inoculated with the disease has a few drops of rat's serum injected into it, instead of dying, as it would otherwise certainly do, it survives just like the rat, and from the spleen of the rat Hankin has isolated a proteid which has a similar protective action to that of the serum.

Cure for Tubercle.—Working on similar lines, Bernheim and Lépine used the injection of goat's blood in phthisis so as to stop, if possible, the progress of tubercle, and Richet has used the serum of dog's blood,

* *Vide* Brunton and Macfadyen, Croonian Lectures on Chemical Structure and Physiological Action, *British Medical Journal*, June 15, 1889, p. 1336.

for the goat is quite immune, and the dog is to a great extent, though not entirely, immune from attacks of tuberculosis. The injection of goat's blood in somewhat large quantities has been given up, while dog's and goat's serum in small quantities of 15 to 20 minims at intervals of several days is still under trial.

Action of Blisters.—But if immunity can be insured by such slight changes in the organism as a few drops of serum from a rat will produce in the body of a mouse, it is natural to suppose that a similar change might possibly be effected by removing the albuminous substance from one part of the body and introducing it perhaps after it has undergone slight change into another. As I have already mentioned, the albumoses of ordinary digestion are poisonous when they are injected into the circulation, and so are the proteid substances obtained from the thyroid and thymus glands. Why then may not the serum of one's own blood, withdrawn from the vessels by a blister and reabsorbed again, be as good as the serum obtained from the blood of an animal? We all know that in many diseases, such as inflammation of the lungs, either pneumonic or tuberculous, in inflammation of serous cavities such as the pleura, pericardium, and arachnoid, and of solid organs like the liver, or of nerves like the sciatic, the application of blisters is one of the most useful therapeutic means we can employ. In spite of all the changes in medical theory, blisters have always maintained an important place in practice. We have hitherto been in the habit of explaining their action by supposing that they cause derivation of blood from the inflamed part or reflexly caused the vessels to contract, and lessened the pressure upon the nerves of the inflamed tissues. But it is quite possible that this may be only a part of the truth, and that the good derived from blisters may be due to this form of treatment being really a form of endermic administration of proteid matters derived no doubt from the blood, but altered in their passage from the vessels to the surface of the skin, and thus having an effect upon the body entirely different from what they would have had if they had remained in their ordinary place. It might form an interesting point for investigation how far the beneficial action of blisters is increased or diminished by leaving the bleb untouched so that the serum may be reabsorbed, or opening it and allowing the serum to drain away.

Bleeding.—It is quite possible, too, that the good effects of bleeding may be due to a similar cause. There can be no doubt that this practice has fallen much into disuse, and I think there can be as little doubt that those who used it in former times were not fools, but were led to use it by the marked relief which in many cases it afforded. Experiments upon animals have shown that withdrawal of blood from the veins causes absorption of proteid matters from the tissues, and these may have an action of their own upon the blood and tissues generally with which they are thus brought into contact. Indeed it is possible that free purgation may be partly due to a similar action.

Speculation and Experiment.—The human body is a most complex piece of mechanism. We learn its action bit by bit very slowly indeed, and we are only too apt to regard the little piece which attracts attention at the moment as all-important and to leave the other parts out of sight. But this is not true of our study of the body only, for the same tendency manifests itself in the pursuit of knowledge of all kinds; yet it is in medicine more especially that this tendency comes to be a matter of life or death, for upon the medical view prevailing at the moment medical practice is apt to depend and erroneous views may lead to the death of many patients. So long as practice depends upon theories, unchecked by experiment, so long will medical practice prove fluctuating, uncertain, and dangerous. One of the greatest gains of the last five-and-twenty years is the general introduction of the experimental method and the habit which has been growing up during it of accepting no statement unless based upon experimental data. Speculations such as those in which I have been indulging in regard to blisters and blood-letting are useful as indicating lines of experimental research, but until these have been thus tested it is foolish and may be dangerous either to accept and act upon them as true or to scout them entirely as false and absurd. Imperfect knowledge is almost sure to lead to one-sided practice, and thus diverging further and further from the truth, ends at last in falsehood and folly.

Antisepsis.—Perhaps no better example of this can be found than antiseptic surgery from the time of the good Samaritan down to Ambroise Paré and Sir Joseph Lister. The good Samaritan bound up the wounds of the poor traveller, pouring in oil and wine, which, only a few years ago, was recommended in an Italian journal as an excellent antiseptic. Ambroise Paré, when his ointments ran out, could not sleep for thinking of the miserable soldiers to whom they had not been applied, and was greatly astonished to find in the morning that these wretched neglected ones were better and happier than their comrades who had been treated *secundum artem.* I have no doubt that Paré's predecessors in trying to improve upon the methods of the good Samaritan and upon the still useful friars' balsam, which is a powerful antiseptic, but stings the wound or sore, had tried to make their applications more and more irritating, not knowing that it was the antiseptic power and not the irritant qualities which were desired. Paré abolished the ointments, with the irritation they caused, and thus did great service to surgery. But a greater one yet was rendered by Lister when he recognized that the danger of operations was due to the entrance of germs, and by preventing this has completely revolutionized surgical practice; nay, more, he has to a great extent revolutionized medicine, for the diseases of the internal organs, which were formerly entirely under the physician's care, are now becoming amenable to surgical treatment, and diseases of the stomach, intestine, liver, kidney, and lungs, and even of the brain and spinal cord, are now successfully treated by surgery when medicines are powerless to help. The most remarkable of all the recent triumphs of surgical operations upon the brain, in which Mr. Horsley has gained such well-deserved fame, would have been impossible without Ferrier's localisation of cortical centres, and would have been equally impossible but for Lister's antiseptic method.

Disinfection.—But it is not only in surgery that recognition of diseased germs as a source of danger to the organism has led to their destruction outside the body, and insured safety from their attack. This occurs in all infective diseases, and this term now includes many which were not formerly regarded as such, for neither consumption nor pneumonia was formerly regarded in this light; but just about twenty-five years ago tubercle was shown to be inoculable, and since then the discovery of the bacillus of tubercle by Koch, and of pneumonia by Friedländer, has caused us to class both these diseases as not only infective, but as caused by definite organisms.

Prevention of Epidemic Diseases.—So long as people were ignorant of the causes of epidemic diseases, they were utterly unable to combat them, and they either in fury slew defenceless people for poisoning the wells, as in the Middle Ages, or appointed days of fasting and prayer, as in our own times. But once an epidemic is known to depend upon the presence of a certain organism, precautions can be taken for destroying the organism outside the body by means of disinfectants, or for lessening the susceptibility of the organism to its ravages inside the body by inoculation, or combating its effects by means of antipyretics.

A knowledge of the life-history of microbes has enabled us to ascertain the power of different substances, either to destroy them completely, or to arrest or retard their germination and growth, and in this way to prevent the occurrence of the diseases which these microbes might otherwise produce.

Old and New Remedies.—In comparing the drugs at our disposal now with those we possessed twenty-five years ago, we are at once struck by two facts, namely, that we not only have a very much larger number of powerful remedies than before, but that we also know better how to use the old ones. Both of these gains we owe to experimental pharmacology, to the testing of drugs upon the lower animals.

Antivivisection.—Every now and again a loud outcry is raised against this method, partly from ignorance, and partly from prejudice. Many—probably most—of the opponents of experiments on animals are good, honest, kind-hearted people, who mean well, but either forget that man has rights against animals as well as animals against man, or are misled by the false statements of the other class. These are persons who, blinded by prejudice, regard human life and human suffering as of small importance compared with those of animals, who deny that a man is better than many sparrows, and who, to the question that was put of old, "How much then is a man better than a sheep?" would return the reply, "He is no better at all." Such people bring unfounded charges of cruelty against those who are striving, to the best of their ability, to lessen the pains of disease both in man and also in animals, for they, like us, are liable to disease, and, like us, they suffer from it. I may, perhaps, be allowed to quote two sentences from a paper which I wrote twenty-four years ago, and therefore a considerable time before any antivivisection agitation had arisen, for they expressed then and they express now the objects of experimental pharmacology.* "Few things are more distressing to a physician than to stand beside a suffering patient who is anxiously looking to him for that relief from pain which he feels himself utterly unable to afford. His sympathy for the sufferer, and the regret he feels for the impotence of his art, engrave the picture indelibly on his mind, and serve as a constant and urgent stimulus in his search after the causes of the pain, and the means by which it may be alleviated."

Gains by Experiment on Animals.—It is said that our mouths are full of promises, but our hands are empty of results. The answer to this is that anyone who doubts the utility of experimentation upon animals should compare the 'Pharmacopœia' of 1867 with our present one. To it we owe, in great measure, our power to lower temperature, for to it is due not only the introduction of new antipyretics such as salicylate of soda, antipyrin, antifebrin, and phenacetin, but the extension of the use of quinine from a particular kind of fever—malaria—to other febrile conditions. To it also we owe our greatly increased power to lessen pain by the substances just mentioned, which have not only an antipyretic but an analgesic action, and give relief in the torturing pains of neuralgia and locomotor ataxy when even morphine fails to ease, unless pushed to complete narcosis. The sleeplessness, too, which is such a frightful complication in some fevers, can now be combated by other remedies than opium and antimony; and we have the bromides, chloral, sulphonal, paraldehyde, urethane, chloralamide, and others which, either by themselves or added to opium, enable us to quiet the brain instead of exciting it to further action, as opium alone so frequently does. Our whole ideas regarding cardiac tonics also have undergone a complete revolution within the last quarter of a century, for I was told when a student that digitalis was a cardiac sedative, and was apt to depress the heart, whereas now we know that it and its congeners—strophanthus and erythrophlœum and sparteine—increase the heart's strength, raise the vascular tension, and are useful not only in sustaining the circulation, but in aiding elimination. This view of the action of cardiac tonics, which has revolutionized the treatment of heart disease, we owe chiefly to the experiments of Traube, although my own experiments, made in the laboratory of Sir Douglas Maclagan under the direction and by the help of my teacher and friend, Dr. Arthur Gamgee, may have helped towards its general acceptance in this country.

Future of Pharmacology.—But perhaps the most promising thing about pharmacology is that we are now just beginning to gain such a knowledge of the relationship between chemical structure and physiological action that we can, to a certain extent, predict the action of a drug from its chemical structure, and are able to produce new chemical compounds having a general action such as we desire, for example, anæsthetics, soporifics, antipyretics, and analgesics, although we have not yet arrived at the point of giving to each one the precise action which would make it most suitable in any particular case. Even when we do not know the chemical structure of a drug we may be able, from noticing one of its actions, to infer that it possesses others. We are, indeed, getting a knowledge of the action of drugs both of known and unknown chemical structure, and a power of making new remedies which will, I believe, enable us within the next five-and-twenty years to cure our patients in a way that at present we hardly think.

* *Lancet*, July 27 1867

THE UTILIZATION OF WASTE PRODUCTS IN BREWERIES.*

The principal bye-products in breweries consist of grains, yeast, spent hops, and carbonic acid, and, in a smaller degree, "bottoms," "returns," and sour beer, some of which are sold and utilized to some extent, but in the majority of cases the full value is not obtained for them, and especially is this the result with those brewers in out-of-the-way and remote places. Until the last few years brewers practically gave the grains away; they had no use for them, and on account of the rapidity with which these materials putrefy, it was very undesirable, and even dangerous, to keep them for any length of time about the brewery; they were disposed of to the first comer at merely nominal prices. But a change has, to a very great extent, taken place. Machinery has been devised by the use of which brewers' grains may be speedily dried, and at such a temperature as to leave only sufficient moisture as to render them eminently suitable for feeding cattle. There can be no question that this result has been of very great benefit to the brewer, for one of the chief risks which he had hitherto very little control over—viz., contamination of his yeast and wort by foreign ferments, owing to having his grains, perhaps for a week or two in the summer time, lying about the brewery premises—has been reduced to practically *nil.* Besides, the price obtainable for dried grains is such that there is a considerable amount on the right side after deducting the expense which is incurred by a brewer in the preparation of a staple commodity from one of a contrary nature.

As regards the treatment of brewers' yeast for other industrial purposes, the prices obtainable for it are, with very few exceptions, gradually diminishing, the cause of this being the preference which is now given by bakers to dried yeast imported from abroad. We can hardly understand why this should be so, for it is now well known amongst bakers that brewers'

* From the *Brewers' Guardian*, July 21.

yeast withstands the "sour" fermentation to a much greater extent than either the compressed yeast of the distillery or the ordinary foreign yeast, on account of the presence of the essential oils and resins derived from the hops used in brewing. In the preparation of yeast for breadmaking there is a very wide and profitable field for research, and the fact that a few of the well-known brewers do obtain a very good price for all their yeast ought to act as a stimulant to further investigation on this important subject.

Endeavours have been made to utilize spent hops to greater advantage than simply for manure. About two years ago a process was patented by means of which it was sought to dry hops which had been used in brewing, and thereby render them of value as litter for horses and cattle, and for packing and other purposes of a kindred nature. One or two years ago patent rights were taken out for the purpose of converting spent hops into brown paper and mill-boards; but we heard nothing further of this project till a short time back, when it was rumoured that it was to be put into practical form at Burton, in order to provide employment for the female population of that town. We wish it every success, and it has recently come to our knowledge that the Mayor and other influential gentlemen of that town are inquiring into the matter, so that it looks as if it will take some tangible form.

From what we have already stated it will be seen that for some of the bye-products of brewing, methods have been devised by which they could be turned into valuable commodities. There is, however, another form of waste, which till now has not been utilized. This is the gas given off during the fermentation of the wort by yeast. In the spring of 1885 we stated, concerning this bye-product, as follows:—"Carbonic acid gas, which is a product of fermentation, is also another form of brewery waste; but perhaps the idea will be considered far-fetched when we say that, at some future time, even this may be probably utilized." Well, this remark of ours has been verified at last, and sooner, perhaps, than the majority of our readers expected. A company is now being formed "for acquiring certain inventions for the collection and utilization of the carbonic acid gas given off at breweries and distilleries during the process of fermentation." The gas is to be collected, purified, and condensed, both to a liquid and a solid, according to the specific purpose for which it is to be applied. When we consider for a moment the extraordinary quantities of this gas which are annually wasted in breweries and distilleries, it seems surprising that no process has been found for turning it to a profitable account. Commenting about six years ago on what an enormous quantity of this gas is liberated into the atmosphere during the production of beer, we stated that in this country alone 28,129,784 barrels of beer were produced in the preceding year (and this figure has been considerably augmented since); this is, in round numbers, 1,000,000,000 gallons, or 10,000,000,000 lbs. of beer. On an average, English beer may be considered to contain 5 per cent. of alcohol, and as, in the fermentation of sugar, the weight of carbonic acid produced is almost the same as that of alcohol (the exact proportions being 48·9 of carbonic acid to 51·1 of alcohol), there must have been 500,000,000 lbs. of carbonic acid produced in our breweries. The specific gravity of carbonic acid is ·1524, and therefore a simple calculation shows that the above weight is equal to 25,000,000,000 gallons, a volume it is almost impossible to realize; such a volume would require a space one mile square and forty yards high to contain it. It is now proposed to utilize the greater portion of this large quantity of carbonic acid. The process by which this is to be done has been tried for some little time past in St. James's Gate (Guinness's) Brewery, Dublin, and Sir Charles A. Cameron has reported very favourably on it. The following are the conclusions at which he arrives after a most careful examination of the process:—(1) An immense quantity of carbonic acid is produced in breweries, and is at present wasted; (2) a large proportion of this gas could be condensed to liquid at a cost not exceeding $\frac{1}{2}d.$ per lb., but probably less than $\frac{1}{4}d.$ per lb.; (3) the process of liquefying the gas is successfully carried on at Guinness's Brewery, Dublin; (4) the liquefied gas prepared at Guinness's Brewery is perfectly free from any peculiarity of flavour or odour; (5) the carbonic acid produced at soda-water works costs about $4d.$ per lb.; (6) it is safer and in every way more desirable to use in beverages carbonic acid derived from a food substance, such as grain, than from mineral sources; (7) the uses of liquid carbonic acid are numerous, important, and increasing.

COPPER IN PRESERVED VEGETABLES.

At the meeting of the Bavarian Society of Applied Chemistry, held last month in Augsburg, the subject of the presence of copper in preserved vegetables was the subject of a long discussion, which is epitomized in the *Chemiker Zeitung* as follows:—

The discussion was preceded by a paper from Herr Mayrhofer, of Mayence, in which the author stated as the result of his experience that in nearly all preserved vegetables copper is present, sometimes derived from the vessels used in their preparation, sometimes added directly in the form of sulphate. In the case of fruits boiled with sugar the juice contains on an average 4 to 9 milligrams of copper to the kilogram of juice, derived entirely upon the copper vessels, which are found in practice to be better suited for boiling products of this kind than vessels of any other material. The green preserves met with in commerce vary in the amount of copper they contain between 26 and 36 milligrams per kilogram; in one case 76 milligrams per kilogram was found. In these green preserves the copper is partly derived from copper vessels and partly added as sulphate. Preserves of this kind show after heating and sterilizing a green colour, comparable to that of the fresh vegetable, whilst without the copper they take a brownish or yellowish colour that makes them unmarketable. The author expressed the opinion that preserves of this kind containing copper can be eaten without injury to health. He stated that he had found by experiment 20 to 24 milligrams of copper sufficient to give the desired green colour to a kilogram of preserves. He therefore recommended that this quantity of copper should be considered allowable and unobjectionable for the colouring of preserves.

Med. R. Karsch (Speyer) stated that what was done in Germany was based upon the practical experience of France, and he thought the same limits might be set up there as in that country.

Herr Barth (Rufach) mentioned a case in Brunswick in which a preserve manufacturer had been acquitted on the basis of a medical opinion. The question involved in the use of copper salts was not one of dressing up decayed food material, but of imparting a colour. In the case of some preserves, peas for instance, a vegetable pigment can be used in the place of a copper salt, but in others, such as beans, it could not.

Herr Barth communicated some experiments made with wine, containing copper which had been derived from the compounds used as dressing against *Peronospora*. Cows were given up to 8 grams of sulphate of copper daily without any injurious effects being observed.

Med. R. Merkel (Nuremberg) uttered a warning against the results of such experiments on animals being applied to men. It was, however, a fact that the cases of chronic copper poisoning recorded in

forensic literature could not support strong criticism; but on the other hand it could not be said that there was no danger. Chronic copper poisoning occurring among workers in copper and bronze had not yet come to his knowledge. In his opinion the meeting was not yet in a position to come to a decision upon the question,

Herr Kayser (Nuremberg) also argued against going to the extreme on the one hand of holding that the presence of a copper compound such as verdigris in an alimentary substance was injurious to health in the highest degree, or on the other that the presence of a certain amount of copper in a food was of no consequence.

Med. R. Egger (Landshut) called attention to the fact that up to that time no one had said where the danger of copper in preserved vegetables begins.

The author replied that the copper compounds formed in the preserves made with or without sugar are insoluble, and therefore not of importance.

Herr Kayser pointed out that in the consumption of preserves containing copper it was not water or a concentrated sugar solution that came into question, but the digestive juice, in which the author's experiments had not proved the copper compounds to be insoluble.

The author said that no copper passed from preserved vegetables into dilute acids.

Herr Hilger (Erlangen) recalled that all albuminoid substances form insoluble compounds with copper, and said that copper must be considered a normal constituent of the human body, a remark in which he was supported by Professor Medicus, of Würzburg.

Director Kochler (Berlin) advised that in the fixing of a maximum limit of that kind regard should be had to the maximum dose in the Pharmacopœia. It was one thing for a poisonous substance to be present in an alimentary substance, and another for it to be introduced by a physician into a human body as a remedy against a disease already there. In the latter case the remedy was often itself injurious, but to a less extent than the disease upon which it acted, and it was always the care of the scientific physician to weigh these conditions.

Director Kochler said that during a visit to the Strassburg exhibition his attention had been attracted to the remarkably beautiful green colour of some preserved beans, and upon inquiring as to how this colour had been imparted he was told that it was a trade secret. Subsequently he had learned that during the boiling of these vegetables in a copper vessel an electric current was passed through the whole, the copper of the vessel acting as an anode. It was evident that in this way a large quantity of copper would be carried into solution.

At the close of the discussion a resolution was passed to the effect that the meeting was not then in a position to come to a definite conclusion, but that it would await the results of further experiments with a view of forming a judgment at the next annual meeting.

FORMATION AND TRANSPORT OF CARBOHYDRATES IN PLANTS.

In a memoir in the Russian language, M. W. Sapoznikow gives the result of experiments on this subject made on the sunflower and gourd. He finds the decrease in the amount of these substances, when leaves are deprived of light, to be only one-fifth in detached leaves compared to what it is in leaves still attached to the plant. The energy of the conversion of starch into glucose shows a daily periodicity, which reaches its maximum between 7.30 and 9.30 p.m., and its minimum between 12 and 5.30 p.m., the maximum of this function being at an earlier period of the day than the maximum of growth. The presence of glucose in the cells hinders the action of the diastatic ferment in the further conversion of starch into glucose. The energy of the formation of carbohydrates in the leaves appears to be greatly influenced by the weather, being very much greater with a clear sky and a large amount of light. With the increase in the amount of carbohydrates in the leaves, the energy of assimilation proportionately decreases. Quantitative experiments show that the whole of the carbon of the carbonic acid decomposed is not used up in the formation of carbohydrates; there must be a second product of assimilation, which is probably a proteid.

THE JUBILEE OF THE PHARMACEUTICAL SOCIETY.

Address from the Pharmaceutical Society of Tasmania.

The following is the text of an address that has been received from the newly-formed Tasmanian Society:—

"Pharmaceutical Society of Tasmania.

"To the President and Council of the Pharmaceutical Society of Great Britain.

"Gentlemen,—We, the undersigned, President, Vice-President and members of the Council of the Pharmaceutical Society of Tasmania, have much pleasure in sending you our heartiest congratulations on the completion of the 50th year of the existence of the Pharmaceutical Society of Great Britain.

"We take a lively interest in all matters which affect the welfare of pharmacy in the parent country, and wish you every success in your efforts to secure better protection for chemists than at present exists in England.

"We, in Tasmania, although the youngest Pharmaceutical Society in Australasia, have enjoyed far better legislative protection than any of our sister colonies. Our Medical Act, under which we are working, dates back to the year 1842, the sixth year of Our Most Gracious Majesty Queen Victoria's reign, and during the Governorship of the late Sir John Franklin, and our Court of Medical Examiners is thus one of the oldest medical examining bodies in the British dominions. More recently a Poisons Act has been passed very much on the lines of the Victorian Poisons Act.

"On the establishment of our Pharmaceutical Society recently the Court of Medical Examiners handed over to us the conduct of the examinations, though they are still represented at them, and reserve the right to grant the licence on our examiners' certificate.

"This is a state of things which is highly satisfactory, and we should like to see the same good relations existing between the Medical Profession and Pharmacists everywhere.

"Again wishing you success and all prosperity, we have the honour, Gentlemen, to subscribe ourselves,

"Yours faithfully,

"Andrew T. Miller (*President*).
"F. Fairthorne (*Vice-President*).
"J. T. Weaver
"Henry C. Drake
"Fredc. Holmes
"F. Styant Browne
"J. W. Toplis
"Carl Eberhard
Members of Council.
"H. P. Gould (*Registrar*)."

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, AUGUST 8, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE COUNCIL MEETING.

AT the meeting of Council last Wednesday, numerous additions were made to the Society. Twenty persons were elected pharmaceutical chemist members; ninety-four were elected associates, and eight were placed on the Register of Apprentices or Students of the Society. Diplomas were granted to twenty-seven pharmaceutical chemists. Before the other business of the Council was entered upon the PRESIDENT referred to the death of Mr. JOHN BARNARD, which took place during the previous night after a brief illness, and to his long connection with the Society's Journal in an official capacity. At his suggestion it was decided that a letter of sympathy and condolence should be sent by him on behalf of the Council to Mr. BARNARD'S family.

In moving the adoption of the report of the Finance Committee, the PRESIDENT pointed out that the receipts of examination fees had been unusually large during the past month, and that the receipts on account of the Benevolent Fund had been almost entirely from investments. After the investment of six hundred pounds on this account, a small sum remained as a nucleus for further donations. The payments were chiefly of the ordinary character for the present month.

On the recommendation of the Benevolent Fund Committee a grant was made of five pounds to a widow, who was an unsuccessful candidate at the last election. Mr. HAMPSON, the Chairman of the Committee, in moving the adoption of the report, expressed a hope that the small number of applications for relief was not merely accidental, but an indication of better times.

The report of the Library, etc., Committee recommended that the list of donations to the Library and Museum should in future be published in the Journal immediately after the committee meeting is held, and that course will henceforth be adopted, with the object of more prompt notification. The report also stated that the Committee had ordered the Libraries and Museums in London and Edinburgh to be closed in the evening during August and September, also that the Library aud Museum in London should be entirely closed from August 29 to September 12 inclusive, and in Edinburgh from August 17 to September 1 inclusive.

The PRESIDENT announced that the Sessional Address in October next will be delivered by Mr. GAINSFORD BRUCE, Q.C., the member of Parliament for the Holborn Division of Finsbury. This is a new departure which may, it is to be hoped, prove to be the first step towards obtaining a better understanding and appreciation of the work of the Society among members of the House of Commons.

The examiners appointed to conduct the examinations for the JACOB BELL and REDWOOD Scholarships reported that altogether twenty-two candidates had presented themselves in London and at the several provincial centres, and that the BELL Scholarships had been awarded to Mr. JOWETT and Mr. GANE. The REDWOOD Scholarship has been awarded to Mr. HORRELL, as Mr. SHEPHERD, the more successful candidate in the competition, had been unable to accept it. These awards were confirmed by the Council.

The report of the General Purposes Committee gave a very favourable account of the results of the prize examinations conducted by Professors ATTFIELD, DUNSTAN and GREEN, and by Messrs. H. G. GREENISH and J. INCE, some of the best competitors having obtained nearly full marks. The results of the examinations for the Council prizes, conducted by Mr. T. MABEN and Dr. INGLIS CLARK, were also reported. The PEREIRA medal has been awarded to Mr. GARNETT, one of the BELL scholars, the Society's silver medal to Mr. HOILE, the REDWOOD scholar, and the bronze medal to Mr. HARRISON, the other BELL scholar, all of whom occupy prominent positions in the school prize lists. The Herbarium silver medal has been awarded to Mr. CLEAR. In connection with the recently founded Manchester Pharmaceutical Association Scholarship the Committee reported upon the regulations that had been drawn up in reference to it, according to which the Scholarship, of the value of about thirty pounds, is to be offered annually, and the scholar is to be for the session a pupil in the Society's School, or if it be desired in any Provincial School of Pharmacy approved by the Council of the Society. The subjects of examination are to be the same as those for the BELL and REDWOOD Scholarships, the examinations being held at the same time and centres and the award made in the same manner as for those. Candidates must be subscribing apprentices or students of the Society, not less than nineteen or more than twenty-one years of age, and they must have been engaged for three years in the pharmacy of a registered pharmaceutical chemist or chemist and druggist in Lancashire, Cheshire, or the High Peak parliamentary division of Derbyshire. Persons to whom a BELL or REDWOOD Scholarship has

been awarded will not be allowed to compete for the Manchester Scholarship, and on the other hand persons who have been awarded this Scholarship will not be permitted to compete for a BELL or REDWOOD Scholarship. The requisite formalities for the establishment of this Scholarship having now been completed the first examination for it will take place at the end of next session, and it is to be hoped that young men within the limited area for which the founder of the Scholarship desires that it should be applicable will show their appreciation of his generosity and desire to promote their welfare by a numerous candidature for the Scholarship.

In view of the approaching meeting of the British Pharmaceutical Conference at Cardiff, delegates were appointed to attend as representing the Society, and Mr. MARTINDALE, as President of the Conference, expressed a hope that a large number of members would also be able to attend. No further mention, however, was made of the suggestion brought forward by Mr. SCHACHT some time ago to establish annual provincial meetings of the Pharmaceutical Society which should coincide in time and place with those of the Conference, though this proposal appears to be one calculated to promote the interests and success of both bodies.

The PRESIDENT mentioned that he had received from M. LIMOUSIN a letter written on behalf of the Society of French Pharmaciens asking for the opinion of the Council as to the desirability of holding an International Pharmaceutical Congress in 1893, and in the event of that idea being approved, what European capital should be selected for the purpose. After an allusion to the proposal of holding an International Pharmaceutical Congress at Chicago at the time of the exhibition that is to take place there, the letter of M. LIMOUSIN was referred to the Library, etc., Committee to consider and report upon. The PRESIDENT also announced that he had received from Mr. MILLER, President of the Pharmaceutical Society of Tasmania, a letter thanking the Council for the invitation to attend the Jubilee meeting, and expressing his regret at not being able to take part in so important a celebration. A letter had also been received by the SECRETARY from the Tasmanian Society, with an address of congratulation and apologies for its having been sent rather late. This address will be found at page 108. At an earlier stage of the proceedings that portion of the General Purposes Committee report which dealt with legal proceedings was considered in committee. The SOLICITOR reported that a penalty had been paid in one case for the sale of a "weed-killer," and on the recommendation of the Committee proceedings were directed to be taken in several cases of alleged infringement of the Pharmacy Act of which information had been communicated to the Council. In accordance with the usual practice at the holiday season it was agreed that the next meeting of the Council would take place in October, and that a quorum would not be formed next month, though the summonses would have to be issued in accordance with the Bye-laws.

DEATH OF MR. JOHN BARNARD.

WITHIN the week just ended the last has been seen of an old member of the Society, who has from its foundation been very intimately associated with its work, and with many will always remain a notable feature in its history. We refer to Mr. JOHN BARNARD, whose death will be felt as a personal loss by many who have been his colleagues at some time or other within the last fifty years or more. After a few days illness Mr. BARNARD died during the night of the 4th inst., and the intimation of the fact, received from the establishment with which he has so long been connected, was conveyed in terms which show that his loss has there been as sorely felt as it will be by his immediate relatives, and as we are sure it will in many parts of the kingdom. In the position of an associate Mr. BARNARD became connected with the Society in 1841, when an assistant at the house of JOHN BELL and Co. In 1847 he became a member, and was for a short time in business on his own account in Bath. Soon after that date, however, he returned to Oxford Street and became then actively engaged with JACOB BELL as his private secretary and assistant in the conduct of the *Pharmaceutical Journal*. When the Journal was afterwards presented to the Society by JACOB BELL, Mr. BARNARD was appointed one of the three editors under whose direction it was conducted until the time when the present weekly issue commenced, and then his other occupations prevented a continuance of his connection with it. From Mr. BARNARD'S intimate relations with JACOB BELL, and subsequently with his successor, Mr. T. H. HILLS, throughout that period of nearly thirty years, he was in a sense a more perfect link between the past and the present time than any other member of the Society could be. But not alone on that ground will his death be regretted, for as the PRESIDENT remarked at the Council meeting, the high esteem he gained for kindliness of nature from every one with whom he came into contact will long keep his memory green.

As the award of the Herbarium Prize by the Council at its meeting on Wednesday is the last that will be made under the same conditions, it may be useful to direct attention to the altered regulation now in force. Up to the present time it has been a condition that a collection to entitle it to recognition must contain not less than three hundred specimens. But in future,—that is in any collection commenced after December 31st,

1890,—it will be a condition that the plants may not exceed in number one hundred and fifty, and that they must be carefully selected and mounted so as to display the characteristic features of the more prominent and typical genera of the chief British natural orders. It will be seen that the object of the alteration is to favour the intelligent selection and mounting of a limited number of typical specimens rather than to encourage the accumulation of large collections.

* * *

On Monday next, the 10th inst., the International Congress of Hygiene and Demography, of which Her Majesty the Queen is Patron and His Royal Highness the Prince of Wales President, will commence its sittings. The opening meeting will be held at St. James' Hall at 3 p.m., and it is specially announced that members attending the meeting must be in their places not later than 2.45 p.m. The sittings will be continued throughout the week, and notice has been given of a number of interesting subjects upon which papers are to be read or discussions raised by medical and scientific authorities, British, Colonial and Foreign. Tickets of membership can be obtained on payment of one pound for a gentlemen and ten shillings for a lady, by application to the officers of the Congress at 20, Hanover Square.

* * *

The Select Committee appointed by the House of Commons to consider the Teachers' Registration and Organization Bills, to which reference has already been made in these columns (Feb. 21, p. 748), has presented a special report in which the registration of teachers in secondary schools is recommended as in principle desirable. In the event of legislation to that effect taking place the committee is of opinion that existing teachers should not be put on the register merely as such, but that they should not at present suffer from any legal disability through non-registration. It considers also that teachers should be admitted to the register on producing such evidence of intellectual acquirements and teaching capacity as might be required by the Council to be instituted, and that the register should eventually be made compulsory upon existing teachers in the event of their appointment to teach in a secondary school assisted by endowment or public money and upon future teachers in all secondary schools. The committee further recommends that the qualifications for registration should include evidence both of attainments and of teaching capacity, and that with this object additional facilities should be provided for the training of teachers in secondary schools.

* * *

At the recent meeting of the Bavarian Society of Applied Chemistry, reference was made to a product which under the name "sugar honey" has been introduced as a substitute for bee honey at a far lower price. It is said to consist of invert sugar, water, a very small quantity of mineral matter and free acid, and to possess the characteristic taste and odour of bee honey. Neither dextrin, cane sugar, nor any other abnormal constituent was detected by direct investigation or by submitting the "honey" to fermentation. One of the speakers expressed an opinion that if the manufacture of this article were taken up by capable hands the work of the bee in respect to honey making would become superfluous and be chiefly of value on account of the wax produced.

* * *

According to the *Pharmaceutical Journal of Australia*, the practice has been introduced into Victoria, on the recommendation of Baron von Mueller, of placing green branches of eucalyptus in sick rooms as a disinfectant. Dr. Curgenven states, after twelve months' trial, that in cases of scarlet fever, if the branches be placed under the bed, the bedding undergoes thorough disinfection, the volatile vapour penetrating and saturating the mattress and every other article in the room. Its vapour is also said to have a beneficial effect upon phthisical patients, acting not only as an antiseptic, but as a sedative and to some extent as a hypnotic.

* * *

According to the Philadelphia *Satelite*, during the abortive attempt to cut a canal through the isthmus of Panama, as much as 200,000 ounces of quinine was used annually in combating malarial fever. Many of the *employés* were in the habit of taking, as a prophylactic, large quantities of sulphate of quinine, in rum or vermouth, every morning before breakfast, a teaspoonful being looked upon as a small dose. One consequence is said to have been that when the attack of fever came, the only medicine that might have been able to save life was powerless, in consequence of the system having become so tolerant of its action. Antipyrin was not found to be of the slightest use in the cure of malarial fever, and when given to reduce temperature or as an anodyne it seemed to interfere with the action of quinine for some days after.

BRITISH PHARMACEUTICAL CONFERENCE.

By the courtesy of the Senior Honorary General Secretary we are enabled to publish the following preliminary list of papers that have been promised for the meeting of the Conference in Cardiff on the 17th to the 20th August:—

Report of the Unofficial Formulary Committee. By the PRESIDENT.

Report on Ipecacuanha, Part 1. General Proximate Analysis. By R. A. CRIPPS and A. WHITBY.

Note on the Estimation of Volatile Oil of Copaiba. By R. A. CRIPPS.

On the B. P. Medicated Lozenges. By FREDERICK DAVIS, B.Sc.

Indian Gums for Pharmacy Work. By Dr. S. RIDEAL, F.I.C., F.C.S.

Suggestions for the Assay of Preparations of Aconite. By A. H. ALLEN, F.I.C., F.C.S.

The Present and Future Water Supply of Cardiff. By THOMAS HUGHES, F.I.C., F.C.S.

Note on a Proposed Method of Standardizing the Extracts of Nux Vomica and Opium. By M. CONROY, F.C.S.

Note on the Constituents of Henbane Seeds. By F RANSOM, F.C.S.

Glacial Phosphoric Acid. By J. HODGKIN, F.I.C., F.C.S.

Note on Dispensing Liquor Strychninæ. By T. SHEPHEARD.

Note on Extractum Euonymi Siccum. By M. CONROY, F.C.S.

Liquid Persian Galbanum. By E. M. HOLMES, F.L.S.

The Opium used in Medicine. By E. M. HOLMES, F.L.S.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, August 5, 1891.

Present—

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Messrs. Allen, Atkins, Cross, Gostling, Hampson, Leigh, Martindale, Newsholme, Schacht, Southall, Warren, and Watt.

The minutes of the previous meeting were read and confirmed.

Diplomas.

The undermentioned, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Ames, John Charles.
Atkinson, Joseph Andrew.
Bates, Josiah Herbert.
Baugh, John Wm. Mahanoora.
Clarke, William Herbert.
Cowley, Robert Charles.
Drabble, Thomas Lambe.
Elliott, Edward Matthews.
Garner, William Luscombe.
Garnett, Henry.
George, David.
Harrison, Edward Frank.
Hart, John Henry.
Hendry, Alexander John Garner.
Hoile, William Bonny.
Holford, Samuel Skinner.
Lee, Ernest Harry.
Mason, Joseph Edwin.
Neville, Egbert.
Perrett, Frederick James.
Plowright, John.
Reynolds, William Colebrook.
Riches, Frank Fraser.
Shakespear, William.
Swan, William.
Taylor, Thomas Morley.
Tocher, Robert.

Elections.

MEMBERS.

The following, having passed the Major examination, and tendered their subscriptions for the current year, were elected "Members" of the Society.

Ames, John Charles .....Bath.
Atkinson, Joseph Andrew.....London.
Bates, Josiah Herbert .....Manchester.
Clarke, William Edward .....Foxholes.
Cowley, Robert Charles.....St. John's, I. of M.
Drabble, Thomas Lambe .....Long Bennington.
Elliott, Edward Matthews ...Walsall.
Garner, William Luscombe .. London.
Garnett, Henry .....Evesham.
Harrison, Edward Frank .....Thornton Heath.
Hart, John Henry .. ..Newport, Mon.
Hoile, William Bonny .....Sandgate.
Lee, Ernest Harry .....London.
Liversidge, Joe Sykes .....Edinburgh.
Mason, Joseph Edwin .....Bexley.
Neville, Egbert ....Wootton Bassett.
Plowright, John .....Pinchbeck.
Reynolds, William Colebrook..Harrogate.
Riches, Frank Fraser.....Paignton.
Taylor, Thomas Morley.....London.

ASSOCIATES IN BUSINESS.

The following, having passed the Minor examination, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Bowker, William.....Radcliffe.
Hudson, Thomas Herbert .....Liverpool.
Mason, Robert ....Johnstone.
Shadwick, Joseph .....Wigton.

ASSOCIATES.

The following, having passed the Minor examination, and tendered (or paid as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Aitcheson, William Drysdale...Berwick.
Ames, William Ralph.....Bath.
Baxendale, George.....Congleton.
Beale, Frederic Owen .....Leicester.
Beale, Horace Sharman.....Cambridge.
Belcher, Standley .....Birmingham.
Bell, James .....Langholm.
Bell, William Arthur.....Uttoxeter.
Benton, William .....Loughborough.
Bindloss, Herbert Meynell ...London.
Bowden, William .....London.
Bray, George Robert .....Launceston.
Bullivant, Walter .....Boston.
Carlton, Herbert.....Horncastle
Carter, Thos. Jos. Walmsley...Fulwood.
Casewell, Richard Hazeldine..Ludlow.
Caunt, John William .....Derby.
Cole, William Henry .....Bristol.
Conroy, Arthur John .....Newport.
Copp, William Risdon .....Southampton.
Cox, Edmund George.....Sheffield.
Crawley, William Pashler.....Oundle.
Crisp, Wallace William .....King's Lynn.
David, Archibald Sinclair.....St. Clears.
Davies, Roger Edward .....Corwen.
Doble, Arthur Glendower .....Tavistock.
Donington, Robert Spencer ...London.
Evans, David Llewelyn .....Llandyssul.
Evans, David William .....Llansadwrn.
Flowerdew, Frederick Philip...London.
Franks, Frank Richard .....London.
Frost, John Arthur..... .....Derby.
Gadd, Henry Wippell.....Exeter.
Geary, Samuel.....Leicester.
Gilbart, Sidney Frederic .....London.
Goldthorpe, Arthur.....Doncaster.
Green, Joseph William .....Nunhead.
Hankinson, William .....Stockport.
Hedges, William Ross, jun. ...Leicester.
Hetherington, John .....Moffat.
Holmes, Willmot ..... .Liverpool.
Hopkinson, Walter John .....Leicester.
Hornsby, James William .....Darlington.
Hughes, Henry John .....Reading.
Hughes, John .....Birmingham.
Islip, Frank .....Dartford.
James, David Isaac .....Cardigan.
Jefferson, John .....Carlisle.
Johnson, Frederick.....Chatham.
Kay, William .....Cumnock.
Keys, Sydney Hudson .....Boston.
King, Edgar James .....Wootton Bassett.
King, William Bealby ..... Gainsborough.
Lawrenson, George .....Manchester.
Lee, Charles Henry .....Melton Mowbray.
Macdougal, David Grierson ...Kilmarnock.
Maclean, James ... .Jedburgh.
Mathewson, David.....Arbroath.
Michell, Saml. Clase Fredk....St. Austell.
Miles, William Henry .....Portishead.
Mousley, William Joyce .....Redditch.
Nicholson, Gilbert .....Tunbridge Wells.
Osborn, James Ernest .....Middlesborough.

Parkin, Frederic Brooks .....Ripon.
Peck, Thomas Whitmore .....Birmingham.
Powell, Frederick William ...Margate.
Pursey, George Foreman .....London.
Rae, Alexander David .....Aberdeen.
Randall, Bruford Henry .....Wareham.
Reilly, Alfred ....Bracknell.
Reith, Alexander .....Aberdeen.
Roadnight, Joseph Rees .....Norwood.
Scowby, Joseph Newsome ...Sheffield.
Sharman, Herbert Broughton..London.
Smith, Alfred.....Forest Hill.
Smith, Edwd. Chas. Henson...Hull.
Smith, Percy Dolph .....Brighton.
Smith, Sidney Frederick .....Strood.
Stevens, William Goyne .....London.
Stirling, John .....Biggar.
Stratford, Horace Oliver .....Margate.
Sykes, Frederick John .....Halifax.
Tayler, Ernest Walker ..... .Tewkesbury.
Thomas, James .....Whitland.
Toyne, Charles Robert .....Hull.
Troupe, George Robert .....Middlesborough.
Tupman, Herbert Wyke .....Teignmouth.
Watson, John Robert.....Newport, Mon.
Wilson, Luther ....Keighley.
York, Frank.....Richmond.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination, and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Anderson, James.....Dundee.
Burnett, John .....Pickering.
Eunson, James Henry .....Sunderland.
Nicklinson, Thomas Arthur ...Cromford.
Oates, Cleophas Henry .....Bedworth.
Silver, Sydney Ward .....Long Melford.
Simpson, Robert .....Aberdeen.
Wilkinson, Henry Albert .....Bulwell.

RESTORATIONS TO THE REGISTER.

The names of the following persons, who have severally made the required declarations and paid a fine of one guinea, were restored to the Register of Chemists and Druggists:—

Frederick Banks, 356, Walworth Road, London, S.E.
Henry Franklin, Needham Market, Suffolk.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and fine.

THE LATE MR. JOHN BARNARD.

The PRESIDENT said he had to announce with a feeling of regret, which he was sure would be shared by everyone, that Mr. John Barnard, who for many years was an officer of the Society, had died only that morning. He was one of those quiet, unobtrusive men, whose work was hardly ever appreciated as it should be. He had known Mr. Barnard intimately from the time when he himself commenced his studies in that building. Mr. Barnard was probably the most intimate friend and associate of Jacob Bell, and for a long time assisted him in the production of the *Pharmaceutical Journal*. When Jacob Bell generously handed over the copyright of the Journal to the Society, to be carried on under the control of the Council, John Barnard, in association with Professors Redwood and Bentley, had the conduct of it, Mr. Barnard being the sub-editor, and having to conduct the business part, the correspondence, and all matters connected with elegant pharmacy and trade matters. Whatever might be thought of the general merits of the Journal in those days, everyone would admit that the zeal, discretion, and consideration for the feelings of his correspondents which Mr. Barnard exhibited left nothing to be desired. After the death of Jacob Bell, Mr. Barnard continued with the firm of John Bell and Co., in Oxford Street, and was as closely associated with Mr. Thomas Hyde Hills, their former President, as he had been with Jacob Bell. He believed Mr. Barnard was an Associate of the Pharmaceutical Society at its foundation, and very early became a member. When it was decided to publish the Journal weekly it was impossible for Mr. Barnard to give the requisite time to it, and since then he had devoted his energies to carrying out the duties, public, private and benevolent, which Mr. Hills assumed in succession to Jacob Bell. To every assistant who went into that house he became a firm friend and paternal adviser, and to all those who had resided with him he was quite certain this news would cause a deep feeling of regret. He was sure the Council would authorize him to send a letter of sympathy and condolence to Mr. Barnard's family.

This suggestion was unanimously accepted.

REPORT OF THE FINANCE COMMITTEE.

The report of this Committee was of the usual character, except that the payments of many items were authorized for two months.

The PRESIDENT (as Chairman of the Committee), in moving the adoption of the report and recommendations, said the principal receipts during the month had been from examination fees, the amount of which was unusually large. On the Benevolent Fund account the receipts had been almost entirely from investments. In accordance with the authority given last month, £600 2¾ per cent. stock had been purchased, leaving £10 16*s.* 0*d.* as a nucleus for other benevolent gentlemen to add to. With regard to the payments there was nothing special to call attention to; they included the lawyer's bill, and one from Messrs. Parkinson for the structural alterations, etc., in the old building, the account having been passed by the House Committee.

Mr. ATKINS asked if it were not the case that the July examinations showed the heaviest entry ever recorded.

The PRESIDENT said he thought it was so, but was not quite sure. There was a very heavy list some years ago, when the existing regulations came into force, but he did not think it reached the last month's number.

The report and recommendations were carried unanimously.

REPORT OF THE BENEVOLENT FUND COMMITTEE.

The report of this Committee included a recommendation of the following grant:—

£5 to the widow (age 55) of an annuitant who was herself an unsuccessful candidate at the last election. (Norfolk).

Two other applications had been deferred for further inquiries.

Mr. HAMPSON (as Chairman of the Committee), in moving the adoption of the report, remarked on the very small number of applications for relief, which he should be glad to think was a sign of better times, but feared it was only a coincidence.

The report was unanimously accepted.

REPORT OF THE LIBRARY, MUSEUM, LABORATORY AND HOUSE COMMITTEE.

Library.

The report of the Librarian had been received, including the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
June	Day . .	537	36	11	21
	Evening .	189	15	3	9

Circulation of books.	Total.	Town.	Country.	Carriage paid.
June . . .	214	119	95	£0 19*s.* 1½*d.*

The undermentioned donations had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

For the Library in London—

Dymock, Warden and Hooper, Pharmacographia Indica, part 4, 1891. From the AUTHORS.

Deutscher Apotheker-Verein, Arzneimittel im Deutschen Arzneibuch nicht enthalten, 1891. From the VEREIN.

Fragner (K.), Ein neues Alkaloïd, Imperialin, 1888.

— Amaryllin and Belamarin, zwei neue Alkaloïde, 1891. From the AUTHOR.

Gerrard (A.W.), New Official Remedies, B.P. 1890. 2 *copies.* From the AUTHOR.

Gille (N.), Falsifications et autres défectuosités des principaux médicaments simples, 2me éd., 1891. From the AUTHOR.

Glasgow University Calendar, 1891. From the UNIVERSITY.

U. S. Department of Agriculture, Division of Chemistry, Bulletin, Nos. 12, 14, 15, 25, 29, 30. From the DEPARTMENT.

The Committee recommended the purchase of the undermentioned works:—

For the Library in London—

Piesse, Art of Perfumery, 5th ed., 1891. 2 copies.

Richardson (B. W.), The Asclepiad.

Barrough (P.), The Method of Physick, with the forme and rule of making remedies and medicines, 1624.

Poggendorff's Annalen der Physik und Chemie.

The Committee also reported that it had ordered that the Society's Libraries and Museums in London and Edinburgh be closed in the evening during August and September. Also that the Library and Museum in London be closed entirely from August 29 to September 12 inclusive, and the Library and Museum in Edinburgh from August 17 to September 1 inclusive.

Museum.

The Curator's report had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
June	Morning	631	45	3	20
	Evening	153	17	1	5

The following donations had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Specimens of the fruits of *Albizzia rufa*, *Sapindus emarginatus*, *Anethum Sowa*, and Chaulmugra seeds. From Messrs. GONNE, CROFT and Co.

To the Herbarium—

Specimen of the leaf of *Ferula Persica.* From the Apothecaries Garden, Chelsea.

Specimen of *Pyrethrum cinerariæfolium.* From the DIRECTOR, Royal Gardens, Kew.

The Committee recommended that the Librarian be authorized to attend the annual meeting of the Library Association in September.

The Staff of the Society's School had attended and reported on the various classes.

It was recommended that specimens of certain alkaloids and other organic compounds be provided for the use of the lecturers, also that the list of donations to the Library and Museum be published in the Journal of the week in which the Library Committee meeting is held.

The PRESIDENT, in moving the adoption of the report and recommendations, explained the object of publishing the list of donations more promptly, and stated that it was proposed to place benches in the practical pharmacy lecture room, under the octagon laboratory.

The resolution was at once carried.

THE SESSIONAL ADDRESS.

The PRESIDENT announced that Mr. Gainsford Bruce, Q.C., M.P. for the Holborn Division of Finsbury, had kindly consented to deliver the address to the students in October next.

BELL AND REDWOOD SCHOLARSHIPS COMMITTEE.

The examiners appointed to conduct the examination for the Jacob Bell Memorial and Redwood Scholarships for the ensuing session reported that twenty-two candidates had presented themselves at the following centres:—Birmingham 1, Bristol 1, Canterbury 2, Darlington 1, Edinburgh 1, Exeter 1, Liverpool 3, London 5, Manchester 3, Nottingham 1, Oxford 1, Peterborough 1, Southampton 1. The envelopes bearing the mottoes of the successful candidates had been opened by the Committee and found to contain the following names:—

Hooper Albert Dickinson Jowett...Liverpool.
Eustace Harold Gane.....London.
William Foskett Edward Horrell...Crediton.

The Committee had therefore awarded the *Jacob Bell Memorial Scholarships* to:—

Hooper Albert Dickinson Jowett
and
Eustace Harold Gane,

and the *Redwood Scholarship* to

William Foskett Edward Horrell.

The PRESIDENT explained that in this competition the same questions were put, the two highest on the list being awarded the Bell Scholarships and the third one getting the Redwood Scholarship, which was not so valuable. In order to obtain a Bell Scholarship the candidate must obtain two-thirds of the standard number of marks, or three-fifths of the standard for a Redwood Scholarship. The third candidate, Mr. J. H. Shepherd, being unable to accept the Redwood scholarship, the Committee had recommended its award to the competitor whose name stood next on the list.

The award of the Committee was unanimously confirmed.

THE BRITISH PHARMACEUTICAL CONFERENCE.

Mr. MARTINDALE, as President of the Conference, having expressed the hope that a goodly number of members would be able to attend the meeting in Cardiff, the following were apppointed delegates:—

The President, Vice-President, Messrs. Abraham, Atkins, Cross, Evans, Leigh, Hills, Schacht, Southall. The Editor, Sub-Editor, and Secretary were also requested to attend the Conference.

REPORT OF THE GENERAL PURPOSES COMMITTEE.

The report of this Committee included the following reports on the

PRIZE EXAMINATIONS.

Practical Chemistry.

Professor Attfield had reported that 62 pupils had been at work during the session, of whom sixteen had competed for the silver medal given at the conclusion of the session.

Chemistry.

Professor Dunstan had reported that five candidates entered for the sessional examination, who all did well, no one gaining less than 70 per cent. of the total marks, whilst the best gained 90 per cent.

Botany.

Professor Green had reported that there were six competitors in this subject, and that the work done had been excellent.

Materia Medica.

Mr. Henry G. Greenish had reported that there were five candidates; but one failed to appear at the written examination.

Pharmacy.

Mr. Jos. Ince had presented a report on this class, which stated that owing to the known superiority of certain students there had been only a limited competition; the marks obtained by the first three were 99, 98 and 96 per cent. respectively.

Herbarium.

Professor Green had reported three competitors for this prize, and he was able to speak in high terms of the work of each of them.

Council Examination Prizes.

Mr. Thos. Maben and Dr. Inglis Clark, who had been appointed by the Council to conduct this examination, had reported that eleven candidates had competed for these prizes.

Acting on the above reports, the Committee recommended that the following awards be made:—

Practical Chemistry.

Silver Medal.....Henry Garnett.

Certificates of Honour...{William Bonny Hoile. Frank Fraser Riches. Ernest Harry Lee.

Chemistry.

Silver Medal.....Henry Garnett.

Certificates of Honour...{Edward Frank Harrison. William Bonny Hoile. Ernest Harry Lee.

Botany.

Silver Medal.....Henry Garnett.

Certificates of Honour...{Frank Fraser Riches. Edward Frank Harrison. Ernest Harry Lee.

Materia Medica.

Silver Medal.....Edward Frank Harrison.

Pharmacy.

Silver Medal.....William Bonny Hoile.

Herbarium Prize.

Silver Medal.....Henry William Clear.

Certificates of Honour...{Charles Edmund Ashby. James Dunning.

Council Examination Prizes.

Pereira Medal (Silver); and Books value £5, presented by Mr. T. H. Hills.

Henry Garnett.

Pharmaceutical Society's Medal (Silver); and Books value £3, presented by Mr. T. H. Hills.

William Bonny Hoile.

Pharmaceutical Society's Medal (Bronze); and Books value £2, presented by Mr. T. H. Hills.

Edward Frank Harrison.

This portion of the report was first dealt with, and confirmed unanimously by the Council.

The Council then went into Committee as usual to consider the legal portion of the report of the Committee. This included a letter from the Solicitor, giving particulars of payments made by defendants who had consented to judgment, or had had orders made against them. In one case a penalty had been paid for the sale of a "weed killer."

Several communications had been received relating to alleged infringement of the Pharmacy Act, and in most cases proceedings were recommended to be taken.

On resuming, this portion of the report was unanimously adopted.

MANCHESTER PHARMACEUTICAL ASSOCIATION SCHOLARSHIP.

The General Purposes Committee had drawn up the following regulations for this scholarship.

Regulations for the Manchester Pharmaceutical Association Scholarship.

One scholarship is offered annually, and is presented at the commencement of the Session of the Pharmaceutical Society's School in October. The Scholar shall for that session be a pupil in the Society's School, or in case he may elect, he shall be a pupil in any Provincial School of Pharmacy approved by the Council of the Society.

The Scholarship is of the value of about £30 (the income arising from a sum of £750), which is to be expended for instruction in the Society's School, or in the Provincial School selected by the scholar and approved by the Council of the Society.

The subjects of examination are the same as for the Jacob Bell Memorial Scholarships and the Redwood Scholarship. The examinations are held at the same time and centres, and the award made in the same manner, and by the same persons as in the case of the Bell Scholarships and the Redwood Scholarship. Candidates desiring to compete must send notice to the Secretary on or before the first day of June, accompanied by certificates of age, and testimonials from their employers or masters, as to capability, industry, and general conduct.

Candidates must be subscribing apprentices or students of the Society, of not less than nineteen or more than twenty-one years of age on the day on which the examination is held, and they must have passed not less, or been engaged for not less, than three years in the pharmacy of a registered pharmaceutical chemist or chemist and druggist in Lancashire, Cheshire, or the High Peak Parliamentary Division of Derbyshire.

No person to whom a Bell or a Redwood Scholarship has been awarded is permitted to compete for the Manchester Pharmaceutical Association Scholarship, and no person to whom a Manchester Pharmaceutical Association Scholarship has been awarded is permitted to compete for a Bell or a Redwood Scholarship.

The PRESIDENT said he had the pleasure of announcing some months ago that a gentleman in the north who took great interest in pharmacy, and who was present at a meeting which he had had the honour to address, had intimated his desire to found this scholarship. Having given certain bonds, and the legal formalities having been gone through, it was necessary to draw up the regulations for the examination, which would take place at the end of the next session. The competition was limited to a certain area, and he hoped the young men who were within it would show their appreciation of the donor's generosity by coming forward in large numbers.

The regulations were unanimously adopted.

VOTES OF THANKS.

Votes of thanks were passed to Professor Green for his report on the Herbarium Competition, to Mr. Maben and Dr. Inglis Clark for conducting the Council

Prizes Examination, and to Messrs Holmes and Tanner for the Jacob Bell and Redwood Scholarships Examination.

International Congress.

The PRESIDENT said he had received a letter from M. Limousin, writing on behalf of the Society of French Pharmaciens, asking the opinion of the Council as to the desirability of holding an International Pharmaceutical Congress in 1893, and if the idea were approved, which capital should be selected. He (the President) understood that there was an idea of holding an International Pharmaceutical Congress in Chicago at the time of the Chicago Exhibition, and he would suggest that this letter be referred to the Library Committee for consideration and report.

This was acceded to.

The Next Meeting of the Council.

The PRESIDENT reminded the Council that its next actual meeting would be held in October. The summonses would, in accordance with the Bye-Laws, be issued for a meeting next month, but it was understood that a quorum would not be formed.

Pharmaceutical Society of Tasmania.

The PRESIDENT said he had received a letter from Mr. Miller, President of the Pharmaceutical Society of Tasmania, thanking the Council for the invitation to attend the Jubilee meeting, and expressing his regret at not being able to be present at so important a celebration, and his hope to visit England before long, when he might be able to attend some meetings of the Society, and possibly read some notes on pharmacy in Tasmania. A letter had also been addressed to the Secretary by Mr. Gould, Secretary of the Tasmanian Society, in which he stated that an address on the Society's Jubilee had been forwarded by the same mail, and apologized for its being rather behind time. The President said the address would be printed in the Journal, and he had only to add that it was a great pleasure to receive this address from, he believed, the youngest pharmaceutical society, and to hold out the right hand of fellowship to their brethren across the sea.

Report of Examinations.—*July*, 1891.

ENGLAND AND WALES.

	Candidates.		
	Examined.	Passed.	Failed.
Major (9th)	8	3	5
„ (10th)	8	4	4
„ (14th)	8	5	3
„ (15th)	8	5	3
„ (21st)	8	3	5
„ (22nd)	8	4	4
	— 48	— 24	— 24
Minor (9th)	24	8	16
„ (10th)	21	7	14
„ (14th)	22	8	14
„ (15th)	24	9	15
„ (16th)	31	11	20
„ (17th)	30	8	22
„ (21st)	25	12	13
„ (22nd)	24	9	15
„ (23rd)	29	9	20
„ (24th)	29	12	17
„ (28th)	29	7	22
„ (29th)	30	18	12
„ (30th)	30	11	19
	—348	—129	—219
	396	153	243

SCOTLAND.

	Candidates.		
	Examined.	Passed.	Failed.
Major (16th)	3	3	0
Minor (9th)	14	6	8
„ (10th)	14	5	9
„ (16th)	13	9	4
„ (17th)	15	8	7
„ (21st)	15	11	4
„ (22nd)	15	11	4
„ (23rd)	14	10	4
„ (24th)	15	10	5
„ (27th)	12	5	7
„ (28th)	14	6	8
„ (29th)	14	6	8
„ (30th)	15	10	5
	—170	—97	—73
	173	100	73

Preliminary Examination.

14*th.*—Candidates examined, 396. Passed, 190. Failed, 206.

29*th.*—Eighteen certificates by approved examining bodies were received in lieu of the Society's examination.

EXAMINATIONS IN EDINBURGH.

July 9, 10, 16, 17, 21, 22, 23, 24, 27, 28, 29 and 30, 1891.

The Vice-President (Mr. Bottle) was present on the 27th, 28th and 29th.

Present on each day—Messrs. Clark, Dott, Gibson, Gilmour, Kinninmont, Maben, Nesbit and Stephenson.

Professor Sir Douglas Maclagan was present on the 16th, on behalf of the Privy Council.

MAJOR EXAMINATION.

16*th.*—*Three* candidates were examined, and were declared qualified to be registered as Pharmaceutical Chemists:—

Hendry, Alexr. John Garner...Turriff.
Swan, William.....Dundee.
Tocher, Robert .....Peterhead.

MINOR EXAMINATION.

9*th.*—*Fourteen* candidates were examined. *Eight* failed. The undermentioned *six* passed, and were declared qualified to be registered as Chemists and Druggists:—

Aitcheson, William Drysdale...Berwick.
Allan, David .....Gorebridge.
Bell, James .....Langholm.
Bell, William Edward .....Bootle.
Bonthron, William .....Anstruther.
Burnett, Thomas.....Lytham.

10*th.*—*Fourteen* candidates were examined. *Nine* failed. The undermentioned *five* passed, and were declared qualified to be registered as Chemists and Druggists:—

Carnegie, Robert.....Peterhead.
Chalmers, James.....Broughty Ferry.
Chree, John Strachan.....Aberdeen.
Croll, David Watson .....Paisley.
Dalton, Thomas Duncan .....Newcastle-on-Tyne.

16*th.*—*Thirteen* candidates were examined. *Four* failed. The undermentioned *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Dempsey, Arthur Kerr .....Edinburgh.
Dickie, Thomas Cooper.....Glasgow.
Duffus, William .....Aberdeen.
Dunbar, John .....Broughty Ferry.
Edward, William Lee.....Edinburgh.
Ellis, John .....Glasgow.

Ellisson, James Bradley .....Hoyland Common.
Emery, Robert Gordon .....Burslem.
Emmons, Charles .....Kidsgrove.

17*th.*—*Fifteen* candidates were examined. *Seven* failed. The undermentioned *eight* passed, and were declared qualified to be registered as Chemists and Druggists:—

Ford, Thomas Mills.....Romsey.
Gee, Thomas Henry .....Macclesfield.
George, Wm. Albert Watkin...Hirwain.
Godwin, William.....Liverpool.
Gratte, Alfred .....Newport, Mon.
Gray, Adam ....Edinburgh.
Grier, James.....Peebles.
Griffiths, Charles Henry .....Manchester.

21*st.*—*Fifteen* candidates were examined. *Four* failed. The undermentioned *eleven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Griffiths, Edward .....Bodedern.
Hargreaves, Bernard ....Preston.
Hetherington, John .....Moffat.
Hill, Blair.....Edinburgh.
Hodgkin, John..... .....Lancaster.
Hodgson, John Duncanson ...Sunderland.
Hollingworth, John Lawrence..Barnsley.
Houston, Frederick John .....Chesterfield.
Hume, John Gordon .....Gatehouse.
Irving, James .....Glasgow.
Jamieson, George Henderson...East Linton.

22*nd.*—*Fifteen* candidates were examined. *Four* failed. The undermentioned *eleven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Johnston, John .....Forfar.
Jones, Ernest Harry .....Manchester.
Kay, William ....Cumnock.
Kemp, William .....Belfast.
Kenah, William Thomas .....Liverpool.
Knight, Peter .....Aberdeen.
Leitch, David .....Greenlaw.
Littlefair, Thomas..... Shap.
Lister, David .....Edinburgh.
Longstaff, William Edwin ...Silloth.
Oliver, Arthur .....Glossop.

23*rd.*—*Fourteen* candidates were examined. *Four* failed. The undermentioned *ten* passed, and were declared qualified to be registered as Chemists and Druggists:—

McDougal, David Grierson ...Kilmarnock.
Main, John .....Laurencekirk.
Masterton, Archibald.....Dunfermline.
Mathewson, David ..... Arbroath.
Maude, George Whiteley .....Bradford.
Miller, Alexander .....Glasgow.
Moon, William James .....Ilfracombe.
Moran, William John Grace ...Glossop.
Morris, Edward Joseph .....Sutton Coldfield.
Mowat, Edward .....Edinburgh.

24*th.*—*Fifteen* candidates were examined. *Five* failed. The undermentioned *ten* passed, and were declared qualified to be registered as Chemists and Druggists:—

Neilson, Richard.....Glasgow.
Nicoll, Robert .....Broughty Ferry.
Ogilvie, James Hay ... .Aberdeen.
Owen, David ....Amlwch.
Parkinson, Robert Holroyd ...Blackburn.
Prichard, Thomas Henry .....Porth.
Priestman, Abraham .....Barrow-in-Furness.
Rankin, George .....Edinburgh.
Robertson, James .....Leith.
Robson, Thomas .....Hartlepool.

27*th.*—*Twelve* candidates were examined. *Seven* failed. The undermentioned *five* passed, and were declared qualified to be registered as Chemists and Druggists:—

Scott, Malcolm .....Edinburgh.
Scruton, Frederick William ...Sheffield.
Seatter, William .....Edinburgh.
Sim, William .....Paisley.
Sturrock, Robert.....Aberdeen.

28*th.*—*Fourteen* candidates were examined. *Eight* failed. The undermentioned *six* passed, and were declared qualified to be registered as Chemists and Druggists:—

Spence, James.....Garmouth.
Stirling, John .....Biggar.
Sutherland, Alexander George.Dundee.
Thomas, William Andrew.....Southport.
Thomson, William .....Glasgow.
Toplis, James Harry .....Chesterfield.

29*th.*—*Fourteen* candidates were examined. *Eight* failed. The undermentioned *six* passed, and were declared qualified to be registered as Chemists and Druggists:—

Walker, William.....Aberdeen.
Watkinson, Harold Arthur ...Farnworth.
Watson, William.....Aberdeen.
White, Nathaniel Stanley.....Liverpool.
Wilkie, Herbert Farnington...Duns.
Wilson, George .....Coldstream.

30*th.*—*Fifteen* candidates were examined. *Five* failed. The undermentioned *ten* passed, and were declared qualified to be registered as Chemists and Druggists:—

Brooks, Joseph .....Manchester.
Eatough, Joseph Stanley .....Blackburn.
Grieve, William .....Crieff.
Jones, Hugh.....Milnsbridge.
Simon, John.....Forgue.
Sinclair, Robert Hodge .....Dunfermline.
Wright, George Burkitt.....Doncaster.
Wyllie, Harry Boak .....Kinghorn.
Yeats, William .....Aberdeen.
Young, Frank Davidson .....Dundee.

COUNCIL PRIZES EXAMINATION, 1891.

The following are the questions set at this examination:—

BOTANY AND MATERIA MEDICA.

Time—10 *a.m. to* 1 *p.m.*

Botany.

1. Describe fully the changes that take place in the seed during germination. What are the physical phenomena noticed? What is known regarding the influence of light, heat, etc., and chemical agents in hastening or retarding the process?

2. Give instances of leaves which have the power of motion, and explain as far as possible the mechanism by which they move.

3. Compare the flower of an orchid with that of a nettle, and name the natural orders in which they would be placed under the Linnean system.

4. Refer the following plants to their natural order and sub-order, giving your reasons in each case:—Ash, birch, poplar, willow, hawthorn, elder, yew, snapdragon, periwinkle.

Materia Medica.

1. Discuss the composition of podophylli resina.

2. Give the rationale of the official process for the preparation of veratrina.

3. Give the characters and composition of myrrh. With what may it be adulterated, and how may the adulterations be detected?

4. Describe minutely the preparation of volatile oil

of bitter almonds, explaining the changes that occur. What is the composition of the product? What may be present as admixtures, and how would they be detected?

CHEMISTRY.

Time—2 *to* 5 *p.m.*

[The working of the answers to be shown.]

1. Give an account of the spectroscope in relation to chemical investigation and discovery. Explain how you would use the instrument.

2. What is Graham's law of Diffusion of Gases? Give an example. What relation has this law to the Kinetic Theory?

3. How would you prepare synthetically, from their elements, Marsh gas and Acetylene? Give the weight and the volume of the products formed from the combustion of one litre of each of the gases.

4. How would you estimate the quantity of grape sugar and urea in urine?

5. A solution contains chlorides, bromides and iodides. How would you separate these from each other?

6. How many grain measures of $\frac{N}{10}$ silver nitrate solution would be used in estimating the chlorine in five ounces of water containing two grains sodium chloride in the gallon?

Reviews.

KEMP AND CO.'S PRESCRIBERS' PHARMACOPŒIA. A Synopsis of the more Recent Remedies, Official and Unofficial, with a Therapeutic Index and a Résumé of the B.P. Additions, 1890.*

Comprehensive as this title may appear for so tiny a volume, it cannot be said to be in excess of the contents, for some of the medicines mentioned can hardly be included among the "more recent remedies," nor do they occur in the B.P. additions. The compiler of the book is unidentified on the title-page, beyond the statement that he is a member of the Pharmaceutical Society of Great Britain, but he has evidently a very creditable acquaintance with current medical and pharmaceutical literature, especially in view of the fact that his residence is in Bombay, and of this he makes good use. In outward appearance and size this 'Prescribers' Pharmacopœia' shows a close general resemblance to the 'Extra Pharmacopœia' of Martindale and Westcott, nor are the points of resemblance confined to the outside. But then it has been said that "imitation is the sincerest form of flattery." In this book, however, the "pharmaceutical details found in other works of this class have as far as practicable been omitted, the book being intended mainly as a guide for prescribing," while much of the information that is given as to solubilities has been revised and adapted to the requirements of a tropical climate. It is also claimed that a feature of the book is the introduction of the Indian drugs in more common use, together with suggestions for the adoption of Indian substitutes for some of the European and American remedies. The information given respecting the numerous chemical compounds that have recently been introduced into medicine is inclusive, and such as will be of great service to the prescriber who wishes to acquaint himself with the claims made on their behalf. It is interesting in this respect to learn that the remedies of this class that so far appear to have met with most favour in India are aristol, orexin, phenacetin, exalgine, chloralamide and sulphonal, some of these being already largely prescribed. In an appendix there are concise chapters on "Pills," "Urinary Testing," "General Testing," "Hypodermic Medication," etc., and a "Therapeutic Index" is followed by a full "General Index."

* Bombay: Kemp and Co. 1891. 24 mo. Pp. i-xii., 1-428.

THE PHARMACOPŒIAS OF TWENTY-NINE OF THE LONDON HOSPITALS. By PETER SQUIRE. Sixth Edition. Revised by PETER WYATT SQUIRE and ALFRED HERBERT SQUIRE.*

This little work is so well-known and justly esteemed that little more than the announcement of the issue of a new edition brought up to date is needed to ensure it a welcome. Since the publication of the last edition, six years ago, fourteen out of the twenty-five pharmacopœias therein collated have undergone revision, namely, those for the two Chest and the Consumption Hospitals, Great Northern, King's College, London, Ophthalmic, Middlesex, Samaritan, St. Bartholomew's, St. George's, St. Mary's, St. Thomas's, Westminster and Westminster Ophthalmic. The alterations have been incorporated with the present volume, and the pharmacopœias of four other hospitals—Central Throat, Lock, and the Victoria and East London for Children—have been introduced. The new formulæ occupy upwards of sixty pages.

PIESSE'S ART OF PERFUMERY. Edited by C. PIESSE. Fifth Edition.†

The present edition of this well-known work is brought out by the firm of Piesse and Lubin, instead of that of Longmans and Co., as previously. It is now twelve years since the last edition appeared, and during that period great progress has been made in our knowledge of the constitution of the essential oils or "ottos" used in perfumery, and many artificial perfumes have been introduced into general use, so that a considerable addition of subject matter might have been expected; yet the number of pages in the fifth edition is fewer by seven than in the preceding one. This, however, appears to be due to the omission of a good deal of irrelevant matter, or of statements which had become obsolete.

The pharmacist would naturally look, in a book of this kind, for the most recent information concerning the essential oils, the so-called "concentrated" volatile oils and perfumed waters, and the artificial chemical bodies now used in perfumery, as well as for a description of the means of ascertaining the quality and purity of the volatile oils, etc., at present in the market. But, with the exception of a note on artificial musk, a brief allusion to heliotropine and a description of a method of making vanillin, which is by no means the most recent one, no mention is made of the important work of Wallach, Schimmel and others on the volatile oils, nor of the numerous chemical bodies, such as terpineol, etc., that are now largely used in perfumery. The antiquated statement that opopanax is produced by the *Opopanax Chironium*, of Sicily, is still allowed to remain unaltered, and the chemistry of the essential oils generally is by no means brought up to date.

The pharmacist who peruses the *Pharmaceutical Journal* will certainly learn nothing new from the fifth edition of 'Piesse's Perfumery,' except in the chapter on "Foreign tariffs on perfumery," which appears to have been entirely recast, but concerns the wholesale rather than the retail trade. The statement (p. 114) that "several species of the plant *Laurus Cinnamomum* yield the cinnamon and cassia of commerce" is scarcely precise enough for modern botanists. The progress that has been made in various countries in the cultivation of plants used in perfumery does not receive due recognition. The exten-

* London: J. and A. Churchill. 1891. Small 16 mo. Pp. i.-xvi., 1-332.

† London: Piesse and Lubin. 1891. Demy 8vo. Pp. i-xvi., 1-498.

sive cultivation of perfumery plants in the Seychelles Islands, the manufacture of cassie pomade, etc., in India from *Acacia Farnesiana*, and in Australia from *A. pycnantha*, the preparation of otto of rose in Germany, and of various volatile oils in the West Indies, are practically ignored. The disbelief in the possible use of eucalyptus oil in perfumery is sadly at variance with the large importations for use in perfuming soaps. The statement that it would pay growers to cultivate patchouly in any of our warm colonies, which has been backed up by the recommendation of the Kew authorities, has probably led to the opposite result, and indeed it is difficult to understand, in the light of Mr. Piesse's remark, that "the oil is the most powerful of any derived from the botanic kingdom," how the consumption could be increased tenfold if the otto were cheaper, for although at one time fashionable, it is, like that of santal wood, no longer so. On the other hand, Mr. Piesse's recommendations of costus root as an excellent tincture for use as a base for several perfumes, and of syringa pomade, do not seem to have met with the notice they merit.

The only really interesting additional article in the work is that on the manufacture of otto of rose, to which several pages are devoted, and even this might have been improved by extracts from Dr. Blondel's thesis on the perfume of the rose (*Pharm. Journ.*, [3], xxi., p. 3). Nevertheless, Piesse's 'Art of Perfumery' remains a most readable book, full of interest to the general reader. If, however, it is to command a sale amongst the large body of chemists and perfumers, the next edition must be brought up to date so far as the commercial sources, chemistry and botany of perfumes are concerned. A book that is ten years behind in its facts can only be useful to those who have not seen the previous edition.

Obituary.

Notice has been received of the death of the following:—

On the 15th of June, Mr. Thomas Brend, Chemist and Druggist, St. Helen's Road, Swansea. Aged 70 years.

On the 21st of July, Mr. Rees Evans, Chemist and Druggist, Llanbyther. Aged 24 years.

On the 21st of July, Mr. Christopher Newton, Chemist and Druggist, Saxmundham. Aged 63 years.

On the 2nd of August, Mr. John Esau Harris, Chemist and Druggist, Exmouth Street, London. Aged 65 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Stereochemistry.

Sir,—All students will be grateful for the masterly article on "Stereochemistry" which appeared in the Journal of July 18.

To those who, like myself, only arrive at the meaning of a German writer more or less painfully by the aid of a dictionary, it is a great boon to have the latest utterances of the men of science of that country presented in a lucid and compendious form; we shall hope for more favours of the kind from the same source.

The latter part of the paper, dealing with the views of Dr. Lagueur, recalls a danger which lurks in the very term "*stereo*chemistry," the risk, that is, of supposing that we have any information as to the actual shape in space of an atom. The fundamental facts which underlie van t'Hoff's theory point only to the direction of polar forces, and leave the form of the body, if any, from which they emanate altogether undetermined, and I need hardly remind those of your readers who take interest in the subject, that the vortex theory of matter would altogether exclude the ideas of simple geometrical shape, and of solidity in its usual sense from the conception of a chemical atom.

V. Meyer tells us, I think, that it was a prevision of such an error that led him to reject the tetrahedral models of van t'Hoff.

It is not true, therefore, that "the molecule occupies a space that must include or be expressed by at least four points," the same argument would reduce an ordinary bar-magnet to a geometrical line possessed of one dimension only.

Having used the magnet, after the example of V. Meyer, as an illustration, I would venture to point out that an illustration is apt to be mistaken for a complete analogy. I understand V. Meyer's answer to Baeyer, on the subject of "strain" in the polyacetylene compounds, to depend upon his "dipole" theory, which supposes an exact resemblance in all points between an "affinity" and a short magnet. Now it is true that a magnet shares with an "affinity," as at present conceived, the properties which we name respectively, attraction and repulsion; and we find that where the similar poles of two magnets repel each other that tendency disappears upon bringing into contact with each magnet the pole of another of the same strength but of different sign.

It by no means follows, however, that the repulsive force which causes, for instance, the four "affinities" of a carbon atom to arrange themselves at the greatest possible distance in space, and so to occupy the angles of an imaginary regular tetrahedron, will be altogether overcome by linkage to another carbon atom, so that three or more "bonds" may now lie parallel without strain. I take this to be the real nature of V. Meyer's theory, for that forces should unite and neutralize one another at an angle seems hardly conceivable.

The danger of illustrations and examples consists, as long ago pointed out by Kant,* in this, that the accidents of the object used in illustration cling about it, and are carried forward together with the essential idea into the conception of the thing illustrated, where they obstruct the clearness of the mental vision and misdirect the imagination in its search for truth.

Wyle Cop, Shrewsbury. Thos. P. Blunt.

The Preliminary Examination.

Sir,—In the letter of Mr. Campbell Stark on page 60 I am pleased to note much that we have in common. As to those points on which we may differ, if Mr. Stark will kindly indicate what he regards as my position I will, with your permission, communicate such elucidation of it as may seem necessary. If he will further point out what parts of my letter are obscure and which statements are astounding, I will endeavour to remove the obscurity and to justify the statements. He will do me the justice of believing that I do not intentionally seek either to mystify or to astonish, and he will see that compliance with what is asked is necessary to lucidity.

In the letter of another correspondent, on page 80, I have been able to discover two ideas. One is that the systematic teaching of dispensing is mere moonshine; the other, that "Cæsar" should be retained for the Preliminary.

The merits of "Cæsar" may be left to the deliberations of the committee we hope to see appointed in accordance

* "Critique of the Pure Reason," Meiklejohn's trans., second ed., p. 105.

with the suggestion in my second letter. Doubtless expressions of opinion from competent writers, like that under notice, will be helpful and get consideration.

With regard to the former idea, it is saddening that a gentleman who sets so great store by reflection should permit himself to speak disrespectfully of moonshine. When we are groping after more light and stumbling for want of it, it is more than pleasing to learn that the institution of a school for dispensing is mere moonshine. Moonshine is to be prayed for when the direct beams of the lord of light are denied us.

Editors and examiners, councillors and critics, all are agreed that dispensing is not adequately taught or learned during apprenticeship. Many of the best pharmacies will not tolerate apprentices; some, to their great credit, turn out finished pharmacists at the end of their term. But we must have regard to what is general, and the examinations point unmistakably to failure of the present system. If we note the signs of the times and inspire any breath of the spirit of the age we shall be led, as in almost every other craft, to the establishment of a Technical School for Dispensing, in which the art shall be taught systematically on a scientific basis. The Pharmaceutical Society, the Conference, the Formulary of the latter, the Pharmacopœia itself, what are they but organs for, and products of, systematized work? We do not now leave the potential Scheeles of country pharmacies to work out their own salvation in Chemistry and the other sciences. Systematized knowledge is brought to their doors, that the development of mental powers may be quickened, that the process of "education" may go on without waste of force, that a true working man in pharmacy may be produced.

I do not say we have blundered. We and our predecessors have done what seemed best and what was possible; but let not the work stop, let development still go on. If there be anything better than a School for Dispensing let us know what it is, and none shall trample on my suggestion more heartily than, yours faith fully,

Deptford. JOHN MOSS.

SALE OF MILK OF SULPHUR.

Sir,—Your article on the St. James' Vestry case for prosecution for sale of milk of sulphur is noteworthy, and points to an aspect of this already threadbare topic requiring attention, and that would close the question. Why do not chemists adopt distinctive titles for the two articles? It was not until the Knutsford case, some years since, that I commenced keeping the ordinary "milk of sulphur," having kept until then, from the first of my commencing business, over thirty years ago, what my old teacher, Dr. Pereira, would recognize, the sulph. præcip., free from lime, only. And in consequence I had from time to time sent away customers who would have the old style and more readily miscible article. Dr. Redwood's testimony in the Knutsford case had equal weight with me as that of his former colleague, for he also had been my instructor over forty years since at No. 17, Bloomsbury Square. From that time I have kept the "milk" of sulphur for those who wish to have it, and let them have it at a lower rate than the sulph. præcip. I use a label bearing the words "Pure Precipitated Sulphur" for the article without lime, which I continue to sell the more largely, and if chemists will just be at the small pains to use distinctive labels all risks of prosecution would be avoided. Were I prosecuted for selling milk of sulphur with lime I should just produce one of my packages bearing the above label and state had that article been asked for it would have been supplied; at the same time, in selling the other article I instruct my assistants to mention that it is not the precipitated sulphur of the Pharmacopœia that is recognized by medical men. If chemists do not draw the line in designation they muddle the magistrates. EDWARD BROWN.

159, *Woodhouse Lane, Leeds.*

UNQUALIFIED ASSISTANTS.

Sir,—I fully agree with "Pharmacy" that the qualified man should be considered before the unqualified. What is our Society for but to protect the qualified? I am afraid its efforts fall far short of its purposes.

It occurred to me forcibly when the Society was about to introduce the Pharmacy Acts Amendment Bill into Parliament what a farce it seemed. By that Bill the Society was endeavouring to stop the unqualified assistants of medical men from dispensing prescriptions. Of course the fact that there are shops owned by legally qualified chemists into which a qualified man never enters once in six months was not to be overlooked. If the unqualified chemist's assistant is allowed to dispense, why not the unqualified medical assistant?

I think if we ever intend to get an Amendment Bill through Parliament we must set our own house in order before we attempt to look after others. To attain this end I would suggest that the Society should commence a more vigorous protection of the qualified man, but at the same time I for one am inclined to help on the unqualified man, if possible.

We all know that there are many unqualified men who have been in business all their lives, and who would, if it were not for the Preliminary examination, be induced to go in for the qualifying examination. The Preliminary is their stumbling block. Why not remove it? Could not the Society arrange to accept a declaration from a chemist "that a man had been employed by him for ten or fifteen years, and that he was over thirty-five years of age," in lieu of passing the Preliminary examination. I believe that other societies accept some such declarations. Then why not the Pharmaceutical Society?

MODERATION.

TINCTURE OF MUSK.

Sir,—I am not clear under what class I should refer to the article on "Tincture of Musk," by M. Van der Voorst. The great diversity in the formulæ for this preparation is referred to. Time was when the therapeutic merits of musk stood high. This is not so now in our land. The much larger use of the article being in perfumery, the question then presents itself, on what constituents of the musk depend its chief value? and then are the constituents that make it of value in mediciue the same as those that do so in perfumery? Have these points been determined? The solvent that may take up the largest proportion of the weight of the musk may or may not be the solvent that will produce the best tincture for either class of use to which the musk may be applied. If the odoriferous and the medicinal qualities of the musk are alike and determined on, then let a uniform tincture be aimed at. If not so, let there be two tinctures, one possessing the chief medical and the other the chief merit for perfumery. Now that musk has reached so very high a cost, these are questions worth study, but we must not come to the conclusion that that menstruum that will take up the largest proportion of the musk is the best for use either in medicine or in perfumery. I have in my own experience found that the darkest tinctures are not the most odorous. I have made a tincture 1 in 50, first by digesting the musk in a rather dilute spirit at a temperature of about 120° F. for two or three days, then added more rectified spirit to make up to the proportion named, and afterwards macerated cold for a week or more, and found such a tincture moderately dark, and apparently to have extracted the larger portion of what is soluble from the musk. I have also made a tincture by maceration at ordinary temperatures, in a spirit made by mixing 3 parts sp. rect. with 1 of water, and found the latter, while paler and manifestly less charged with extractive matter, to be equally strong in odour; but such a tincture requires a few weeks' maceration. The perfumers will have attained the art of getting the most out of so precious an article as musk long since, and will neither want us to tell them, nor they us, how.

159, *Woodhouse Lane, Leeds.* EDWARD BROWN.

Erratum.—In some copies of last week's Journal the signature "E. J. MILLARD" was omitted from the letter on Methylated Spirit on p. 100.

J. R. Summers.—We think it would be wise to indicate on the label that the preparation is not strictly in accordance with the official formula.

T. Rousby.—Apply to the Secretary for a copy of the Regulations of the Board of Examiners.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Ellwood, Poore, Hill, Vizer, Proctor.

The Pharmaceutical Journal.
FIFTY-FIRST YEAR OF PUBLICATION.
SATURDAY, AUGUST 15, 1891.

THE AUTHORITATIVE DEFINITION OF MEDICINES.

The 'Annual Report on the British Pharmacopœia, 1885,' presented to the Pharmacopœia Committee of the General Medical Council, always contains matter that is of special interest to pharmacists, and the report for 1890 deals prominently with a subject that demands the careful consideration of every member of the craft, viz., the proposed adoption of the Pharmacopœia as a standard for household medicines. Though it is at the present day satisfactory that there is a closer relation between pharmaceutical practice and the authority of the Pharmacopœia than was formerly the case, it is still the fact that there is with some members of the public a preference for medicinal preparations which are not strictly those sanctioned by the Pharmacopœia. This is a state of things relating mainly to what may be called domestic or household medicines, and it may be illustrated by the mention of sweet spirit of nitre and spirit of sal volatile. So far as the dispensing of medicines according to the prescriptions of medical practitioners is concerned, there can be no question that the pharmacist is strictly bound to respect and comply with the directions of the Pharmacopœia, and unless specifically directed otherwise to make use only of medicines compounded according to its formularies. This provision of the fifteenth section of the Pharmacy Act is one that may be regarded as eminently desirable, not only for the public good, but also in the interests of pharmacists, since it furnishes them with an authoritative basis for their procedure. But in regard to popular remedies a greater degree of latitude has prevailed, and the demands of customers have sometimes been supplied more in conformity with usage and consideration of what the customer desires to have than in accordance with the conditions that would be observed in the dispensing of a physician's prescription. Thus, for instance, laudanum or paregoric may not always have been the tincture of opium or the compound tincture of camphor of the Pharmacopœia. The practice of selling such preparations may have been in some cases comparatively unobjectionable, but certainly it has not always been so. If deviation from the Pharmacopœia be admitted at all, it is very difficult to define the extent to which it may be carried, and hence it has been found necessary to have recourse to the Food and Drugs Act to put a stop to the sale of articles of an entirely spurious character. It is undoubtedly most desirable that such conditions should not obtain in reference to medicinal preparations, and to prevent their possibility the General Medical Council has adopted the terms laudanum and paregoric as synonyms of the Pharmacopœia preparations to which they properly apply. According to the authority by which the Pharmacopœia is constituted the "one uniform standard and guide whereby the nature and composition of substances used in medicine may be ascertained and determined," these preparations are therefore distinctly defined. If that authority be recognized, it would clearly be an offence punishable under the Pharmacy Act to compound those medicines of the British Pharmacopœia except according to its formularies. It is, we take it, to the interest of pharmacists that the authority of the Pharmacopœia should be upheld and observed, and that the public should be induced to look to their obligations and responsibility as guarantees that its wants will be properly supplied.

Hence it has come about that in connection with the subject of the supply of domestic medicines the question of synonyms has been raised, and Professor Attfield in preparing his report on the Pharmacopœia has had his attention directed to a number of suggestions originating from pharmacists that certain popular names of household medicines should be made synonyms of corresponding Pharmacopœia preparations. Most of the suggestions above referred to have appeared at various times in the pages of this Journal, and it is therefore unnecessary to mention them individually. It is rather to the principle involved in the adoption of popular names as synonyms of Pharmacopœia preparations that we desire to call attention. In a general way it may be said that such a course would have the advantages of giving the pharmacist authority for his practice, of relieving him from some responsibility and of affording him protection from the risk of prosecution under the Sale of Food and Drugs Act. According to Professor Attfield's view of the matter, the specified objects of the Pharmacopœia show that the legislature and those to whom Parliament entrusted the duty of framing a pharmacopœia clearly contemplated the inclusion in that volume of all reliable medicinal substances, whether prescribed by medical practitioners, prepared and vended by pharmacists, or purchased with or without medical prescription by the public. He refers to the Sale of Food and Drugs Act as having directed greater attention to the accurate definition and description of all articles which are the subjects of sale and purchase, and he very properly remarks that the druggist's store is the very last place over which *caveat emptor* should be inscribed. On the contrary, it is above all things desirable to induce the public to regard the pharmacist as a person upon whose professional responsibility and guidance they can rely in purchasing articles of which they are themselves un-

able to judge, and therefore it is to the advantage of the pharmacist to be able to strengthen that position by putting forward and observing the authority of the Pharmacopœia as his standard and guide.

But while heartily acquiescing with the proposal to define medicinal preparations more precisely by the authoritative adoption of popular names as synonyms of Pharmacopœia articles, it must not be overlooked that there are dangers to be encountered in carrying out that plan. In the first place there is now a very general tendency to look with disfavour upon anything that is calculated to interfere with trade. Even measures that are recommended in the interests of public safety are not superior to this influence, and to this day the restriction of the sale of certain articles which are the cause of numerous deaths by accident has been objected to because it was feared that trade would be interfered with. Again, the attempt to define may be attended with danger of creating confusion. In adopting a popular name as a synonym of a Pharmacopœia article it will be necessary to observe the principle that names are properly intended to distinguish between things that differ rather than by association to disguise or obliterate more or less any differences that may have existed and may still continue to exist. An arbitrary adoption of a popular name as the synonym of a Pharmacopœia article might thus cause confusion and inconvenience instead of being the means of distinct definition, or it might amount to a practical prohibition of the sale of the article to which the popular name had previously been applied. Such eventualities are suggested by the recommendation to make the term "milk of sulphur" a synonym of precipitated sulphur. That is one of the methods proposed for getting rid of existing difficulties, and at page 142 we reproduce the portion of Professor ATTFIELD'S report which deals with this subject. We cannot attach much weight to the argument founded on historical data. These go to prove that at one time or other the terms precipitated sulphur and milk of sulphur, or their Latin equivalents, were indiscriminately applied to the pure article and to that containing calcium sulphate. But that is merely matter of history which is of little account in regard to the present situation. Granting even that for any reason the term "milk of sulphur" as applied to the calcareous article must now be considered a misnomer, we have still to deal with the question put by the Marlborough Street magistrate as to a matter of fact, Is there an article known as "milk of sulphur" that is different from precipitated sulphur? If that be the case, and if the term "milk of sulphur" has been so generally associated with the calcareous article of the 1746 Pharmacopœia as to have become its special popular designation the plan of making the term "milk of sulphur" a synonym of the present Pharmacopœia article does not seem to recommend itself. It would confuse together things that are different and, if it had the effect desired, it would amount to a prohibition of the sale of the calcareous article. We have already expressed the opinion that if the question put by Mr. HANNAY can be answered in the affirmative there cannot be any ground for a prosecution under the Sale of Food and Drugs Act when the calcareous article is sold as "milk of sulphur," and in that case its *bonâ fide* sale should not be interfered with. There is, however, another mode of dealing with this matter which should commend itself to the pharmacist, and would, we think, satisfy all requirements; that is to advise the use of pure precipitated sulphur in place of the calcareous article which has become known as "milk of sulphur." By doing so the pharmacist would be exercising a legitimate function as a professional adviser. If that recommendation failed to meet with a customer's approval and the calcareous article were supplied, it should never be sold without a label distinctly describing its difference from the precipitated sulphur of the British Pharmacopœia.

BRITISH PHARMACEUTICAL CONFERENCE.

IN addition to the titles of papers promised for the Conference next week, already published, the following have been received:—

On the Alkaloidal Value of Some Commercial Henbanes. By A. W. GERRARD, F.C.S.

Note on Extract of Malt and Castor Oil. By S. M. BURROUGHS.

Some Notes on Oil of Eucalyptus and Eucalyptol. By R. H. DAVIES and J. H. PEARMAN.

Cascara Sagrada and Extracts, with Special Reference to Question 8 on the Blue List. By JOHN MOSS, F.I.C., F.C.S.

Apart from the general interest attaching to the subjects discussed at the International Congress during the past week there are many points which claim especial consideration by the pharmacist, and for that reason we have thought it appropriate to secure a report of the addresses, papers and discussions relating to hygienic science.

* * *

A Meltham chemist was summoned at the Huddersfield police court on the 11th inst. for selling methylated spirit without a licence. A fine was imposed amounting with costs to £6 0*s.* 6*d.* We understand that the conviction in this case was based upon the circumstance that the defendant had two shops but only one licence.

* * *

We desire to acknowledge the receipt of a copy of a new edition of the Price List issued by the Liverpool Chemists' Association, which has been forwarded on behalf of the Council of that Association by the Honorary Secretary, Mr. A. S. Buck. The object of this useful publication is to promote an equalization of chemists' prices in accordance with the altered conditions of the trade. To chemists in the district for which it has been specially drawn up it will be familiar, and from the fact that it has now reached a ninth edition it may be inferred that its utility has also been appreciated by chemists in other parts of the country. On the present occasion we can only notify the fact that a new edition has been published, but will take an early opportunity of referring to its general plan and contents more fully.

Proceedings of Societies in London.

INTERNATIONAL CONGRESS OF HYGIENE AND DEMOGRAPHY.

The Seventh International Congress of Hygiene and Demography was opened on Monday afternoon at St. James's Hall, when the chair was taken by the President, H. R. H. the Prince of Wales, at 3 o'clock. The hall was crowded in every part.

The proceedings commenced with the reading by Sir Douglas Galton of a report by the Permanent Committee appointed by the last Congress, held at Vienna, upon its proceedings and the steps taken to organize the present Congress. This was followed by—

THE PRESIDENT'S ADDRESS OF WELCOME.

His Royal Highness the Prince of Wales, who on rising to deliver the presidential opening address was received with loud and prolonged cheering, said:—Sir Douglas Galton and Gentlemen,—It gives me great pleasure to open the proceedings of this Congress and to offer a hearty greeting to all its members, especially to those whom it has induced to come from distant countries. Many as have been the meetings for good purposes over which it has been my good fortune to preside, there has very rarely, if ever, been one of which the object has been approved by a greater weight of authority. The importance of our Congress is proved, not only by the large number of members who have assembled here to-day, but by the names of those who are on the list of its officers, both honorary and active. Under the Queen's patronage this list includes, together with several members of my family, some of the principal members of Her Majesty's Government, the presidents of nearly all the medical corporations, representatives of the Universities and of the chief medical and scientific societies in the United Kingdom, delegates from nearly every great country in the world and from all our sanitary institutions and medical schools, many official representatives of our colonies and India, the Lord Mayor and Sheriffs of the City of London, the masters of several of the City Companies, and a great majority of those who, here or elsewhere, have gained the highest renown in the study of public health or of the sciences most nearly allied to it. All these approve of the design of the Congress, and they may well do so, for in so far as its object can be fulfilled it will everywhere bring good to all classes of society. As one looks through our programme, it is impossible not to feel distress and even horror at the multitude of dangers to health in the midst of which we have to live. Some of them appear at present to be inevitable, but the great majority may certainly with due care be averted. I cannot pretend to be able to judge but a few of these dangers, but I would take as examples those to which my attention was especially drawn when I was a member of the Royal Commission on the Dwellings of the Working Classes. I learned much there of the dangers to health which may be ascribed to the constant increase of our great manufactories and to other industries from which especially come the overcrowding of our towns, the building of huge factories, the pollutions of our atmosphere, the accumulations of refuse, the fouling of rivers, the impurities of earth and air and water. I learned not only these dangers, but the immense difficulty of increasing or even maintaining our activity in all branches of trade without incurring heavy risks to health, more particularly in our chief centres of population. The task of averting them might have appeared hopeless, but I have rejoiced to see how much has already been done in diminishing them, and to observe how our registers bear witness to the decreasing mortality in our large towns, to the increasing average length of life in the whole population, and to many facts proving the good influence of our sanitary institutions. But on them I do not now propose to dwell; I will only conclude from them that the good already done and the constantly increasing knowledge of the whole subject may make us sure that much more good may still be attained, and that neither this nor any other nation should be content until prosperity in business and all other things desirable for the national welfare are made consistent with national good health. How the many dangers which our programme indicates may best be dealt with will, of course, be discussed in the several sections. It will be no trivial work if their sources and probable remedies can be clearly pointed out, and especially if this can be done—as in a Congress such as this it should be—in a strictly scientific manner, calmly and dispassionately, without any reference to either general or municipal politics, or for any other purpose than the promotion of health. It is only on conviction such as may thus be produced that the appointed sanitary authorities can compel the changes necessary to be made, for such changes are almost always inconvenient or injurious to some, and might even seem unjust to them, unless it be made quite clear that they would be very beneficial to the community. But my hope is that the work of this Congress may not be limited to the influence which it may exercise on sanitary authorities. It will have a still better influence if it will teach all people, in all classes of society, how much everyone may do for the improvement of the sanitary conditions among which he has to live. I say distinctly "all classes," for although the heaviest penalties of insanitary arrangements fall on the poor, who are themselves least able to prevent or bear them, yet no class is free from their dangers or sufficiently careful to avert them. Where could one find a family which has not, in some of its members, suffered from typhoid fever or diphtheria, or others of those illnesses which are especially called "preventable diseases?" Where is there a family in which it might not be asked, "If preventable, why not prevented?" I would add that the questions before the Congress, and in which all should take personal interest, do not relate only to the prevention of death or of serious diseases, but to the maintenance of the conditions in which the greatest working power may be sustained. In this I include both mental and bodily power, for the highest possible prosperity must be when men and women of all classes, rich and poor alike, can safely do such good and useful work as they are fit for, and for which they are responsible to those among whom they live. To this end it is essential that they should enjoy the best possible health and vigour, and to obtain these it is necessary that everything possible should be done for the promotion and maintenance of the national health. Such, then, is to be your work; let me say our work, for though I cannot further contribute to the proceedings of the Congress, I shall watch them with much interest, and shall always strive to promote whatever may be here plainly shown to be useful for the public health.

Replies to the Address of Welcome.

Dr. Brouardel, Dean of the Faculty of Medicine of Paris, in the name of the French members of the Congress of Hygiene and Demography, offered their respectful homage to the Prince of Wales, and asked him to convey to Her Majesty the Queen of England the expression of their most heartfelt thanks for having accorded to the Congress Her Royal patronage. In the year 1837, the year of the coronation of Her Gracious Majesty, appeared the Act which rendered obligatory the registration of deaths. This Act inaugurated the era of administrative reforms concerning the public health which had been rightly called "the Victorian era." Under the impulse given

by William Farr and Edwin Chadwick, a system of registration of the causes of diseases and of deaths was organized. Certain important cities, before the law made it obligatory, obtained supplies of water beyond all suspicion of pollution, and adopted systems of removal of foul water and waste matters. In these cities the sickness and death rates diminished rapidly; this furnished the necessary proof—it was time for reform. Twenty years ago the Local Government Board was established, and in 1875 submitted to Parliament a Bill for the protection of the public health. During its discussion in Parliament Mr. Disraeli pronounced in the House of Commons the memorable words that "The public health is the foundation on which repose the happiness of the people and the power of a country. The care of the public health is the first duty of a statesman." Since then England had each year made fresh improvements in her sanitary laws. If in her eyes they were not yet perfect, in the eyes of the nations who surrounded her they were an ideal towards which all their most ardent aspirations tend. It was England's example they invoked when they claimed from their public authorities the powers necessary to oppose epidemics, to combat the scourges which decimate their populations. England had taken the first rank in the art of formulating laws for the protection of health. This was not all that she had done in the domain of hygiene. Among the diseases which could be properly termed pestilential, there were, thanks to the work of the hygienists of all countries, some which from the present time might be considered as preventable—such were small-pox, typhoid fever, dysentery, and cholera. For one of these, the most terrible, the immunity conferred by vaccination was absolute. Who was it who thus preserved from death, from blindness, from infirmity, millions of human beings of all countries and of all races? On the 18th of May, 1796, a date which might well be the date of a great battle, Jenner inoculated with vaccine matter, by means of two superficial incisions, the youth James Phipps. Protection against small-pox belonged to England. Was it possible to establish the conditions of propagation of typhoid fever without quoting the names of Budd and of Murchison? In 1855 Dr. Michel de Chaumont had for the town in which he lived experimentally established the *rôle* played by drinking-water in the propagation of this disease; unhappily public opinion was not prepared, and his discovery was not listened to. In the work the efforts of the English school were most fruitful. It was the epidemic of cholera in 1866 in England which gave birth to the theory of its propagation by drinking-water? Was it not at that date that, under the influence of Sir John Simon, the Lords of the Privy Council issued an order formulating the laws of prevention adopted to-day? Even in England these discoveries had not immediately borne all their fruit. The anti-vaccination leagues were not yet dead. Proofs accumulated during a century had not sufficed to open all eyes; it was not only physically that persons were born blind. After the enthusiasm which each discovery receives came the difficulties of application, doubts, reactions. For the last fifteen years medical doctrines, especially those most concerned with hygiene, had undergone a revolution which surpassed in importance all those of which history had taken notice. Could France be represented in a congress of hygiene without recalling the name of M. Pasteur? For centuries it had been asserted that epidemic diseases were propagated by means of contact, by the air, by effluvia, by miasmata. The idea of morbific germs, if not the name, was even found in the works of Hippocrates, but in what an uncertain sense! The theory of contagion had passed from century to century with strange modifications; the uncertainty of the methods of research and the difficulties of observation bound up together truth and error. It remained for Pasteur to prove the existence of these germs, their form, their life, their mode of action, and by their attenuation to solve the problem of immunity. Thanks to his works, and thanks to those of his pupils, realities had succeeded to contingent possibilities. We know some of our enemies, their habits, and their mode of penetrating the body; up to this time man had been conquered by these infinitesimal beings, but thanks to recent discoveries he will be their conqueror. When at the beginning of a century one can inscribe the name of Jenner, and at its end that of Pasteur, the human race might rejoice; more had been done for it against misery, disease, and death than in any one of the centuries which have preceded it.

Professor von Coler, Director General of the Prussian Army Medical Department, expressed the acknowledgment of his colleagues to the President for his address.

Professor Corradi, of the University of Pavia, speaking on behaif of the Italian delegates, said the chains which bound his country with England were ancient, and science had made them more lasting. Lanfranc, of Pavia, and Anselm, of Aosta, restored in the eleventh century learning to Canterbury, and from among the students of the Italian universities the English nation took their teachers. But already Robert of Anglia was among the rectors who opened, in the year 1205, the university at Vicenza, having removed from Bologna, where a little before the poet Gualfrido had taught literature with great success, and where a little afterwards Alano, the universal doctor, rendered famous the chair of canonical law. The teachings and the discipline of the Italian schools entered, with scholars become teachers, into Oxford and Cambridge, and the traditions were maintained. But if these had become chains of habit, a more intimate connection followed in the sixteenth century. William Harvey reunited indissolubly in the field of science the names of the two nations, by giving the demonstrations of a fact of which in the Anatomical School of Pavia the fundamental principles were found; but instead of partial portions and scattered or uncertain ideas, he evolved a complete system, under which all was known in the greatest simplicity. The discovery of the circulation of the blood was the most solemn testimony that one began great things and another finished them. This remarkable event signalized one of the greatest moments in the history of science, not only by the fact itself, but by the new spirit which it induced into biology, in which was the foundation of hygiene. Moreover, to recall the names of the doctor of Folkestone, and of the hospital of St. Bartholomew, the "Stator Perpetuus" of the Royal College of Physicians of London, was to forbode well of the Seventh International Congress of Hygiene. The glory of Harvey was reflected upon his predecessors, his masters; to salute him was to salute both Italy and England, who affectionately joined in celebrating his immortal name.

M. Joseph Körösi, Director of Municipal Statistics, of Budapest, said it was not to single persons only that their gratitude was due; they had to thank all England, the genius of the great English nation, for it was England whom, among all nations of the world, they must consider the mother-country of statistics, especially of demography. This branch of science, the very nucleus of statistical work, which, in fact, was quite a science in its own right, had chosen the task of investigating the laws which regulated the life, increase, and decrease of nations. Its work, therefore, comprised three main parts: statistics of natality, of mortality (this part including biometry), the science of measuring the duration of human life, and of the increase of population. And when inquiring who were the founders of this new science, they heard unanimously quoted the names of England's sons—Graunt, Petty, Halley, Malthus. On the following day they

would meet within the venerable hall of the Royal Society. It was in the old room of that Society, then in its very first youth, but soon rendered conspicuous to the world by the genius of Newton, that Graunt, 230 years ago, established for the first time the problems of demography, and that the king himself, admirably appreciating the work done, recommended that the author should be received as a member of the learned Society. The Congress of Hygiene and Demography would continue his work on the very birthplace of demography. It was there that, shortly afterwards, Sir William Petty, by the eminent power of his genius, raised the new science to political importance and to popularity; and it was again there that in 1693 the famous Halley became the founder of biometry, the most important part of demography, by working out the first table of mortality. And now the young science, which two centuries ago left those halls, shy, and even without a name, passing through the world under the pseudonym of "Political Arithmetics," had found its way over the whole globe. Having been worked out in Germany, having received a name and new ideas in France, and having been enlarged and imbued with a more scientific character in Belgium by Quetelet, having got its well-equipped offices in every country of the civilized world, they were proud to see its numerous representatives meet at the same place where two centuries ago the science was born. After a triumphant career of 230 years it returned to its home, in which it awoke to light, and again the throne of England received it with favour and benevolent interest. For demographic not less than for statistical work it was of the highest importance that its representatives, scattered as they were over the whole globe, should fully understand each other, for only so could they accomplish what they aimed at—that their observations should comprise equally all countries of the world, that their researches should be conducted and worked out on the same principles everywhere, and that they might combine the incomplete and often discrepant observations of single nations in a full descriptive history of all civilized mankind.

Dr. W. Roth, Surgeon General of the Army of Saxony, said that they had to admire the progress in the science of hygiene, which flourished in England at a time when the German universities just began to give their attention to the subject. They were in duty bound gratefully to acknowledge the great progress in the science of hygiene, which was due to the influence of the school at Netley. And of the many eminent men who worked there he mentioned one who was no longer among them, but whose memory would be dear to everyone who took an interest in the welfare of their soldiers and in the progress of their science, Edward Alexander Parkes. Till his death, in 1876, his lectures at Netley attracted all those who took an active interest in the progress of hygiene. And they must not forget to mention his friend and successor, De Chaumont, who proved to be his best fellow-worker, and who did some eminent work in questions of practical hygiene.

Sir James Paget proposed a vote of thanks to the President for his presence and address. He expressed the conviction that great results would be achieved by the Congress which had been so auspiciously inaugurated, as he was old enough to remember the great advantage that the International Medical Congress of 1881 had derived from the patronage and presence of the Prince. There had always been a need that sanitary science should have in its aid the best knowledge to be obtained in every branch of medical science, and that Congress, with its large number of sections and wide variety of subjects, was calculated to prove of the utmost value. Each section must bear in mind that, however minute and careful its deliberations, it was but a part of one great whole, and he hoped that the public interest that would be excited would make it clear to every Government of the world that it was as much its duty to make provision for the pursuit of deepest science as for the ordinary routine matters of sanitary progress.

Dr. G. Buchanan, Chief Medical Officer to the Local Government Board, seconded the motion.

The vote was adopted with cheers, the audience rising.

The President briefly expressed his thanks, and the proceedings were adjourned.

SECTION OF PREVENTIVE MEDICINE.

This section, which met on Tuesday morning in the rooms of the Society of Antiquaries, Burlington House, was presided over by Sir Joseph Fayrer, K.C.S.I., LL.D., M.D., F.R.S., Q.H.P.

Sir Joseph Fayrer's Address.

In his opening address, Sir Joseph Fayrer said that the unprecedented progress in human knowledge which characterized the present century had not been wanting in preventive medicine. It was, however, during the last half of it that advance had been most remarkable, whilst it was in a later part of that period that it had so established itself in the popular mind as to have passed from the region of doubt and speculation into that of certainty. It was now pretty generally understood that about one-fourth of all the mortality in England was caused by preventable disease, that the death-rate of large communities might be reduced much below that at which it has been wont to stand, that the average duration of life might be made to approximate nearer to the allotted four score, and that the conditions of living might be greatly ameliorated. The chief obstacles to improvement had been ignorance and want of belief; but a better knowledge of the laws of life and health, a more rational comprehension of the nature and causes of disease, were gradually but surely entailing improvement in the conditions of living and in the value of life, as well as the diminution and mitigation, if not extinction, of morbid conditions which had in past times proved so injurious or destructive to life. It was of happy augury for mankind that the subject of public health was now fairly grasped by popular sentiment, and that, though ignorance, opposition, and vested interests still contested the ground, progress was sure, and the light of science was illuminating the dark places. It was now better appreciated than it ever had been, that the causes which induce disease and shorten life are greatly under our own control, and that we have it in our power to restrain and diminish them, and to remove that which has been called "the self-imposed curse of dying before the prime of life." The progress of preventive medicine might be illustrated by contrasting the state of England and its population of more than 29,000,000 during the Victorian, with the England of the Elizabethan age and its 4,000,000. He might remind them of the frightful epidemics which had formerly devastated the land in the forms of black death, sweating sickness, plague, petechial typhus, eruptive fevers, small-pox, influenza, and other diseases, such as leprosy, scurvy, malarial fever, dysentery, etc., of the wretched mode of living, bad and insufficient food, filthy dwellings, and ill-built towns and villages, with a country uncultivated and covered with marshes and stagnant water. According to Defoe one-fifteenth part of England consisted of standing lakes, stagnant water and moist places, the land unreclaimed, and with the chill damp of marsh fever pervading all. The homes of the people were then wooden or mud houses, small and dirty, without drainage or ventilation, the floors of earth covered with straw or rushes, which remained saturated with filth and emitting noxious

miasmata. The streets were narrow and unpaved, with no drains but stagnant gutters and open cesspools, while the food was principally salted meat with little or no vegetable. To this might be added a large amount of intemperance and debauchery. In such conditions disease found a congenial nidus, and by a process of evolution assumed the various epidemic forms which proved so destructive to life. Some of these had gone, it was to be hoped never to return, and the conditions which fostered, if they did not cause them, had gone also. Our immunity during the last diffusion of cholera gave some ground for thinking it might be so with the diseases that remain, if, indeed, the Legislature and popular intelligence should be of accord on the subject. Great improvements have gradually been made in the mode of living; the houses are better constructed, the drainage and ventilation are more complete, the land is better cultivated, and the subsoil better drained; marsh fever and dysentery, at one period so rife, are unknown, and leprosy has long since disappeared. The death-rate is considerably reduced, and the expectancy of life enhanced. Water is purer, food is more varied and nutritious, clothing is better adapted to the climate, the noxious character of many occupations has been mitigated, and the mental, moral and physical aspects of the people altogether improved; education is general, a better form of government prevails, and the social conditions are far in advance of what they have been. But still the state of our cities showed that improvement is demanded, and one object of this Congress was to point out why and how this may be effected, not only in this country, but throughout the world. Certain well-known diseases were now less severe in their incidence, if not less frequent in their recurrence. Since the passing of the first Vaccination Act in 1840, the death-rate from small-pox had diminished from 57·2 to 6·5 per 100,000 for 1880–1884, though for the five years 1870–1874 it was 42·7, thus showing that there was still much to be learnt about vaccination. Enteric fever was not separated from typhus before 1869, but since then the death-rate had decreased from 0·39 to 0·17 per 1000, and it had been shown that this improvement was synchronous in different parts of England with the construction of proper drains. The diminution in the death-rate from typhus was quite as striking, and this also was shown to have run parallel with improved sanitation in more than one large town. The death-rate from scarlatina fluctuated between 97 and 72 per 100,000 between the years 1851 and 1880, and though it had diminished considerably of late years (17 per 100,000 in 1886), a corresponding increase in the death-rate from diphtheria had taken place, and this might be due in part to a better differentiation of the two diseases. In 1858 it was reported that phthisis killed annually more than 50,000 people. The death-rate from this disease had not decreased very much for England and Wales, but it had done so in some large towns, notably in Liverpool, and Dr. Buchanan and Dr. Bowditch, of Massachusetts, had both shown a striking parallelism between the diminution of the death-rate from this cause and the drying of the soil resulting from the construction of sewerage works. Cholera first appeared in England in 1831, and there were epidemics of it in 1848–1849, 1853–1854 and 1865–1866; but the number of deaths diminished each time it appeared, and though it had been present since it had never reached the height of an epidemic. This was fairly attributable to local sanitary rather than to coercive measures. Preventable disease still killed yearly about 125,000, and considering the large number of cases for every death, it had been calculated that 78¼ millions of days of labour are lost annually, which means £7,750,000 per annum. This did not include the days lost by the exhaustion so often induced by the still too numerous unhealthy houses of the poor. The death-rate was still higher, and the expectancy of life lower than it should be; and though we had got rid of the terrible plagues of the middle ages, yet other epidemics have made their appearance. Cholera had four times visited us, fevers, eruptive diseases and diphtheria had prevailed, influenza had appeared several times, even recently, and after leaving us last year only to return with renewed virulence, caused in the United States a mortality almost equal to that of the plague. Much had been done, but much remained to be effected. That we could exterminate zymotic disease altogether was not to be expected, but there could not be a doubt that we might diminish its incidence, and though we might never reach the "fons et origo mali," yet we could make the soil upon which its seed is sown so inhospitable as to become sterile. The scope and objects of preventive medicine should extend also to a consideration of the best means of controlling or obviating the conditions which involve over-competition in various occupations, whether political, professional, or mercantile, by which wealth or fame is acquired or even a bare livelihood is obtained, and under the pressure of which so many succumb. The recrudescence of those psychical phenomena manifested by the so-called hypnotism or Braidism,—morbid conditions arising out of the influence of one mind upon another,—was a subject which claimed the watchful notice of preventive medicine on account of the dangerous consequences which might ensue from it. The abuse of alcohol, opium, chloral, and other stimulants and narcotics, and the evil consequences which might result therefrom, was also a subject worthy of consideration. The possible deleterious influence of mistaken notions of education, as evinced in the over-pressure which is exercised upon the young, the predominance of examinations, their increasing multiplication and severity, and the encouragement of the idea that they are the best test of knowledge, was another subject which demanded the jealous scrutiny of preventive medicine. Though preventive medicine in some form had been practised since the days of Moses, it had received but little recognition until a comparatively recent period. When science developed and observation extended, medical men and others became impressed with the influence of certain conditions in producing disease. When philanthropists like John Howard devoted life and property to the amelioration of such awful conditions as existed in our jails, rude sanitary measures gradually came into operation and partially obviated these evil conditions. But it was not before the middle of this century that any scientific progress was made. It was when Chadwick, Parkes, and others initiated the work by which they have earned the lasting gratitude of the human race, that preventive medicine became a distinct branch of medical science. The sanitary conditions of towns and communities have been for the last fifty years largely cared for by the Legislature, and a variety of Acts have been passed which deal with questions concerning the public health. Were all the provisions enforced, little would remain to be desired, but as many of them were permissive, not compulsory, the benefit was less complete than it might be. The old difficulty of prejudice combined with ignorance still too often stood in the way, and despite evidence which on any other subject would be conclusive, the most obvious sanitary requirements were often ignored or neglected. Many thousands of lives had been saved by the Sanitary Acts now in force; but there was little doubt that more thorough organization under a Minister of Public Health would have most beneficial results, and would save a great many more. The public was, however, much indebted to the action of the Government Local Board, under whose able administration the most crying evils are gradually being rectified. Through

the wise precautions enacted by it against the importation and diffusion of epidemic disease, when other parts of Europe were affected by cholera, this country escaped or so nearly so as to suggest that it was to sanitary measures we owed our immunity. The records of the past fifty years proved the influence exerted by sanitary measures on vital statistics. The first reliable tables from which the expectancy of life might be derived showed that in 1838 to 1854 it was for males 39·91, for females 41·85 years; by the tables of 1871 to 1880 it had increased to 41·35 for males, and 44·66 for females. It was shown also that the expectation of life increased every year up to the fourth year, and decreased after that age. For males up to 19 years it was higher by the last tables, but after that age it was higher by the old table; for females it was greater by the new table up to 45, but after that age it was less. The improved sanitation saved more children's lives, but the conditions of gaining a living were harder than they were at the time of the first table, which accounted for the expectancy of life for adult men being less. Women remained more at home, where the better sanitation told, and were not subject to quite the same conditions as men, so that their expectancy of life was greater than by the old tables up to the age of 45. A further proof of the effects of sanitary work was a decreased death-rate. A comparison of the death-rates of England during past times with the present would sufficiently prove the point.

1660–79	80	per 1000.
1681–90	42·1	,,
1746–55	35·5	,,
1846–55	24·9	,,
1866–70	22·4	,,
1870–75	20·9	,,
1875–80	20·0	,,
1880–85	19·3	,,
1885–88	18·7	,,
1889	17·85	,,

In some parts of England, where the main object was the recovery or maintenance of health, the death-rate was down to 9 per 1000, while in others, where the main object was manufacture and money-making, it was as high as 30 per 1000. In 1859 the death-rate in the European army in India was ascertained to be 69 per 1000. The inquiry resulted in certain changes and improvements in the housing, clothing, food, and occupation of the soldier. Since these have been carried out there had been a steady decline in the death-rate, and the annual reports of the Sanitary Commissioners to the Government of India gave the rates as: 1886, 15·18 per 1000; 1887, 14·20 per 1000; 1888, 14·84 per 1000. During some years it has been even lower, down to 10 per 1000, whilst the general efficiency of the troops has increased. It was not easy to estimate the money equivalent of this, but taking the rough standard which values each soldier at £100, a simple calculation would show how great was the gain, and who could estimate the value of lives saved and suffering avoided? An important result of the observations of the medical officers of the sanitary service of India had been to show that cholera is to be prevented or diminished by sanitary proceedings alone, and that all coercive measures of quarantine or forcible isolation are futile and hurtful. In preventive as in curative medicine, knowledge of causation was essential. A certain empirical knowledge might be useful as a guide, but no real advance could be expected without the exactitude which results from careful scientific observation and induction; the spirit of experimental research was now dominant, and progress inevitable. Recent advances in physiology, chemistry, histology, and pharmacology had done much to throw light on the nature and causes of, and also on the means of preventing or of dealing with disease. It was impossible to exaggerate the value of the scientific researches which have led to the antiseptic methods of preventing the morbific action of micro-organic life, whether the toxic effects produced by them, or those induced autogenetically in the individual. Theory had been closely followed by its practical application in prevention and treatment of disease, whilst the study of bacteriology, which was of such remarkable pre-eminence at the present time, was opening out sources from which might flow results of incalculable importance in their bearing on life and health. That the conclusions arrived at are always to be depended on the speaker doubted; it seemed that scientific zeal might perhaps sometimes outrun discretion. That it might be wiser to postpone generalization had been more than once apparent, whilst the expediency of further investigation before arriving at conclusions which might subsequently prove to be erroneous should not be lost sight of. In the enthusiasm of research early generalization had too often been followed by disappointment.

Prevention of Spread of Disease.

Surgeon-General J. M. Cunningham, M.D., C.S.I. next read a paper on "*The Mode of Preventing the Spread of Epidemic Disease from one Country to Another.*" After referring to the want of precision in the term "epidemic," and the difficulty of finding words to describe such epidemics which involved no theory of their causation, he dealt with the three modes of prevention employed in different countries: (1) Quarantine; (2) Medical inspection; and (3) Sanitary improvements. With regard to the first, he thought the history of cholera over the world, and especially in Europe, was a proof of its failure, and the assumptions on which it was based were purely hypothetical and opposed to facts. The evils of quarantine were great and undoubted. Much good had been no doubt effected by medical inspection, but the system could not be credited with the arrest of epidemics. The only efficient means of checking epidemic disease was by sanitary improvements, pure air, pure water, drainage, and suitable clothing. To improvements in this direction he attributed the remarkable exemption from cholera which England had enjoyed during the last twenty-five years.

Mr. Robert Lawson, LL.D., read a paper on "*The Communicability of Cholera from Country to Country,*" in which he dealt with the probability of the exciting factors being conveyed by the air, whether fully or only partially developed. If this was so it was not in their power to exclude them, but much might be done by hygiene and other local means to limit their development and so to avoid excessive mortality.

After a paper on "Australasian Quarantine" by Dr. J. Ashburton Thompson (of New South Wales) discussion was invited.

Dr. Felkin (Edinburgh) said the people of Central Africa, although to a certain extent uncivilized, recognized very distinctly the use of preventive medicine to check the spread of infectious disease. Syphilis had been spread by the Arabs throughout the continent, but very stringent measures were now being taken with a view of stamping out the disease by means of inoculation. Boys and girls were compelled to be inoculated three or four times over the left breast before they were permitted to marry. It was found in the White Hill district that these measures had prevented the spread of the disease. The spread of cholera in Central Africa had been considerably checked by the enforcement of isolation.

Dr. Stekoulis (Constantinople), Dr. Hewitt (Minnesota), Dr. Simpson (Calcutta), Dr. Thorne-Thorne, Brigade-Surgeon McGann and Professor Stokvis (Amsterdam) referred to the importance of sanitary improvements as a means of checking disease, and agreed

with the readers of the papers that the imposition of quarantine was utterly useless as a preventive measure.

SECTION OF BACTERIOLOGY.

Sir Joseph Lister's Address.

Sir Joseph Lister, the President of this section, opened the proceedings with the following brief address. He said the International Medical Congress which was held in London in 1881 was graced by the presence of the two foremost bacteriologists, Pasteur, the father of the science, to the splendour of whose work from first to last he could not trust himself to attempt to do justice, and Koch, who had rendered such signal services to the science. Would that the health of one of these men and the engagements of the other had permitted them to be with them to-day. During the ten years that since had elapsed great work had been accomplished. On the occasion of that Congress Pasteur formulated his position with respect to the attenuation of virus and preventive vaccination. Koch demonstrated his method of cultivation on solid media, whilst he had also the opportunity of showing in London for the first time the typical bacillus which he had discovered. Since then Pasteur had done all his wonderful work regarding rabies, and Koch had extracted from the bacillus which he had discovered a substance which he had employed for diagnostic and therapeutic purposes in tubercular diseases, and whatever might be the ultimate judgment arrived at with regard to the therapeutic value of tuberculin there could be but one opinion as to the transcendent interest pathologically of its effects. Other men meanwhile had been assiduously cultivating the wide field of bacteriology, and had arrived at results not unworthy of the masters whom they had followed. Without attempting even to notice all the work that had been done he might refer to the separation of the virulent chemical poisons secreted by some bacteria from the organisms that produce them, as was done by Roux with diphtheria; the elaboration of the phagocyte theory by Metschinkoff; the conferring of immunity against tetanus by Behring and Kitasato by injecting an inorganic chemical substance into the circulation, and the proof that the serum of an animal on which immunity had been conferred in that way would itself produce immunity in another animal. The observation of Hankin that a little of the serum of the blood of a rat introduced into the circulation of a mouse will confer immunity in that animal against anthrax, and the beautiful proof given by Messrs. Vaillard and Yersin that the bacillus of tetanus when washed of the poison that it produced is incapable of developing among healthy tissue, were but samples of the work that had been accomplished during the last ten years. Those who wished to be convinced of its enormous value and extent had only to visit the Museum, which consisted of two parts: one department being devoted to the exhibition of apparatus employed in bacteriological research, and the other containing the most beautiful series, or rather set of series, of preparations of all the micro-organisms that have been discovered.

Etiology of Malaria.

The first subject dealt with was "*The Etiology of Malaria*," introduced by Professor Dr. Laveran, who read a paper on "*The Hæmatozoon of Malaria*," which he had first described in 1880, and which had since been recognized by many observers. This paper was illustrated by lantern demonstrations, and was followed by one by Professor Celli Rowe, also illustrated, on "*The Parasites of the Red Blood Corpuscles*."

A discussion followed, in which Professor Crookshank supported the thesis that malarial diseases were caused by parasitic micro-organisms, whilst Mr. W. North (London) thought the evidence was not sufficient, and seemed inclined to attribute the evil effects to chill. This notion was strongly combated by Professor Kneppe, Dr. Anderson, and Dr. Cooper (Calcutta).

The Bacteriology of Cholera.

The next subject, which seemed to evoke a great deal of interest, was "*The Bacteriology of Asiatic Cholera*." introduced by Professor Kneppe, Prague, who read a paper giving the results of his own researches which tended to corroborate the views of Professor Koch, that the disease in question was caused by the presence of the comma bacillus.

Dr. Klein followed with some observations, in which he raised the question whether there was sufficient evidence to prove that the comma bacillus is the bacillus of cholera, and pointed out that cases of thoroughly typical Asiatic cholera had been investigated in which the comma bacillus was not found in sufficient numbers to account for the effects observed on the hypothesis that it was the poison eliminated by these organisms which caused the pathogenic effects. Many cases had been examined in India in which only a few comma bacilli had been found in the ileum. Again, the description given of these bacilli by different observers was by no means identical, and pointed to there being several species and not one only. He illustrated this point by several slides showing bacilli, all capable of being described as comma shaped, but differing very materially in size and appearance, which had been found by Dr. Cunningham, of Calcutta, in the mucous flakes of cholera patients. Another point worthy of notice was the occurrence of comma shaped bacilli in mucoid material apart altogether from the presence of cholera. Slides showing such bacilli from the intestines of apes suffering from diarrhœa illustrated this point. He did not assert that these were the same as the cholera bacilli of Koch, but maintained that certain conditions of the intestines might favour the production of large quantities of these organisms, which need not have any causal connection with the disease itself.

Professor Gruber supported Dr. Koch's theory, and suggested that the different forms observed were due to different modes of cultivation.

Dr. Bruce (Netley) drew attention to several statements put forward in connection with this subject, which further experiment had failed to substantiate. He had inoculated white rats and guinea pigs with a pure cultivation of cholera bacillus, obtained from Calcutta, and they were alive now, instead of dying in forty minutes, as had been alleged. He thought there was abundant evidence that the comma bacillus was always found in cases of Asiatic cholera, but they were found elsewhere also.

Professor Kneppe having replied, reiterating his original position,

Dr. Klein also added a few words, saying that he had been evidently misunderstood by both Professor Gruber and Professor Kneppe. Everyone was aware that different modes of cultivation would produce different results in micro-organisms; but his point was that under precisely similar conditions there was evidence of distinct species.

Sir Joseph Lister, in closing the discussion, said everyone must form his own opinion as to the side on which the balance of evidence lay; but the principal point, and one of great interest, which had been brought out by Professor Kneppe, was that he was able from the cultivation of the comma bacillus to produce death very rapidly in the lower animals. One of the weakest points in Koch's original work seemed to be that it could not be demonstrated, without enormous difficulty, that the comma bacillus produced any

choleraic effect. This seemed to have been made quite plain by Professor Kneppe's work, and it was an important addition to knowledge.

The remainder of the sitting was occupied with a discussion on the bacteria present in the mouth, introduced by an elaborate paper by Dr. Miller, of Berlin.

On Immunity.

On Wednesday the discussion on Immunity was opened by an address of remarkable interest by Dr. Roux, of the Pasteur Institute, Paris.

Dr. Roux fitly indicated the scope of the discussion in his opening sentence, in which he stated that, in inviting a pupil of M. Pasteur to open the discussion, the organizing committee had reminded them that the numerous interesting works which had recently appeared on this subject had had one point of departure—namely, the attenuation of virus and preventive inoculation—the two subjects with which Pasteur's name would to all time be honourably associated. With the single notable exception of vaccination, the only way of conferring immunity against any disease was the inoculation with the virus of the disease itself. To the natural method of producing immunity Pasteur had added the less dangerous one of preventive inoculation by means of an attenuated virus. The designation "attenuated virus" ought to be reserved for a virus weakened in successive operations. A virus might be weakened without being attenuated—for example, by artificially lowering the vitality of the organisms producing it. The two methods of attenuation were described by Pasteur—viz., prolonged exposure of the cultures to air at a suitable temperature, and the passage of the organisms through the bodies of different species of animals. Other methods have also been employed—*e.g.*, the action of heat, the use of antiseptics, of compressed oxygen, of desiccation, and of light. In all cases, whatever the method employed, it was necessary that the attenuation should be effected slowly and gently; rapid attenuation could render a virus altogether inactive without impressing on it any hereditary weakness. However prepared, in order to confer immunity, it was necessary that the virus should be brought into contact with the tissues of the animal. In the early experiments the virus employed was always living—viz., the weakened organisms themselves. Another method had now been recognized—viz., by the injection of their chemical products. The two might be described as bacterial inoculation and chemical inoculation respectively. With the first method the names of Pasteur, Toussaint, and Chauveau were associated; with the latter, those of Wooldridge, Salmon, Charre, Chamberland, and Roux, and many others. To produce immunity, therefore, it was only necessary to introduce the chemical products of the bacteria, not the bacteria themselves, into the body. According to the dose given, these products could either produce the symptoms of the disease or protect against it. These products were hence of prime importance. They were for the most part unstable; many of them were lost even in the process of filtration through a porcelain filter. He described a new method by which he had been able to obtain them free from living organisms, by the use, namely, of certain essences, especially those of clove oil and mustard. Although these were but slightly soluble in water, they had a remarkable power of killing bacteria. Moreover, they were volatile, so that they could readily be removed *in vacuo*, and the cultures were then got free from bacteria, while containing the chemical products unchanged. He thought the use of these essences would be of great service. Another difficulty in studying these products was that they were not always formed in our artificial cultures. The bacteria only formed their poisons in certain media. As to the nature of these substances, it was at first thought that they were of the nature of alkaloids; they were now recognized to be of the nature of albuminous bodies, their action being comparable to that of ferments. An interesting question here arose. They had seen that the same products could, according to dose, be either poisonous or protective. Were the substances which produced these different effects the same? M. Bouchard thought they were not. There was nothing impossible *à priori* in the idea that an organism might produce different substances, some harmful, others beneficial. Some recent observations seemed to bear out this view. Thus Fraenkel had found that immunity against diphtheria could be conferred on guinea-pigs by injection of toxic cultures heated to 65° C., while Roger had found that cultures of erysipelas heated to 100° C. were poisonous and non-protective, while they were protective and non-poisonous if heated to 110°. In both cases heat had destroyed the poisonous, while retaining the protective, qualities of the culture. In any case it was certain that even the protective substances were poisonous if injected in large doses; and hence it was impossible to say, with our present knowledge, whether the protective and the harmful functions could be dissociated from each other. Another question then arose. Was the protection conferred by chemical products as permanent and durable as by living virus? In the case of anthrax and pneumonia the immunity conferred by the living virus lasted a longer time than that given by chemical products, but the observations yet made were still insufficient to allow us to give a definite answer. Having passed in review the various methods of conferring immunity, he went on to consider how they acted and what changes made an actual refractory.

Dr. Roux was followed by Professor Buchner, of Munich, who dwelt upon the opposite view generally taken by the German scientists on this difficult subject, and ascribed the bacteria-destroying power to the action of the serum or liquid part of the blood. He went on to speak of the antagonistic action exercised on bacteria by certain albuminous bodies which he termed *alexines*.

Mr. E. H. Hankin, of Cambridge, who followed Professor Buchner, dilated on the properties of these important bodies, which he termed "defensive proteids," and claimed priority for this nomenclature.

Dr. Adami, of Cambridge, Professor Ehrlich, Professor Kneppe, of Prague, Dr. Klein, F.R.S., and Dr. Metschinkoff, of the Pasteur Institute, who was loudly cheered, then spoke, advocating their respective views as to the cause of immunity. Dr. Metschinkoff, as the discoverer of the process known as "phagocytosis," was listened to with special interest. He reasserted emphatically his previous position, and took exception to many of the arguments which had been used by Professor Buchner, with a view to disprove the power attributed by Dr. Metschinkoff to the white blood corpuscles of devouring the virulent germs of disease. He concluded by stating that his researches were in accordance with the results of Darwin and Wallace.

SECTION OF THE RELATIONS OF THE DISEASES OF ANIMALS TO THOSE OF MAN.

Food Poisoning.

"*On Meat Infections—Food Poisoning*," by Edward Ballard, M.D., F.R.C.P., F.R.S. The following is the substance of a paper read on Wednesday in Section III. Up to about twenty years ago, gastro-intestinal disturbances, obviously resulting from the eating of flesh-foods, or of soups, etc., prepared from them, were commonly attributed to accidental impregnation of

the food with metallic poisons, or, in rare instances, to some chemical change in its organic constituents, the nature of which, if it differed at all from ordinary putrefaction, was unexplained, and at that time inexplicable. Indeed, much of the etiological research of the last twenty years has had reference to the production of disease in man through the agency of his food. Of necessity all that could be at first established as to the spread of specific disease by milk was the bare fact of accidentally infected milk conveying the specific contagion into the human system. But since the rise and cultivation of the science of bacteriology, more delicate methods of research have become available. And this new method of research has further become available for the elucidation of the phenomena of what has been called "food-poisoning." Fourteen instances of such poisonings out of a larger number that have come under the notice of the medical department of the Local Government Board since 1880 are available for the present purpose, and illustrate the points to which the author desired to draw attention. These are the Welbeck epidemic, due to the eating of cold boiled ham; the Nottingham series of cases due to the eating of baked pork; a case of sausage poisoning near Chester; an instance of poisoning from tinned pigs' tongues at Oldham; an instance of family poisoning by roast beef at Bishop Stortford; an instance of poisoning of several families at Whitchurch by brawn; an instance of family poisoning by roast pork again at Whitchurch; an instance of family poisoning by tinned salmon at Wolverhampton; poisoning by articles consumed at a wedding breakfast at Carlisle; family poisoning by veal pie at Iron Bridge; poisoning by pork pie or brawn at Retford; poisoning by pork pies and boiled pork at Carlisle; poisoning by meat pie at Portsmouth; and the epidemic of pleuro-pneumonic fever at Middlesbrough. In all but the last instance the prominent phenomena were those of gastro-enteric disturbance; in the last the prominent local phenomena were those of pleuro-pneumonia. The essential character of the epidemic was a specific fever, which spread through the locality from person to person and from family to family, partly through the atmosphere and sewer and drain emanations, but partly through the use of infected food. There was a strong family likeness in the phenomena exhibited by the cases of disease observed in the first twelve instances, both in their clinical and pathological features. If the diseases induced in all were not identical, they were so nearly so that up to the present it had not been possible to distinguish them. The phenomena exhibited were those of more or less severe gastro-enteric disturbances and those of more or less pronounced disturbance of the nervous system. The first symptoms of serious illness usually set in without the preliminary warning, at a varying period after the eating of the poisonous food. They were rigors, or a sense of faintness with muscular weakness and prostration, sometimes very severe, giddiness, abdominal pain, vomiting and diarrhœa, commonly of a very offensive character. These symptoms were soon followed by fever, headache, often intense, and great thirst; and as the malady progressed other nervous disturbances had been observed, such as cramps, muscular twitchings, various disturbances of vision, dilatation of the pupil, drowsiness, and even sometimes coma. Convalesence was apt to be tedious, and had sometimes been accompanied by desgemination of the cuticle. The phenomena observed in the principal organs of the body after death were inflammatory, hæmorrhagic or destructive changes in the stomach and intestines, pulmonary engorgement, or a hæmorrhagic condition of the lung tissues, and inflammatory or destructive changes in the liver and kidneys. These were phenomena not of mere local irritation but of a general disease having alliances with our ordinary specific fevers. The author then gave a detailed account of each of the fourteen cases cited, with the results of Dr. Klein's examinations of what remained of the food where such had been made. In conclusion Dr. Ballard said the following inferences appear to flow from the instances of food-poisoning thus briefly outlined.

1. The phenomena which we speak of as "food-poisoning," productive now of one and now of another sort of definite malady among consumers of certain foods, are claiming, on ever-growing evidence, to be regarded as true infective diseases, as much so as scarlatina or tuberculosis.

2. In infected food capable of producing disease on being eaten we find one or both of two things—a living microscopic organism and an organic chemical poison of greater or less virulence.

3. Of these two things, that which is immediately operative in the production of the morbid phenomena is the chemical poison which is apparently of a basic nature and a product of the processes of bacterial life.

4. Specifically different bacteria capable of producing this chemical poison may through its agency give rise in the human system and in animals to clinical phenomena and pathological changes in the organs which are so similar that at present they cannot be distinguished.

5. Given the bacterium and favourable environment, the bacterium may grow, multiply, and produce its own special chemical poison from the material which affords it nourishment either outside the body or within it. One important element of environment is temperature. If a bacterium will not grow at the temperature of the body, it of course will not produce its operative chemical poison when introduced into the system.

6. Moreover, both the bacterium that produces the chemical poison in an infected food and the chemical poison itself may apparently be evanescent; perhaps in the former case the bacterium being killed by its own products, and perhaps in the latter case because the chemical poison undergoes destructive changes. Hence an infected food, poisonous when eaten at one time, may fail to be poisonous when eaten at a later period, or poisonous when inoculated at one time may cease to be so later on; or one portion of an infected mass of food may be poisonous, and another part not be so.

7. As regards the kinds of animal food which in the adduced instances produced mischievous or fatal results. Of the fourteen instances food was or consisted largely of:—

Pig-meat of one kind or another in	9 instances.
Veal	1 instance.
Beef	1 „
Butcher's meat (kind unstated)	2 instances.
Tinned salmon	1 instance.

Dr. Ballard is disposed to think that this is no unfair representation of the relative frequency with which swine's flesh thus gives rise to specific diseases of the kinds referred to, as compared with animal food from other sources.

8. What does all this indicate as an efficient precaution against "food-poisoning?" No one is likely to be hindered by any fear of infection from eating cold ham or gelatinized food of any kind if he likes them. But if we do eat ham or bacon, cold or warm, it is a proper precaution to avoid them if not duly cooked throughout. But the grand precaution of all is the very commonplace one signified by the word *cleanliness*. Every factory where pork is converted into brawn or hams ought to be so arranged that light and a draught of air can penetrate freely everywhere; there should be no corners where refuse matter can lodge and become a centre for the cultivation of mor-

bid micro-organisms in filth; the rise of ground air should be obviated by cement under the pavement or flooring; and the place should be kept scrupulously clean and free from incursion of sewer air or putrid emanations of any kind. Kitchens, and above all pantries and places where food is stored in hotels, public refreshment rooms, or pastrycooks' premises, and in private houses, should be similarly cared for. It should be held to be part of the business of conservators of public health to see that these rules are observed, as well as the business of every master or mistress of a family.

In the discussion which ensued, Dr. Blanchard dwelt at some length on the different modes in which articles of food acted toxically. It was by no means the case universally that the evil effects were due to bacteria, or to ptomaines, and he gave the results of many experiments, showing that, especially in the case of fish, molluscs and crustacea, a toxic principle was developed at a particular season of the year, due to the activity at that period of the generative functions.

Dr. Klein expressed his obligation to Dr. Blanchard for his remarks, because too often the word ptomaine was employed simply to stifle all further inquiry. He had shown plainly that ptomaine poisoning was one thing, and the poisoning by animal food which contained morbific matter at certain seasons was a totally different thing, and for such cases the term ptomaine should never be used. He then described his method of investigating the cases described by Dr. Ballard. In all cases some of the food suspected was given to mice, and in most instances severe gastro-entiritis was produced. The next step was to endeavour to isolate the organism capable of producing the toxic substance. In some instances they succeeded in getting organisms in great abundance, and the products of the cultivation were used experimentally on animals, either by subcutaneous injection or as food. In this way two distinct groups of phenomena had been discovered. In the one a fermentative process was going on, due, no doubt, to bacteria, but which could not be considered in the true sense pathogenic—they did not produce infection. By a true infection he meant the second class, where a microbe was found capable of growing in the living tissue, and thus producing a specific disease. The microbes which had been isolated from poisoned food fell into two categories; one which produced no disease by itself, but when artificial cultivations of it were introduced in sufficient quantity into the alimentary canal disease was produced. With the second set, when even a small trace of the culture was introduced subcutaneously or into the alimentary canal, disease was at once set up. Dr. Klein concluded by exhibiting some slides showing the different forms of bacteria he had found.

SECTION OF CHEMISTRY AND PHYSICS IN RELATION TO HYGIENE.

This section met in the rooms of the Chemical Society, Burlington House. The proceedings were attended by a large audience throughout, comprising many foreign representatives. Shortly after 10 o'clock the President, Sir Henry Roscoe, M.P., LL.D., D.C.L., F.R.S., delivered the following address:—

Sir Henry Roscoe's Address.

Ladies and Gentlemen,—The branch of the great subject of hygiene with which we in this section have to deal, viz., that of the relation in which it stands to the sciences of chemistry and physics, is one of primary importance and interest. Indeed, taken in its most general sense, the relation of the science of health to chemistry and physics will be found to include almost all the varied subjects which come under the cognizance of this Congress, for all vital processes are regulated by chemical and physical laws, and physiology has been well defined as the chemistry and physics of the animal body. Hence the preservation of a normal condition, or of health, being dependent upon these laws, it is clear that our section is the most important of all, for it is by obeying chemical and physical laws that health is maintained, whilst by neglecting to follow them we court disease and death.

But whilst as chemists and physicists we may claim credit for laying the foundations of the edifice of hygienic science, we gladly admit that portions of the building have been raised by other hands, and heartily do we welcome the successful efforts which the biologist, the physician, the engineer, and the statesman have made to help us to complete the building up of a condition of things by which the amount of preventible disease is reduced to its possible minimum, and that of health and well-being increased to the maximum possible under the necessary circumstances of our lives.

As to the progress which during the last half century has been made towards the attainment of this end—he who runs may read. Those who can carry their minds back fifty years will be free to confess that at that time, whether in England or abroad, the principles of sanitary science were recognized only by a very few men of light and leading, and that any attempt to carry out these principles were, indeed, few and far between. Fifty years ago our notions of the nature of contagion, of the causes which lead to the spread of epidemic diseases were of the crudest and vaguest description. We then had no idea of the fact now not only proved beyond doubt, but strongly impressed on the public mind, that both water and milk are fertile carriers of disease if contaminated even ever so slightly with infectious material.

In those days "pump" water was believed to be wholesome if only it was cool and sparkling, and water from a source now recognized as dangerously impure was preferred to the pure article which came from a distance in the city mains. Now the sanitary authority closes all doubtful wells, and municipalities incur vast expense in bringing home to every one a pure supply of this necessity of life. Still much remains yet to be done for an adequate supply—especially in rural districts where the village pump is too often the sole means of existence, and where that pump is not infrequently in close proximity to sources of dangerous impurity. Moreover, even where the supply is of good quality its quantity often fails in dry seasons from lack of any impounding system of the flood waters. That 50 years since our knowledge of these matters was limited is due to the fact that in those days chemists were unable to decide whether a water was harmless or dangerous. The methods of analysis were then crude and insufficient; and even now, when these methods have been greatly improved, the most expert analysts may find themselves in disagreement, on a mere chemical examination, as to whether a given water is fit to drink or not. The discussion of these methods of examination on Thursday next may, I should hope, contribute to the elucidation of these doubtful points.

Fifty years since no one realized that the existence of cesspools under their houses, of which there were then thousands in London, was a source of danger to the inhabitants. The idea of getting rid of and of utilizing fæcal matter was laid hold of ages ago by nations, such as the Chinese, whom we in our wisdom term barbarians, whilst the civilized European waited till the middle of the nineteenth century before he discovered that if he would preserve his life he must remove from his neighbourhood the refuse which accompanies that life, and even now, at the end of the century, he is far from having solved the question of the best way of its removal, much less that of its utiliza-

tion. On Wednesday next we shall have an opportunity of learning the opinion of those competent to give it on the much vexed questions of the chemical and physical principles involved in the treatment of sewage; and if we can lay down, even in outline, what these principles are, our section will not have met in vain.

The question of air pollution, which will come on for discussion during our sittings, is a much more difficult though an equally important one. We can bring pure water into our houses by pipes, we can also take away the polluted water by sewers, we can see the fresh water running in, and we know, if our drains are in order—an assumption it is true, and perhaps a bold one—that our dirty water at least goes away from us. In the case of the air, we cannot regulate the fresh supply so easily. Nature, indeed, does much for us; indeed if she did not, we should be badly off. We cannot see the air, whether pure or otherwise: our sense of smell may, if it be sensitive—which is again an assumption often incorrect—possibly tell us that something is wrong, though it by no means follows that an odourless air is pure and healthy. But to ascertain how far the air is impure, and to express it in figures was, so far as concerns many of the most important of these impurities, impossible fifty years ago, and is only now beginning to be understood. But even were we able to detect the presence in the air of the spores of the as yet undetected influenza microbe we should be far from having a means of freeing the air from it. By filtration through cotton wool, air can be obtained practically free from microbic life as well as from dust particles and fog, but such air filtration can only be adopted in a very limited number of cases, and is altogether useless for general purposes. One of these few instances is that of the House of Commons, where a system of air filtration has been successfully adopted, by which the air of the debating chamber has been preserved perfectly free from fog as well as from microbic life if the doors are kept closed.

The discussion on town fogs and their prevention, which is to be introduced by Dr. Russell, will enable us at any rate to form an idea of the causes and possible mode of preventing these serious drawbacks to a city life. A scientific inquiry, if it does not at once succeed in finding a cure for the evil may, at least, point the way to prevention, and I shall be surprised if we do not find that the ultimate panacea will consist in using gaseous fuel and the electric light.

Another source of air pollution, more easy to grapple with, lies in the escape of deleterious gases from chemical works and other manufactories. The removal of many causes of such pollution has been satisfactorily accomplished in this country under what are known as the Alkali Acts, or more properly the Noxious Vapours Acts. Thanks to the care with which these Acts have been worked, both by the Government inspectors and the manufacturers themselves, the serious complaints which arose of nuisance due to the escape of acid and other noxious vapours are now no longer heard; and not only has the public been the gainer by the stoppage of the escapes which formerly occurred, but the manufacturers themselves have also benefited, inasmuch as they have had their attention directed to improvements in their processes which have proved remunerative.

The great smoke question is one upon which I hope some light will be thrown by the discussion which will take place during our meeting. Much, doubtless, can be done in preventing the output of smoke from factories and other places in which large quantities of coal are burnt, but, after all, the smoky atmosphere of our towns is caused chiefly by the thousands of domestic fires, and at once to alter these so as to prevent smoke, or to insist upon gaseous fuel being generally used instead of coal, is to expect the impossible.

I have said that the foundation of hygienic progress is to be sought in the application of chemical and physical principles. This is true not only of the matters of every day experience to which I have already referred, but also of the most recent and astounding discoveries, showing the dependence of the health of the community on the actions of microbic life. Thus Pasteur and his pupils have proved that these actions on the host or body receiving the microbes as guests are to be attributed rather to definite chemical products formed by the living micro-organisms than to the organisms themselves. For just as in the well-known instance of the vinous fermentation, the products of the action of the yeast plant on sugar are alcohol, carbonic acid, and subsidiary compounds, so each definite micro-organism—such, for example, as that peculiar to diphtheritis—engenders certain active chemical principles which are capable of effecting serious or fatal changes, characteristic of this disease, within the animal body. Hence the ultimate causes of epidemic disease rest upon a chemical basis, and as we find in a simple chemical an antidote for poisoning by any of the commoner chemical poisons, so it would appear that an antidote for hydrophobia, for example, is to be found in the complicated chemical products of the life of the micrococcus characteristic of this disease. How these antidotes—except in the most simple cases, such as acid and alkali and the like—act is as yet unknown. We do, however, know that the growth and life functions of this yeast plant are stopped in presence of an excess of the poison, alcohol, which it secretes, and this fact may help us to explain, to some extent, the protective action exerted by the chemical poison developed by many pathogenic micro-organisms. The elucidation of this subject, all-important for the health of the community as well as of the individual, is one of the most pressing scientific needs of the day. To isolate the various chemical products, to study their actions, both chemically and pathologically, is a necessary step towards the attainment of the end which we all have in view, viz., the prevention and cure of disease. Hence, it will be admitted by all, that whilst the determination of the morphological characters of micro-organic life is an essential preliminary, it is to the examination of the life-functions of the organism, and especially to those connected with the production of its peculiar chemical poison, that we must look for the complete solution of the problem; and, therefore, it is in the laboratory of the chemist, and by the application of chemical and physical methods of research that progress in these matters will, in the coming time, be made. So again, I say that the foundations of hygienic progress are to be sought in the application of the principles of chemistry and physics.

And now, gentlemen, I know that all well-wishers to this progress, whether English members or the foreign guests who have honoured the Congress by their presence, will rejoice to learn that we in England, determined no longer to lag behind our continental friends, are about to establish a National Institute of Preventive Medicine, in which not only researches of the kind I have alluded to can be satisfactorily carried out, but where instruction in the numerous special branches of science, upon which the health of the nation depends, can be given. Those who have interested themselves in this movement feel that it is no less than a national disgrace, that whilst almost every other civilized nation has established an institute of the kind in its midst, we in England should stand alone inactive and supine. We believe that the necessity for such a national institute only requires to be made generally known to be universally acknowledged, and we feel confident that now having obtained the first step towards the attainment of our object, viz., recognition under license of the Board of Trade, the council of the institute will only have to

ask in order to obtain the considerable amount of pecuniary support necessary for carrying on the work of the institute on a scale worthy of the country. I am glad to be able to announce that the Berridge Trustees have already offered £20,000 towards the establishment of this Institute of Preventive Medicine. That is a good beginning, but when you remember that in order to carry out the work of the institute we shall require five times that amount at least, you will see that we still have plenty of room to work for obtaining the remainder of the sum necessary for the purpose. But I believe when the country at large acknowledges, as it will do, the importance of, and the necessity for, this foundation, that the money will be forthcoming. This support must come wholly from private sources; for our Government, unlike that of many countries, as yet holds aloof from supporting institutes of this kind, however necessary they may be to the general well-being of the country. I must echo the words of Sir James Paget when he pointed out the manner in which other governments have come forward, and that it is the duty of the Government to foster these most important institutions in which researches of the highest value can be carried out. That is a work which I think the Government of every civilized country ought to undertake. The time may not be far distant when different views to those held at present on the subject will prevail, and when Parliament will consider it one of its first and most binding duties to support by Imperial grant an institution whose sole aim is that of increasing our knowledge of the conditions upon which the health of the nation ultimately depends, and of diffusing that knowledge widely throughout the land.

Discussion on Town Fogs.

Dr. W. J. Russell, F.R.S., then read a paper on "*Town Fogs and their Effects*," in which he dealt, first, with the circumstances which lead to the formation of fogs, and pointed out that dust particles are necessary for their production, but may be filtered out of the air by passing it through cotton wool. He then referred to Aitken's experiments on dusty and on dust-free air, and pointed out the smallness of the amount of matter capable of determining the formation of fog, and that even purely gaseous products cannot pass away when a fog exists, as is shown by the accumulation of carbonic acid which then takes place. Taking 4 in 10,000 volumes as the amount of carbonic acid in London air, he had found it increased in a dense fog to 14·1, which must represent a very serious accumulation of the general impurities of the air. Products of complete combustion are capable of acting as fog producers. There is great variation in the character of fogs, from wet fogs to dry fogs, and they may be made to give their own account of their constituents by analysis of the deposits they leave. As to the meteorological conditions under which fogs usually occur, the persistence of fogs above the dew point is noticeable. Some fogs do not reach the ground, but exist only in the higher regions. The impurities in the air of towns are absorbed by fogs. An estimation of sulphates, chlorides, and organic matter in London fog, and comparison of amounts, show that they are greater than in the air of the suburbs. Quantitative determinations have been made of fog deposits collected at Kew, Chelsea, and Manchester, showing the quantities of soot and dust contained in them. At the Kew orchid houses 20 square yards of roof yielded 30 grammes of deposit, representing 22 lbs. to the acre, or 6 tons to the square mile. Professor Dyer said the deposit at Kew was "like brown paint." An examination and analysis had been made by the Manchester Committee, and important and interesting experiments carried out showed the presence of a large amount of metallic iron and magnetic oxide. Evidence showed that fogs have increased in London and other towns, and that there is a relationship between the increase of dark fogs and the consumption of coal in London. In regard to the effects produced by fogs, it was stated that a three days' fog at Manchester produced a deposit containing per square mile 1½ cwt. of acid and 13 cwt. of blacks. The general effects on the human subject were serious, and statistics showed that the death rate is seriously affected by fogs. In the London district (an area of fifteen miles round London) in 1875, 4,880,000 tons of coal were consumed, while in 1889 the consumption had risen to 6,390,000 tons, and supposing only 1 per cent. of the sulphur escaped and accumulated in fogs that would represent a serious impurity. A marked effect was produced by them on plant life, as shown by the experiments made at Chelsea by Dr. Oliver for the Horticultural Society. Town fog has a powerful destructive action on many kinds of plants, and interesting results had been obtained from an investigation of the nature of the specific poisons which may exist in fog. Fogs are in almost all cases produced by a sudden and great reduction in temperature with a large resulting increase in the death-rate, which is, however, attributable rather to the sudden fall in temperature than to the fog itself. Fogs have a great action in absorbing light, and have a special power of absorbing the more refrangible rays. An estimation of the amount of gas burnt in London to compensate for the light absorbed by fogs gave 25,000,000 cubic feet in London in one 24-hours day during the winter. Deleterious effects on health must arise from this absorption of light. A comparison of the amount of sunshine in London with that in the neighbourhood, and some other places, resulted much to the disadvantage of the metropolis. Experiments on the distances at which objects are visible during a London winter showed the density and opacity of London fogs. Upon the questions whether fogs can be abolished from towns, and whether, if not abolished, they can be rendered free from foreign matters, the answer was that as long as coal is burned in towns dense fogs must form. Fire-grates, kitcheners and furnaces might be much improved, but it was improbable that the improvement would be so great as to ensure perfect combustion. The alternative was to adopt gas and coke for fuel. Even then the presence of sulphuric acid in the air would still have to be considered, but our fogs would at least be white. The social aspect of the question still remained, namely, how to compel people to give up using coal, for it was impossible at the present day to do as was done in the reign of Edward I., that was to try, condemn and execute a man for burning coal in the City of London.

Mr. Hartog, in reference to the investigations and experiments which had been made on the subject in Manchester, said the first thing they desired to ascertain was the amount of sulphur as an indication of what the presentible impurities were, which of course included the products of combustion in animal bodies, sulphuric acid being of course due wholly to coal combustion. Significant results were obtained. In the centre of Manchester during three days snow 10 milligrammes of sulphuric acid per metre were found deposited on the first day, 19 on the second, and on the third it had risen to 31. Three miles from the centre of the town only 7·5 milligrammes were found on the third day. This showed the necessity of having various stations for obtaining trustworthy information. Other experiments in Manchester led to similar results in regard to the impurities in the atmosphere, and great advantage might be obtained from experiments of the same kind in other large towns in the country. An interesting description was then given of the apparatus for determining the amount of sulphurous acid in the air. Dr. Russell had

collected the dust from the air by using cotton wool, and his example was followed in the Manchester experiments. They also used permanganate according to Tidy's method. With Dr. Russell they entirely agreed also as to the serious effects from want of light in foggy weather. Like him the Manchester Committee was unable to prescribe a panacea for fog, but their object was at all events to take the first step of ascertaining and describing its symptoms.

Dr. Theodore Williams remarked upon the effects of fog upon persons suffering from bronchial catarrh, bronchitis, and pneumonia, resulting, when prolonged, in anæmia. Strange to say, people apparently ready to die recovered to some extent in fog. Although among aged persons and infants mortality was then largely increased, the death rate for the mass of the population between one and sixty years of age was actually lower when the temperature was reduced, as was the case last winter when it was 1·6 below the average for twenty years previously. At Brompton Hospital he had had instances of bronchial asthma, patients being greatly benefited by foggy weather, and one who came up to London from Devonshire at the point of death actually so far recovered as to alarm his friends by on the second day "getting up and going out in the fog." Others again had expressed a preference for travelling on the Underground Railway, especially between Portland Road and Gower Street, while the only part of the river they could enjoy was the neighbourhood of the Isle of Dogs. Cotton-wool about one inch in thickness was used at Brompton Hospital to filter the air.

The President: Quite insufficient; you must have a thickness of six or eight inches to draw away the fog particles suspended in the air. In the House of Commons it is a foot thick, the air being driven through by means of a fan. In that way a perfectly pure supply of filtered air is obtained. The same method is employed in many schools in Scotland.

Mr. Ernest Hart said nearly all the knowledge they had on the subject they owed to Dr. Russell, Professor Austin Roberts, and another great authority on the question of dust in fogs, Professor Aitken, but much more was required before anything useful could be done. It was useless so say fogs were beneficial even to asthmatic patients, and it would be very unfortunate if any statement should apparently go forth on the authority of Dr. Williams that fog would under any circumstances be anything else than injurious. Many absurd statements had been put forward, based on the "large amount" in the air of creosote and soot, which were antiseptic and beneficial to health, but no scientific basis existed for them. In fact, the small quantity of creosote in the air was absolutely useless for such a purpose, and its effect could not for a moment be put in competition with the numerous evils resulting from fog and impurities in the atmosphere. As to Dr. Russell's suggestion, he was sure the reduction of temperature accompanying fogs would not explain the decrease of mortality. At any rate much more exhaustive analyses would have to be made before that theory could be accepted. Its evil effects were not confined to respiratory diseases, but included the results of deprivation of light. Roses would grow in London thirty years ago, and the last conifer in Kensington Gardens died some time ago. Wax could be bleached in London twenty years ago, but had now to be done at a distance. Rough tests of that kind showed the effects of fogs and impurities in the air. We were legislating to abolish cellar dwellings, but practically in our large towns everybody lived in such abodes on account of the thick darkness surrounding them. Urgent legislation, therefore, was very necessary in this matter. The Smoke Nuisance Abatement Association had done a great deal in directing public opinion to it, and the only reason they had not so far been able to do anything tangible was that the public themselves apparently did not wish anything to be done. Lately they had got a Committee of the House of Lords appointed on the subject, and that Committee had reported in favour of a simple tentative measure making it permissible for bye-laws to be adopted in certain districts requiring new houses only to be furnished with the means of consuming their own smoke by any one of the dozen methods now at the choice of local authorities. That was under the "most practical means" clause. A large number of municipalities petitioned in favour of the measure, including London itself, but unfortunately Lord Wemyss, representing the Property Defence League, opposed the Bill, urging that it was an interference with the sacred rights of property, and that landlords should not be compelled to do anything of the sort. The Duke of Westminster, to his credit, supported it, but the general landed interest prevailed, and the Bill was thrown out, without one word of remonstrance from either newspapers or sanitary authorities. It was to be hoped that the Congress would raise its voice, and call on the Local Government Board to take steps to limit or minimize the production of smoke from dwelling-houses. To legislate for factories alone in our great towns for that purpose was useless. Smoke was indeed no longer emitted from factories, breweries, printing establishments, etc., in London, the nuisance was mainly caused by dwelling-houses.

Dr. Tripe, Medical Officer for Hackney, agreed with Mr. Ernest Hart as to the injurious effects of fogs. In Hackney, as soon as they set in, an increase in the death-rate followed. Low temperature was certainly not so fatal, as was proved by a comparison of statistics for such periods and for foggy weather. Fog was not necessary after all for asthmatics, even supposing it benefited their condition, for the required atmosphere could be produced in their own bedrooms, so that was no argument in its favour.

Dr. Edward Haughton, of New York, concurred with Mr. Hart that legislation was most urgently required in this direction, as the public could only be moved by compulsion, no doubt a great evil if it could be avoided, but necessary here. Count Romford, some twenty years ago, in his celebrated and valuable essays, had upon this very question pointed out what was required for the purpose of domestic smoke consumption. The death of plants was a subject for gardeners, and was a small matter compared with the effects of the absorption of light upon humanity, that being one of the greatest elements in preserving health. Mere cold did not kill people, but fog when associated with it was an enormous factor in the increase of death-rates. Dr. Albert Carpenter had advocated a tax upon houses to give a sufficient motive to owners in making the necessary changes in the construction of the grates. Six-sevenths of the fuel consumed in this metropolis was wasted, and that waste was the cause of terrible suffering to the poor. It was an awful state of things that people should be dying wholesale for want of sufficient means of warmth when that means is devoted to polluting the atmosphere. House-owners ought to be made to consume their fuel properly by some of the various ways recommended by the Smoke Nuisance Abatement Society.

Mr. Ernest Hart interposed to say on behalf of the Society that they were not able to do it.

Dr. Haughton could only say in that case they were more modest than Count Romford. All open grates were wasteful. The Congress ought to pass a resolution in favour not of a £1 house-tax as proposed by Dr. Albert Carpenter, but of some smaller tax which would supply a sufficient motive to house owners.

Professor Oliver, of Kew, then read a paper upon the "*Effects of Fog upon Plant Life.*" He said those effects were found to be very marked in orchid collections,

and were injurious to the leaves, foliage, and young shoots of plants and flowers at even 40 miles distance from London. Their nutritive organs were affected and destroyed, and they died. As regards the injurious constituents of London fog, sulphurous acid was conspicuous, in Manchester hydrochloric acid. By experiments in closed chambers he had been able to produce upon plants all the effects and phenomena of London fogs. The changes produced were a gradual swelling and then breaking down of the protoplasm, resulting in the death of the plant in three-quarters of an hour or less. No doubt the sulphurous acid in fogs was the chief cause of mischief to both animal and vegetable life. The tissues of leaves absorbed metallic oxides, particularly iron from fog deposits. It had been found necessary for the preservation of plants at Kew, as for the protection of legislators in the House of Commons, to filter the air through cotton wool, and to supply the deficiency of light in foggy weather by electric illumination.

Mr. Pridgin Teale, of Leeds, said the remedy for the evils mentioned was no doubt the use of gaseous fuel, but practically we were a long way from that. Imperfect combustion was caused by having the fuel insufficiently heated, surrounded by iron and air, the heat produced being carried away as rapidly as possible. The correct principle was to burn it in a "hot jacket" of fire brick, the grate being converted really into a crucible. That was really going back to the principle of Count Romford, who only went wrong in allowing cold air to get underneath his grate.

Herr Andresen having addressed the section in German for a few moments,

Herr Lehmann, of Wurtzburg, speaking in the same language, said people there suffered as did Englishmen from fogs, but owing to their better methods of heating in the houses by closed stoves, dust was not present to the same extent in the atmosphere. Still their public statues, marble and bronze, were affected much as were our own.

The President felt very strongly in regard to the remarks of Mr. Hart, that some representation should be made on this subject to the Government. He would be happy to do anything he could to bring it forward in the House of Commons, and would now propose the following resolution:—"That this Section for Chemistry and Physics in the International Congress of Hygiene and Demography request the President of the Local Government Board and the Home Secretary to take into consideration whether legislative measures cannot be introduced to lessen the amount of smoke produced in dwelling-houses in towns, and thus diminish the density and mitigate the evil effects of town fogs."

The motion was seconded by Mr. Ernest Hart, and carried unanimously.

Mr. Raffle suggested that a committee should be appointed by the section to consider the whole question.

The President said as there were so many committees, societies and associations in various parts of the country who were moving in the matter, it had perhaps better be left in their hands.

Smoke from Factories.

Mr. A. E. Fletcher, H.M. Chief Inspector of Alkali Works, then read a paper on "*The Means at our Disposal for Preventing the Emission of Smoke from Factories and from Dwelling Houses.*" He first made reference to the antiquity and persistence of the complaints against black coal smoke, and said that action was taken to suppress smoke by Royal edict in 1386. A Parliamentary inquiry was held in 1829 and in 1843, and legislation followed in 1853, in 1856, and 1875. The effect of these Acts on the smoke of London had been greatly to diminish the amount emitted from factory chimneys and steamboats on the river. The Metropolitan Smoke Acts were administered by the police, while the smoke clauses of the Public Health Act were in the hands of the local sanitary authorities. Black smoke was the result of imperfect combustion, and the conditions to be observed in order to prevent it are:—(1) The admission to the furnace of sufficient air; (2) The mixture of that air with the combustible gases; (3) The ignition of the mixture by exposure to sufficient heat. The difficulty of observing these conditions in a hand-fed furnace was then shown, and various mechanical appliances referred to. Gas firing was dealt with, and analyses given of fuel gases taken from furnaces where various descriptions of coal were consumed. The smoke of domestic fires was next touched upon, and the difficulty of correcting the open fire. The general heating of the air of the house by central stove in the basement was recommended, with the use of gas as a fuel.

Alderman John Mack, of Manchester, as a member of the Smoke Committee there, was of opinion that whatever might be said of factories, domestic fire-grates were far greater sinners. At Manchester they had now very little smoke from any other source except ironworks; they had less now than formerly, and the authorities were still doing all they possibly could to reduce it. The Committee had afforded great facilities there for the use of gas in domestic cooking, and considerable improvement was hoped for in that direction.

Mr. Courtenay, of Chelsea, pointed out the defective construction of our present stoves and grates, and invited members of the section to inspect a hand-fed furnace of his own on an improved principle. The right principle, he said, had not been adopted anywhere except at Crossness and Barking.

Dr. Delépine gave a demonstration of an apparatus for removing the smoke of fires from the air of towns, and for using it for the purpose of disinfecting sewers. The model was, while working, closely watched with much interest by the members present.

The President, in giving a summary of the action of the apparatus, said the smoke was sent by means of an ordinary Bunsen water-pump into the supposed sewer down below. In the process a considerable quantity of the black deposit was washed out of the air. It was further suggested that in large towns the sewage itself might be employed for the purpose of washing the air. This was certainly a novel suggestion, and it was difficult to say how far it would commend itself to the opinions of the section. They would, however, be glad to hear any suggestions which would tend to elucidate this fog question, and would promise a means of getting rid of the difficulty.

The section adjourned to 10 the following morning.

The Disposal of Sewage.

On Wednesday morning a discussion upon the sewage question was opened by the reading of a paper on the "*Chemical and Physical Processes employed in the Treatment of Sewage*," by John C. Thresh, D.Sc., M.B., etc. In introducing this subject Dr. Thresh said his remarks would refer exclusively to water-carried sewage. In the majority of towns the sewers conveyed domestic sewage, manufacturing refuse, and rain and storm water. The domestic sewage might or might not include human excrement. The manufacturing refuse would vary in character with the staple industry. The rain and storm water chiefly affected the sewage by increasing its volume in proportion to the rainfall, and this occurred at irregular intervals. To avoid this disturbing element of variation in quantity, many towns recently sewered had adopted the "separate" system of sewerage, conveying as much of the rainfall as possible directly into the running streams. Where this had been done the amount of sewage to be

disposed of daily was a fairly constant quantity, and the difficulties in treating the sewage had been reduced to a minimum. The great variation in the strength and character of the sewage in different localities rendered it impossible to devise any one system of treatment which should be universally applicable. Moreover, the degree of purification required was not constant. Where the sewage could with safety be cast into the sea, or into the estuary of a tidal river, purification need not be nearly so complete as when its only outlet was into a stream which, a little lower down, furnished the water-supply to the towns and villages on its banks. The deleterious matters contained in water-borne sewage were chiefly "organic," and of two kinds, soluble and insoluble, the former being in solution and the latter in suspension. The insoluble portion might be divided into (*a*) living organisms: bacteria, etc., and (*b*) dead organic matter. The relative importance of these constituents of sewage in reference to its purification was a subject which admitted of considerable diversity of opinion. But where the effluent passed into a stream furnishing the water-supply to communities lower down along its course, no system of treatment would be satisfactory which did not remove entirely specific organisms and suspended impurities. The dissolved organic matters also must be reduced to a minimum by precipitation, oxidation, or in some other way. To effect this a combination of processes was usually resorted to, physical and chemical. A classification of these was a somewhat difficult matter, inasmuch as certain groups overlap the others; but the following would, probably, answer every purpose:—1. Subsidence—(*a*) With complete rest; (*b*) During slow, but continuous flow; 2. Mechanical straining and filtration; 3. Chemical filtration; or percolation through materials exerting some chemical, or catalytic, action on the organic matters; 4. Precipitation by the addition of one or more chemicals. These may be—(*a*) Soluble, as the salts of iron and aluminia; or (*b*) Insoluble, as clay, magnetic oxide of iron, and the various kinds of charcoal; 5. Electrolysis, or purification by electrical treatment; 6. Oxidation and destruction of the organic matter by addition of chemicals; 7. Sterilization and disinfection for the destruction of micro-organisms, and the arrest of putrefaction; 8. Nitrification, or the destruction of the organic matters by the action of the nitrifying organisms found in surface soils; 9. Irrigation, or the utilization of the organic matter as food for growing crops. In exceptional cases only was any one of these processes alone found to yield sufficiently satisfactory results. To attain such results, two or more of them must be used in combination or in succession. Thus, after the addition of chemicals to effect precipitation, the precipitate must be removed either by subsidence or filtration, or by both, and the effluent may even require further purification, either by percolating through land for "nitrification," or through specially prepared chemical filters. Even where the sewage was passed on to the land, a preliminary straining or filtration, or partial clarification by subsidence was frequently resorted to. Where it was not, the land itself acted as a mechanical as well as a chemical filter. Dr. Thresh then discussed the groups of processes seriatim, and at considerable length. Subsidence, he said, was only applicable as a preliminary to some other mode of treatment; mechanical filtration also could only be considered of real service as an adjunct to some other process. Probably a combination of precipitation, subsidence, and chemical filtration would, in the near future, be regarded with the greatest favour. As to electrical treatment, further experiments were needed to convince the sceptical that this was other than a roundabout way of producing a soluble iron salt to act as the precipitating and purifying agent. Methods of oxidation of organic matters by chemical agents had hitherto either been limited in their success, or the expense had been prohibitive. The practical utility of sterilization and disinfection processes, except as a temporary expedient, was more than doubtful; but sterilization appeared to be most completely effected by the "Amines" process, consisting essentially in the treatment of sewage with a mixture of herring brine and milk of lime. In respect to nitrification, he said it was now conceded that it is preferable to remove suspended matter from sewage before passing it through the soil. The conclusions of Warington as to the action of nitrifying organisms, recently published in this Journal, were also quoted. Lastly, irrigation, as at present conducted, was thought not to offer a final solution of the problem how to dispose of sewage.

The following papers on the subject were also read:—

"*The Power of Soil and Vegetation combined to Destroy Disease Germs, and so prevent the Possibility of the Spread of Enthetic Disease in Consequence of Sewage Farming*," by Alfred Carpenter, M.D. The author referred to the International Medical Congress of 1881, when he submitted a series of propositions, tending to prove that sewage farming was safe. He now reproduced five of the nine propositions then submitted. 1. That the judicious application of sewage in close proximity to dwelling-houses does not depreciate the health of the inhabitants. 2. That the judicious application of sewage to land will satisfactorily cleanse the effluent water, and fit it for discharge into any ordinary rivulet or watercourse. 3. That vegetables from fields continuously irrigated by sewage are satisfactory food for man and beast, and that animals fed mainly on sewage-grown crops are as healthy as animals fed on ordinary agricultural produce. 4. The germs which spread infectious disease are not capable of reproduction on properly cultivated sewage farms, the chemical and vital conditions of the surface of the soil being contrary to their further development. 5. In order to produce the results described in proposition 4, it is requisite that the sewage be kept near the surface, moving over the land rather than through it in a downward direction. It must be kept within the influence of vegetable root fibrils, and of the humus of the soil, and under drainage is not a necessity. The author supported these propositions by a reference to the experience gained during the past thirty-one years on the Beddington Sewage Farm; proofs being adduced mainly from observations made during the last ten years.

"*On the Duty of a Locality to Utilize the Nitrogenous Matter in its Sewage for the Benefit of the Nation*," by Alfred Carpenter, M.D. The object of this paper was to show that localities have duties to the nation to which they belong. The cost of utilizing sewage might exceed the financial returns from the cultivated lands, and for that excess the locality utilizing the sewage would have to pay. But the author contended that the increased production of crops tends to decreased price, which is a national advantage; and he expressed the belief that density of population need not involve high priced provisions if the excreta of the population be properly used in agriculture; and that it is the duty of a nation to produce a sufficient amount of food for the people, so as to be independent of the foreigner in the event of war. He argued that the non-utilization of sewage leads to conditions which allow of the production of disease germs and the multiplication of epidemics, and supported his arguments by the results which have been attained in Croydon, at the expense of a two-penny rate. For this there has been a diminished death-rate; illness correspondingly reduced; five-fold production of crops on the land, giving employment to

many people in the open country, in this way withdrawing them from the crowded towns; and a great production of meat and milk; thus, to some extent, ensuring the nation against the fear of famine if war should break out, and supplies from abroad be stopped. The author strongly protested against any measures being taken to destroy the agricultural value of sewage as being opposed to national interests; and, comparing the sewage of London with that of Croydon, showed that it would be a national advantage to utilize the sewage of London as that of Croydon is utilized, and that the nation would be recouped for this expenditure if the interest on the amount expended were guaranteed by the State.

The President regretted that Dr. Dupré was not able to be present to read the paper announced. Liebig many years ago pointed out that all civilized countries were yearly throwing away millions of pounds worth of matter which should be used for fertilizing purposes. The proper treatment of sewage was a subject of the greatest importance, and we were only really beginning to get information upon it. As yet it had not been placed on a scientific basis in regard to the action of micro-organisms or bacteria. Dr. Thresh's remarks upon that point were therefore most important and interesting. Valuable investigations had been carried out on this subject by the State Board of Health of Massachusetts. Filtration through sand or soil was not a merely mechanical operation. An important action went on upon the surface of each grain of soil or gravel by an enormous number of those micro-organisms, which acted as purifying agents. Until those purifying agents and the true scientific principles for the treatment of sewage were better understood it was almost useless to discuss the competing claims to superiority of lime, blood, iron, or other processes for its treatment. Dr. Carpenter's paper opened up the very wide question, How far it is possible to make use of the sewage of our large towns. Many difficulties had to be dealt with; for instance, the enormous quantity of storm and surface water falling over so extended an area as that of the metropolitan district. If in the early forties, when the cesspool system was done away with in London and sewerage adopted, the rainfall and the sewage had been separately dealt with by a dual system we should have been much better able to cope with this gigantic question.

Mr. Alfred Rœchling, C.E., said this question could only be solved by the joint action of chemists and engineers. In Leicester almost every chemical process had turned out a complete failure, and they had now established an irrigation farm of 1400 acres, the largest in this country. The Berlin sewage farm, which had worked most successfuly, comprised 19,000 acres, though the whole of that area had not yet been laid out. That city was divided for drainage purposes into twelve independent districts, on a radial system. Having twelve pumping stations gave great advantages in reduced depth and size of mains and less lift, thus counterbalancing the greater expense for land. Two sets of pipes, about a yard in diameter, were laid along the sides of the streets, whereby interference with the centre of the roadway was prevented. Ditches about a foot and a half deep for conveying the sewage to the roots of the crops had been adopted as a mean between broad irrigation and intermittent filtration. The land of the Berlin farms, which had disposed of 360 odd million tons of sewage, was as well able as ever to purify it. A profit of about £1 an acre had been made for the last three years, excluding of course repayment of loans and interest. Prisoners undergoing light sentences were employed on the works, and though presumably persons in impoverished health, there had been no single case of typhoid fever there in 1889, when it was prevalent in the city, showing that these farms were not injurious to health.

Dr. Gilbert said the question resolved itself into two distinct branches, purification and utilization. In perfect purification the whole of the nitrogenous matters should be retained in the soil, being oxidized into nitrates. He would not entirely condemn intermittent filtration, where suited to a locality. By the proper utilization of sewage no doubt enormous quantities of succulent food could be produced in this country, both for cattle and human beings, though not to an extent which would render importation of food entirely unnecessary.

Colonel Jones urged that the laws of nature should be followed. Complete circulation exists between animal and vegetable, the waste product of the one forming the nourishment of the other. It was quite useless to treat sewage with homœopathic doses of lime. The ultimate question with the public would be, Do sewage farms pay? The scheme for conveying London sewage to Canvey Island in the Thames was the best.

Mr. Geo. H. Bremner advocated the aëration process as the best for dealing with foul, putrid matter, having employed it in his works for forty years. That was the natural method of purification, and the only difficulty in the way of its general adoption had been that it did not agree with the ideas of chemists, who had so long tried to keep these matters in their own hands, until Sir Henry Roscoe (the President) came forward and frankly declared that nothing could be done without aëration. If the London County Council would add proper aërating machinery to the existing works no more complaints would be heard about London sewage.

Mr. Rœchling, in reply to a question, said the rate required to meet the deficiency on the Berlin farms was less than 1*d.* (·97*d.*) in the £1. They were the most successful and complete extant.

The President remarked that chemistry was very well in its place, but was a perfect farce in connection with sewage.

Mr. Perry (Camberwell Vestry) urged that the Berlin plan of division into districts should be adopted in London, and that the storm water should be dealt with separately from the sewage. Centralization in this matter was a mistake, and cost was of course always a first question with the ratepayers. The sewage would have to be taken at least twenty miles out of London, and it was no use to blink that necessity.

Mr. Sellar, representing the company working the A.B.C. process, contended that it had been absolutely successful, while irrigation had not answered. Sewage could be effectually dealt with therefore, and even for the London 200,000,000 gallons space was all that was necessary.

The Chairman then proposed a resolution which, as finally modified in discussion, stated, "That in the opinion of this meeting the best yet known method of disposing of the sewage of towns is that of purification and utilization on the land."

Dr. C. R. Drysdale seconded the motion, and it was carried.

Dr. Gardiner asked to what extent of precipitation the Croydon sewage was subjected before being distributed on the land—whether the sludge question entered into the matter at all.

Dr. Carpenter said that for years past the sewage had been passed directly on to the land without any treatment beyond sending it through a kind of sieve to intercept matters not capable of being reduced to small proportions, those matters being removed separately and utilized by market gardeners on their land. They calculated 5000 tons of sewage to each acre of land in the year, and obtained in return from it

40 tons of green crops or mangolds. The objections expressed to living in the neighbourhood of sewage farms were entirely ideal, and the result of prejudice. If local authorities would only do their duty no putrid sewage would be found in our sewers, and no doubt that result would be achieved in due time. The division of the metropolitan area into twelve districts was advisable. *Divide et impera* must be the maxim followed in dealing with this immense problem. Land within forty miles of London not worth at present 5*s.* an acre for agricultural purposes would be worth £5 if London sewage were used upon it, and surely the difference between those values would cover the cost. The mistake of wasting sewage matters during the last 800 years (it was not made in Saxon or Celtic times) could not be remedied in a year or two; but when our sewage was properly applied to the land our produce would be immensely increased, and we should be so far saved from disastrous consequences when the day comes that the markets of the world are somewhat closed against us. At Croydon all the known processes of treatment—lime, iron, carbolic acid, charcoal—had been tried and had failed, and success was not achieved until the sewage was applied to the land.

Alderman Bolton (Burslem) said the irrigation system had been eventually adopted in that town, as it had proved the best. One great objection was the expense, owing to the high prices demanded for land, if required for a sewage farm. If only the ordinary instead of a prohibitive price were asked for land in those circumstances the adoption of that system by towns would be greatly facilitated.

Dr. Edward Haughton (New York), referring to the Chinese method of disposing of sewage, said that within that empire, where perhaps one-fourth of the population of the world was congregated, the quantity of food raised was enormous. They simply followed the natural method. The real difficulty in civilized communities was how to use the dry system of treatment without its being offensive. In some places the nature of the soil would cause an enormous increase of bacteria if decomposing matters were placed on the surface. The dry method was preferable, and the worst thing that could be done with manure in any shape was to dilute it. If we would only take the proper course in this matter we should not have to send to the ends of the earth for guano to supply the place of what we at present deliberately destroyed.

The section was then adjourned to the following morning at 10 o'clock.

SECTION OF STATE HYGIENE.

This section met in the rooms of the Astronomical Society, Burlington House, and the following subjects came under discussion:—

Food Adulteration.

"*Food Adulteration and International Measures for its Prevention*," by Dr. P. F. van Hamel Roos, of Amsterdam. The author suggested that having regard to the adulteration of foods, etc., in different countries, international arrangements should be made for preventing such adulteration. Governments should establish a code indicating the normal composition of commercial articles in general, and of food-stuffs in particular. This code should form the basis of decisions in every country on questions of adulteration. Every government should make itself acquainted with the code and with the changes which may have from time to time to be made in it.

Law Relating to the Discharge of Noxious Gases.

"*The Present State of British Law Relating to the Discharge of Noxious Gases from Manufacturing Processes*," by A. S. Fletcher, F.C.S., F.I.C., Her Majesty's Chief Inspector under the Alkali, etc., Works Regulation Act. The author said that in addition to the ordinary sources of air pollution in towns and manufacturing districts, such as arise from overcrowding, from defective drainage, the emission of coal smoke, etc., there were the noxious gases arising from various chemical operations conducted often on a large industrial scale. It was the object of his paper to draw attention to the regulations that have been made concerning them. The law makes no attempt to stop such operations on account of the noxious gases that are generated, but adopts means for regulating them, and sets a limit to the amount of such noxious gases which may be discharged into the air. The Alkali Act of 1863 was the first attempt on the part of the legislature to deal specially with the noxious gases of chemical works. Passed tentatively for five years, it was renewed in 1868, and has been succeeded by the Acts of 1874 and 1881. Previous to the passing of these Acts, redress for injury sustained from the action of noxious gases in destroying the farmer's crops, his trees, etc., could only be sought by an appeal to the common law, which was, however, found insufficient to afford compensation in the case here referred to. The Alkali Act, designed rather to prevent such injury than to give compensation for it, makes the emission of acid gas, beyond certain limits, a penal offence. Under it inspectors are appointed with power of entry to the works in order to secure the observance of its provisions. The Act has not been found oppressive, but on the other hand helpful to the manufacturer. In the last Alkali Act, that of 1881, many works, other than those for the production of alkali, were brought within its scope. There are now 1034 works registered under it, of which 133 only are alkali works. Only those processes of manufacture come under the Act which were specially named in the schedule appended to it. This had led to strange anomalies owing to the constant change and development of chemical processes, and it was much to be desired that a more general noxious gases regulation Act should be adopted, whereby all works, wherein certain noxious gases are generated, should be brought under its control. These noxious gases formed but a short list, namely, chlorine and its acid compounds, the acid compounds of fluorine, nitrogen, and sulphur, including sulphuretted hydrogen. To these might be added metallic fumes containing lead, antimony, arsenic, or zinc. An Act for regulating all works liable to discharge any of the foregoing substances would not require amendment from time to time, as must be necessary when the specific processes of manufacture are named, since these are ever changing. Some even would think it better to make no attempt to enumerate the gases to be considered noxious, and to enact simply, that in the case of every manufacturing process from which a noxious gas may be thrown off, the manufacturer should use the best practicable means for preventing the escape of such gas into the atmosphere. For the purpose of such an Act a noxious gas might be defined as "a gas which gives offence, and is the subject of complaint to the local authority on the part of ten neighbouring ratepayers."

Dr. Abbott (Boston) said the law in the State of Massachusetts with regard to noxious and offensive trades was the oldest of any of the sanitary laws, dating back to 1697, but there was not much trouble with factories of that sort. The principal ones dealt with were those for the manufacturing of artificial manures, and what were termed rendering works, which dealt with hog fat, and all kinds of material of that sort, and often became offensive in the neighbourhood. The first authority dealing with these factories was the local authority, the municipalities, and if they neglected or refused to act an appeal was not

made to the State Board of Health, but the latter could act independently. With regard to Dr. Roos's paper, the State Board of Health had had power to act with regard to the adulteration of food and drugs since 1882. That Act had been followed in a few other States, and an attempt was made to carry it through Congress for the whole country, but without success. In Massachusetts they had done more than in any State in the Union. Since the law came into operation they had examined about 30,000 samples of food and drugs, and had conducted about 700 prosecutions. Under the Act they were compelled to spend three-fifths of the whole money provided, which was now 115,000 dollars a year, in carrying out the law with regard to milk and milk products, butter and cheese, the remainder being expended on all other articles. The particular articles most at fault were spices, syrups, honey, cream of tartar, and a few others. Certain articles, such as bread, they never had any trouble with, and the cereals, flour and sugar, were the same. Glucose, which was made from maize, was a large industry, and he understood a syndicate had just been formed by some English gentlemen with a capital of 20 million dollars for manufacturing it in the Western States. This entered into a great many falsified products, and they were subjects of prosecutions, though it was harmless in itself. The most important prosecutions were those where articles contained deleterious ingredients, and he believed an action was now being taken with regard to copper in canned vegetables. Some proceedings had been commenced just before he left, but he did not yet know the result. They had not yet arrived at the point of regulating the amount of noxious gases which might be allowed to escape from chemical factories.

The Sale of Poisons.

The following paper was then read by G. Danford Thomas, M.D., coroner for London and Middlesex.

On referring to the report of the Registrar-General in 1889 I found that in that year 15,025 persons died from what are termed violent deaths, and that of this number 636 were from the effects of poison. Excluding authentic cases of suicide, which number 260, there are left 376 cases of death arising from poison classified as occurring from accident or negligence. The various poisons recorded as causing these deaths were arsenic, mercury, lead, copper, lunar caustic, phosphorus, sulphuric acid, nitric acid, hydrochloric acid, carbolic acid, carbonic acid, turpentine, paraffin, opium, laudanum, morphia, cordials, soothing syrups, paregoric, chlorodyne, alcohol, chloral, atropine, belladonna, iodine, prussic acid, oil of almonds, cyanide of potassium, aconite, colchicum, strychnine, nux vomica, cocaine, antipyrine, Steedman's powders, Burnett's disinfectant, and besides these a few deaths were attributed to eating fungi, poisonous weeds and poisonous fish. The records of the coroners' courts would reveal in detail exactly how and under what circumstances these deaths occurred, and how, when, and in what form the particular poisons causing such deaths were obtained and taken. Such records are well known to medical men, and are therefore unnecessary to be repeated in detail here. Most of them have been taken in mistake for something else, or taken as overdoses of medical preparations, the dangerous contents of which were unknown to the consumers. Despite the regulations and precautions which, to a certain extent, are imposed in this country by law on the sale of poisons, the would-be suicide manages to obtain what he wants in one way or other, and even, indeed, if effectually hindered in this manner of self-destruction would readily find some other means of accomplishing his object. But, as I have mentioned, the larger number of deaths from poison are classified as from misadventure, and although this term has been denounced by my friend Dr. Hubbard, who has frequently called attention to this matter as inapplicable to many of the cases so recorded, yet the one is properly used as opposed to suicide or the wilful act of some other person. In some instances neglect, not necessarily of a criminal character, may rightly be attributed either to the unfortunate deceased person himself or to the careless act of some one else. In the same year, 1889, sixty-three deaths occurred where the kind of poison was not stated. Now as far as the large majority of deaths from poison is concerned we can obtain fairly reliable facts and statistics, but it is impossible to even estimate the large number of persons who may suffer either from acute or chronic poisoning who may recover, or who do not die from the immediate effects of poisonous drugs. Hospital records will reveal a considerable number, but to these must be added those which every medical man in practice encounters from time to time. It is well known that some of the poisons in the list I have given are contained in many of the proprietary and so-called patent medicines and nostrums which are largely sold to the public, who procure and consume them without any knowledge as to the contents which they contain, the suggestion of a friend or some specious advertisement being the only recommendation upon which they administer to themselves these too often dangerous preparations. It is true that on analysis many of these so called remedies are found to contain harmless ingredients, but on the other hand a large number of them contain what has not been inaptly termed concealed poisons, such as morphia, and all the varying preparations of opium, prussic acid, antimony and other poisonons drugs as found in chlorodyne, black drops, soothing syrup, some of the balsams, elixirs, tooth powders, etc., and even in so called blood mixtures arsenic and iodide of potassium have been discovered in quantities capable of producing poisonous results. Dr. Hubbard has referred to what he has not inaptly termed the "running away knocks at death's door" constantly occurring, the most frequent result of which is profound coma for many hours. These have no public register, they are only recorded on the tablet of the memory of the families in which they occur, and in the diaries of the medical men. Having briefly referred to the deaths and cases of poisoning that arise in so many instances from preventable causes, I would draw your attention to the sources from which these poisons are obtained, and the facilities with which many of them are sold and purchased, and then after mentioning the regulations affecting the sale of poisons in this country in their naked and concealed forms, I will endeavour to suggest what further regulations might with advantage be adopted as a means of lessening the mortality from poisoning, and reducing the danger to health and life which now exist from the indiscriminate sale of proprietary and patent medicines containing some of these concealed poisons. There are three Acts of Parliament regulating the sale of poisons, the Arsenic Act of 1881, and the two Pharmacy Acts of 1852 and 1868 respectively. These Pharmacy Acts contain two schedules of poisons, and when a poison contained in either schedule is sold it must be labelled with, first, the name of the article, secondly, the word "poison," thirdly, the name and address of the seller, and in addition to this, when any poison in schedule 1 is sold there must be an entry in a poison book, with the date of the sale, the name and address of the purchaser, the name and quality of the article, the purpose for which it is wanted, and further it is not to be sold unless the purchaser is known to or introduced by some person known to the seller. The following are the list of poisons contained in the schedules referred to. Having read the poison schedules Dr. Thomas continued: Now, it will at once be seen that there are still a large number of poisons not included in the

above lists, and these can be purchased without restriction from any one who likes to sell them. For example, carbolic acid, nitric acid, hydrochloric acid, sulphuric acid, and phosphorus, as rat poison, can be procured at most chandlers and oil shops from 1d. upwards by any person of any age, and they can be sold, and often are, in any kind of vessels, ginger-beer bottles or tea cups, without cork, label, or indication of any kind as to the nature of their contents. Poisons bought in this way cause a large number of deaths from poisoning, classified under the headings of misadventure and suicide. I should mention that the wholesale dealers are exempt from the operation of these Acts, so that any quantity of poison can be obtained from them without restriction. A photographer told me recently that he had only to send his boy to the wholesale house and he could obtain as much cyanide of potassium as he wanted without any difficulty. Besides the chemist and druggist, the chandler and the oil shop keepers who sell poisons, there are about 13,600 tradesmen in Great Britain other than those mentioned, consisting of grocers, linen-drapers, general storekeepers and others, who are dealing in mysterious secret medicines, many of them containing poisons the nature and properties of which are absolutely unknown to the vendors. In the year 1888 there were in Great Britain 21,600 licences taken out for the sale of patent medicines. Comparatively speaking there are very few patent medicines. The composition of a really patent medicine is known and can be seen at the patent office, but a proprietary medicine is a secret preparation, and hence preferred by the owner, but both bear the Inland Revenue stamp and are vaguely termed by the public patent medicines. Over £200,000 was realized by the Government last year from the sale of medicine stamps, and about £6000 from licences to sell. These figures will give some idea of the extent of the sale which takes place annually in Great Britain in secret remedies, and is a painful record of what charlatanism and quackery are able to achieve in this so-called enlightened age. How far, then, is the State to interfere as regards the health of the people in the sale of poisons and of secret remedies containing poisons. In making regulations care has been taken not to hamper the requirements of trade. Bearing this in mind, I would respectfully submit that much stricter regulations might be enforced, and still the purchaser, either wholesale or retail, would not be subject to one half the restrictions he has to submit to if he desires to remove a cask of wine or the spirit from a bonded warehouse in the docks. As an amendment to the Pharmacy Act I would remove such poisons as morphia, laudanum, chloroform, nux vomica, belladonna, chloral hydrate, and corrosive sublimate from the second to the first schedule of poison, and all those poisons that can be procured at the oil shops, and which I have already mentioned, should at once be placed in schedule 2 so as to insure their being labelled as directed by the Act. I would further make it compulsory that all such liquid posions should be sold in a distinctly coloured bottle, and that no one under the age of sixteen should be served at all. Such regulations would inflict hardship on no one. With regard to the sale of proprietary and secret medicines containing poisonous drugs I would have the contents clearly expressed on the label, and the word "poison" added as required in the sale of such poisons under the present Act. Let us see what the Japanese are doing in this matter. They have established a public laboratory for the analysis of chemicals and patent medicines. The proprietors are bound to supply a sample with the names and proportions of the ingredients, directions for its use, and an explanation of its supposed efficacy. During the year 1889 there were no fewer than 11,904 applicants for a licence to prepare and sell 148,091 patent and secret medicines in Japan. Permission for the sale of 58,638 different kinds was granted, 8592 were prohibited, 9918 were ordered to be discountenanced, and 70,000 remained still to be reported upon. The majority of those authorized to be sold were of no efficacy, and few were really remedial agents. The sale of these was not prohibited as they were not dangerous in any way to the health of the people. In Italy, only as recently as January 1 in this year, the sale of secret remedies became subject to the following regulations. The composition and the quantity and quality of the active subtances contained must be written on the labels and on the advertisements, and no special therapeutic virtue or indication is to be attributed to them either on the label or in the advertisement, but they may be sold only by chemists under th e vigilance of the sanitary authority, and on medical prescription. In France the pharmacien is forbidden to sell secret remedies or even to keep them on his premises under certain penalties. In Germany the chemist may sell patent medicines when ordered by the physician, but he must not sell secret remedies. All patent medicines sold by the chemist must be prepared under special supervision, according to the rules of the pharmacopœia. In America the practice varies in the different States, but generally speaking the sale is unrestricted. Other nations seem in advance of Great Britain in respect of the precautions taken in the interest of the public health with regard to the sale of poisons and secret medicines containing poisonous drugs. We might surely in many respects follow their example. I have one further suggestion to make as regards the sale of secret medicines. I would make all proprietary medicines really patent. Indeed, abolish the licences to sell them, and I would confine the retail sale to chemists and druggists only.

Dr. Littlejohn (Edinburgh) said as surgeon in the police for thirty years, he thought that possibly his experience might have enabled him to add some suggestions to those of Dr. Thomas, but he with his wide experience in a much larger area had, he found, made every suggestion possible, and he very cordially supported him. Nothing was more disgraceful than the ease with which preparations of opium could be procured by the vulgar. He had on several occasions taken from the pockets of a suicide twenty small phials of laudanum. Any child might go into a druggist's shop and purchase 1d. or 2d. worth without let or hindrance. He strongly supported the suggestion that opium and its preparations should be put in schedule 1.

Brigade Surgeon McGann spoke in very strong terms from his experience in India of the evils arising there from the totally unrestricted sale of poisons. He had constantly advocated some amendment of the law in that respect, but utterly without effect. Arsenic for instance was easily procurable in every bazaar, and it was very largely resorted to for the purpose of poisoning; of course it was easily discovered after death, but then discovery was too late to be of any service. It was very desirable that something should be done in this matter, and he hoped the section would express some opinion on the subject.

Mr. M. Carteighe (President of the Pharmaceutical Society of Great Britain) said: As I happen to know something about poison legislation, and officially it my duty to institute prosecutions from time to time, I may be allowed to say that with the conclusions Dr. Danford Thomas has come to in his paper I for one cordially agree. I should desire to say that I do not do so because I am officially connected with a body of men in whom it is proposed that the restricted power should be vested, but solely and entirely in the public

interest. Since the passing of the existing Act of Parliament we have had the greatest difficulty in carrying out the powers entrusted to us. There have been so many ways in fact of circumventing the language of the Act that, as Dr. Danford Thomas knows, it has been almost impossible in many cases to prevent the indiscriminate use of statutory poisons. With regard to the important question that he raises, how far proprietary medicines containing morphia and other potent preparations should be prohibited, I ought perhaps not to say much, because it is my duty with my colleagues at some time or other to consider that point in relation to our existing powers, but I should say that from the point of view of a citizen of any ordinary State, it certainly is demoralizing that while on the one hand the pharmaceutical chemists of the country are restricted in the sale of laudanum and other preparations under certain conditions, and while they carry out their duties in that respect, an ordinary huckster in the street may sell any quantity of the same laudanum if mixed with treacle or some other harmless material. The result of legislation has been that whereas the sale of what may be called statutory poisons as such has been diminishing, the sale of quack medicines or nostrums containing poisons and secret remedies has increased enormously since the Act passed. It seems curious, but it appears to be so from the observation of medical men, that in proportion as difficulties are placed in the way of obtaining alcoholic liquors, so there is an increased desire and demand for these secret preparations containing poisons which under the present statute are not allowed to be sold except under certain restrictions. We all know the enthusiasm, if one may call it so, or the excitement, which is now evinced on the question of total abstinence, and the attempts made in the Legislature to interfere with the sale of alcohol, and yet while doing this to prevent one evil, another evil of magnitude almost as great, if not greater, is springing up side by side. I venture to throw this out as one reason why the suggestion Dr. Thomas makes should be considered at an early period by some government department.

On the motion of Dr. Danford Thomas a resolution was unanimously agreed to that in the opinion of the section the existing law regulating the sale of poisons should be amended, and greater restrictions placed upon the sale, especially in Great Britain, India and her colonies.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The stated monthly meeting of the Council of the Pharmaceutical Society of Ireland was held on Wednesday, August 5, at Number 11, Harcourt Street, Dublin. The chair was occupied by the Vice-President, Mr. William Frederick Wells, junr.

Also present — Messrs. T. W. Robinson, G. H. Grindley, P. J. Lyons, R. Simpson, P. Merrin, S. P. Boyd, G. Beggs and Arthur T. Ferrall (Registrar and Clerk to Council).

The Registrar read the minutes of the last meetings, which were signed.

The Registrar read a letter from the Privy Council acknowledging receipt of letter and copy of regulations for assistants to pharmaceutical chemists, also a communication from the Privy Council acknowledging receipt of further letter with reference to the same subject.

The communications were marked "read."

A letter was read from the British Pharmaceutical Conference desiring names of delegates to the Conference to be held at Cardiff.

Mr. Grindley proposed, Mr. Lyons seconded, and it was resolved "That the Vice-President, Mr. Beggs and Mr. J. C. C. Payne (Belfast) be nominated delegates."

The Registrar read a letter from Messrs. John Finlay and Henry V. Golden desiring to be placed on the Preliminary Register. Their request was complied with.

The Registrar read a letter from Mr. John Robson, L.P.S.I., notifying his change of address to Headford Place, Kells.

Mr. J. Walker, M.P.S.I., wrote desiring that "The *Chemist and Druggist* may be substituted in lieu of the *Pharmaceutical Journal*."

The Vice-President: We will have to have this decided at the annual meeting, and we may mark the letter "read." If it be the wish of the annual meeting to have this request complied with we shall of course do so.

The Vice-President moved in accordance with notice "That the words following be added to regulation 1, examination for assistants to pharmaceutical chemists:—"and have lodged the fee of two guineas to the credit of the Society."

The Registrar said the regulation would then read, "Candidates presenting themselves for examination who have passed the preliminary examination of the Society, or such examination as is equivalent thereto, and have lodged the fee of two guineas to the credit of the Society."

Mr. Grindley seconded the motion, which was carried.

The reports of the examiners on the Preliminary pharmaceutical licence and druggists' examinations held in July were laid on the table.

The Vice-President: In Dublin two were stopped and twenty-one passed on July 8; on the 9th there were three stopped and eighteen passed. In the Belfast examination there were six out of twenty-six who failed, and two were absent. In Cork four passed.

Mr. Lyons: As to the Belfast examination, the day after the examination reports appeared in the Belfast papers of the examination, and one of them was headed "Pharmaceutical Examinations in Belfast." Some notice ought to be taken of the matter, for the report referred to was utterly misleading. The Council, I submit, should interfere, because reports like this (which I produce) should not be sent out without authority. I think the Registrar ought to write to the Examiner and ask him to forward the results directly to the Registrar.

The Vice-President: In Dublin we send official reports to the papers.

Mr. Lyons: So far as the examiner Dr. McKinny is concerned he was in no way responsible for this report that appeared in the paper.

The Vice-President: I will instruct the Registrar to tell the Examiners that in future the Council would like to have reports sent to them without informing the candidates or the Press the result.

Agreed.

The Registrar read a letter from Mr. Sunner, Visitor to the Druggists' Examination at Cork, and also the reports from the Law, Declarations and House Committees.

The reports were passed.

On the motion of Mr. Robinson, seconded by Mr. Biggs, Mr. Grindley was elected Auditor in room of Mr. Hayes.

The Vice-President proposed that Mr. J. C. McWalter L.P.S.I., 19, North Earl Street, Dublin, be nominated to membership.

Mr. Grindley seconded the motion.

Carried.

The Vice-President moved, Mr. Lyons seconded, "That the following be nominated to membership:—Messrs. Robert R. Ritson, 25, High Street, Belfast; John Thompson, 100, Peter's Hill, Belfast; Thomas N.

Moffatt, Crumlin Road, Belfast; James L. M'Allister, 5, Clarinda Place, Belfast; and John Gorman, Bangor, county Down.

Mr. Boyd moved, and Mr. Robinson seconded, that the following gentlemen be nominated as Associate Druggists:—Messrs. J. M. Ross, Carlow; John Lavin, Elphin; F. C. Judge, Mitchelstown; Joseph Annesley, Arklow; Patrick Toole, Westport; George Meares, Moyvore; E. P. Ryan, Thurles; J. R. Gorman, Ballymote; Thomas E. Gordon, Gorey; Robert Dormer, Newtownbarry; John Smyth, Trim; Arthur Burns, Mohill; Gerald O'Toole, Tullow; Mrs. Mary A. Byrne, Bollinakill; Mrs. E. M. Cunningham, Ballymore; Mr. Thos. Maxwell, 3, Alexander Terrace, Bray; Mr. J. F. Donaghy, 47, Kower Ganlinen Street, Dublin; and Mr. Henry Farrell Noas.

Mr. Robinson moved, the Vice-President seconded, as Associate Druggists—Mr. R. Humphrey Smith, J.P., Mountmellick, and Mr. Richard Ellis, Mountrath.

The Vice-President: The fourteen druggists who were proposed in July as "Associate Druggists" have not paid their subscriptions, and therefore cannot be elected to-day.

The accounts were passed as follows:—Mr. Chambers, stationery and printing, £8 7*s.*; *General Advertiser* notices of examination, £4 7*s.*; Alliance Gas Company (gas for three months), 15*s.* 7*d.*; the Registrar, postage and sundries, £5 5*s.* 11*d.*

Adjourned.

The following were admitted for Registration as Chemists and Druggists in business as such prior to August 11, 1875:—

Harty, J.	Nenagh.
Garty, P.	Raharney.
Kelly, T.	Moate.
McLoughlin, J.	Castlerea.
McMaster, G.	Dublin.
McNinch, J.	Larne.
Meany, Ellen M.	Callan.
Peel, J.	Armagh.

SYNONYMS OF MEDICINAL PREPARATIONS.

The following remarks relating to the application of the term "Milk of Sulphur" are quoted from the 'Report for 1890 on the Revision of the British Pharmacopœia, 1885,' recently presented by Professor Attfield to the General Medical Council:—

Sulphur Præcipitatum. Precipitated Sulphur.—Suggested synonyms, *Lac Sulphuris*, Milk of Sulphur.

It will be necessary to treat these names and synonyms somewhat fully in order that there may be no mistake in future as to their true significations. At present the whole subject is in a state of confusion.

The London Pharmacopœia of 1721 gave the first process for Lac Sulphuris; offering such a choice of one of two leading materials as would, we now know, afford practically pure precipitated sulphur on the one hand, or precipitated sulphur mixed with more or less sulphate of calcium—dependent partly on the extent of edulcoration, but probably always with much, sometimes two-thirds, of this calcareous substance—on the other hand. The London Pharmacopœia of 1746, omitting one of the two materials just alluded to, gave a process for Sulphur Præcipitatum, which would, we know, afford only the mixture of precipitated sulphur with more or less sulphate of calcium, and pointed out that lac sulphuris was the usual name for this product, but that sulphur præcipitatum was to be the new name. The London Pharmacopœia of 1788 set forth a process for Sulphur Præcipitatum that would yield practically pure, that is non-calcareous, precipitated sulphur; and Dr. Healde's translation of the London Pharmacopœia of 1809 also gave for "Sulphur Præcipitatum, P.L. 1787, P.L. 1745, Lac Sulphuris, 1720,"* such a lime-and-hydrochloric-acid process as would yield what is known as pure precipitated sulphur; which process and name have been retained officially to the present time, with the exception of the period from 1836 to 1851, when sublimed sulphur alone was official. The last London Pharmacopœia, that of 1851 to 1864, was best known to pharmacists by Phillips' translation, in which the process just alluded to is introduced by the following list of names and synonyms: "Sulphur Præcipitatum, P.L. 1824. Precipitated Sulphur. Lac Sulphuris, P.L. 1721. Sulphur Præcipitatum, P.L. 1746, P.L. 1788, P.L. 1809." Other leading authorities—Gmelin, Chemistry; Pereira, Materia Medica; Redwood, Pharmacy; Squire, Pharmacopœias Compared; and all British authors of repute, though they also allude to the calcareous article, treat "Precipitated Sulphur" and "Milk of Sulphur" as one and the same thing. Many, probably most, British pharmacists of the present day apply the name "Milk of Sulphur" indifferently to the calcareous and non-calcareous varieties of milk of sulphur.

Respecting sulphur obtained by precipitation, therefore, we have in Great Britain two quite different things, each represented by the same two names. We have calcareous precipitated sulphur, and we have non-calcareous precipitated sulphur. The former has been, and will always be liable to be, termed "Precipitated Sulphur" and "Milk of Sulphur." The latter has been, and will always be liable to be, termed "Precipitated Sulphur" and "Milk of Sulphur."

In other countries no such state of confusion exists, for the simple reason that while two names, "Precipitated Sulphur" and "Milk of Sulphur," are everywhere used, two things are unknown. The calcareous precipitated sulphur is never manufactured, never used. It appears to have been imported into the United States from Great Britain under some misapprehension ('Proceedings of the American Pharmaceutical Association,' vol. xix., pp. 60, 61 and 346); but outside the British Empire calcareous precipitated sulphur is practically unknown to the civilized world. Other peoples use only the precipitated sulphur which is unmixed with precipitated sulphate of calcium, and which sulphur they term indifferently "Precipitated Sulphur" and "Milk of Sulphur." The processes prescribed for its preparation in official and other books, and its stated characters and tests, suffice to prove that outside our Empire the calcareous precipitated sulphur is unknown. That, in other countries, the terms "Precipitated Sulphur" and "Milk of Sulphur" mean one and the same thing, and that both terms are freely employed in most countries the following references will establish. Lochman's translation of the German Pharmacopœia of 1884, published in the United States, gives the following names and synonyms for what is ordinarily known as pure precipitated sulphur. "Sulfur Precipitatum, Precipitated Sulphur, Schwefelmilch, Milk of Sulphur, Lac Sulfuris, Præcipitirter Schwefel." The Russian Pharmacopœia thus heads the paragraph on the substance in question: "Sulfur Præcipitatum, Lac Sulphuris." The Greek Pharmacopœia, under "Sulphur Præcipitatum," gives, "Syn. Lac seu Magisterium Sulphuris. Ital., Zolfo precipitato o Latte di Zolfo. Gall., Soufre précipité. Angl., Milk of Sulphur. Germ., Schwefelmilch." The Danish Pharmacopœia, "Sulphur Præcipitatum (Lac Sulphuris)." The Swiss Pharmacopœia, "Sulfur Præcipitatum. Synon. Lac Sulfuris." The United States Dispensatory, "Precipitated Sulphur. Lac Sulphuris; Milk of Sulphur; Lac (s.

* These are the dates of official authorisation. They fall in the year before the dates of official publication, the printer's few months intervening in each case. These Pharmacopœias are more commonly known as those of 1788, 1746 and 1721.

Magisterium) Sulphuris ; Soufre précipité, Lait de Soufre, Fr. Schwefelmilch, G." The Portuguese Pharmacopœia, "Sulfur Præcipitatum, Leite de euxofre." The Mexican Pharmacopœia, "Sulphur Preæcipitatum vel hydratatum. Magisterio de azufre, Leche de azufre; Soufre précipité, Franc; Milk of Sulphur, Ing." The Hungarian Pharmacopœia, "Sulfur Præcipitatum, Lac Sulphuris." The Netherlands Pharmacopœia, "Sulfur Præcipitatum. Lac Sulfuris." The Swedish Pharmacopœia, "Sulphur Præcipitatum. Fäldt Svafvel." The Austrian Pharmacopœia, "Sulfur Præcipitatum. Lac Sulfuris." The Norwegian Pharmacopœia, "Sulphur Præcipitatum. Pharmacopée Française, Soufre précipité. Ceteræ: Sulphur Præcipitatum. Lac Sulphuris. Svovelmelk."

The original source of the confusion in Great Britain, caused, not by calcareous precipitated sulphur being termed both "Precipitated Sulphur" and "Milk of Sulphur," nor by non-calcareous precipitated sulphur being termed both "Precipitated Sulphur" and "Milk of Sulphur," but by each of these two different substances being called by the same two names, is not easily explained; first, because the genesis of the term "milk of sulphur" has not been made out satisfactorily; secondly, because we do not know whether to set down to pharmaceutical accident or to therapeutical design the production of both varieties under P.L. 1721, and the calcareous variety, only, under P.L. 1746. The name "milk of sulphur" was probably originally applied to the *milk-like fluid* obtained on adding an acid to an aqueous solution of a polysulphide, afterwards being retained for the sulphur precipitated from that fluid. (See the following work quoted by T. B. Groves in the *Pharmaceutical Journal*, 3rd series, vol. vii., p. 18. The *New Dispensatory*, printed for J. Nourse, 1780.) If this be so, a simple pair of experiments will show that each fluid must have been equally milk-like, the fluid containing suspended sulphur only, and the fluid containing the mixture of suspended sulphur and suspended hydrous sulphate of calcium, hence that neither could have had a monopoly of the name, "Milk of Sulphur" through it alone having a milk-like appearance.

If, as some special pleaders have argued, the calcareous precipitated sulphur was probably the original "milk" of sulphur because its colour would be likely to obtain for it such a name, whereas the colour of the non-calcareous precipitated sulphur would not suggest the term "milk," it is very remarkable that the compilers of the 1746 Pharmacopœia (who first definitely ordered what may be distinguished as the calcareous precipitated sulphur) should, of all persons, have desired the name "Milk of Sulphur" to be changed to "Precipitated Sulphur." It would be natural to give the name "Milk of Sulphur" to a milk-like fluid of which the chief and invariable component was the old mineral or sublimed sulphur of the first three London Pharmacopœias, 1618, 1650 and 1677; it would not be unnatural to retain that name in 1821 for the sulphur deposited from the milk-like fluid, seeing that it both resembled and differed from the original sulphur; and it would be natural to change that name, in 1746, to "Precipitated Sulphur," because of the incongruity involved in retaining the name "milk" for a pulverulent substance. Probably the presence of hydrous sulphate of calcium in the "Sulphur Præcipitatum, P.L. 1746," was an accident, and, so far from being designed, was not considered of any moment; perhaps it even was not known to be present; for there is no good evidence forthcoming that precipitated sulphate of calcium has or was ever considered to have any therapeutical value.

Whatever be the history of the matter in this country, and whatever the practice in other countries in past or present times, it is at least quite clear that in England the Pharmacopœias have, at different dates, recognized both non-calcareous precipitated sulphur and calcareous precipitated sulphur. Moreover, the calcareous sulphur has officially been termed both Lac Sulphuris and Sulphur Præcipitatum. Not only so, but the non-calcareous precipitated sulphur also has officially been termed both Lac Sulphuris and Sulphur Præcipitatum. Hence neither substance can claim unquestionable monopoly of the name Precipitated Sulphur; neither substance can claim unquestionable monopoly of the name Milk of Sulphur.

Following the lead of the Pharmacopœias, medical practitioners, pharmacists and the public from time to time appear to have favoured now one and now the other of these two varieties of sulphur, terming the calcareous variety both *milk of sulphur* and *precipitated sulphur*, and terming the non-calcareous variety both *milk of sulphur* and *precipitated sulphur*; a natural and excusable conservative feeling often inducing individuals to continue to favour the variety and name to which they had become accustomed, even though that variety and name had perhaps ceased to be current in the Pharmacopœia of the time. Continuing to follow the official lead and the Pharmacopœias above mentioned having ceased for a hundred years to recognize the calcareous variety, most medical men have gradually ceased to use it; and many druggists have ceased to sell it, and have successfully induced their customers to purchase only the non-calcareous variety, the purchasers themselves, however, in the majority of cases continuing to ask for "milk of sulphur." The public seem in fact to be quite unable to adopt such changes in names, and pharmacists are consequently, and not unreasonably, requesting that their efforts to sell only the non-calcareous precipitated sulphur of the British Pharmacopœia, when asked for "milk of sulphur," should, in harmony with the history of the subject in this country, and past and present practice in other countries, be supported officially by *Lac Sulphuris* and "Milk of Sulphur" being inserted as synonyms of *Sulphur Præcipitatum* in the next edition of the British Pharmacopœia. See *Pharmaceutical Journal*, [3], vol. xx., p. 573, and vol. xxi., pp. 428 and 592.

There can be little pharmaceutical objection, for any direct reason, to the course suggested; for while pharmacists have as a body always rightly resented any imputation of fraud in connection with the sale of calcareous milk of sulphur (though never sympathizing with vendors who have got into difficulties through sheer carelessness in selling a different variety of sulphur to that demanded by a purchaser), they have as a body, at all events since the Pharmaceutical Society was organized in 1841, evinced a desire to sell the non-calcareous varieties in preference to the calcareous. William Ince, Charles James Payne, and Jacob Bell, names now familiar as those of early Presidents of that Society, all spoke of the calcareous variety as impure precipitated sulphur at the Pharmaceutical Meeting held on April 13, 1842; Mr. Edward G. Schweitzer also, one of the first of the Honorary Members of the Society, at the Pharmaceutical Meeting of January 11, 1843, stating that he published similar remarks in 1837. At that time the calcareous precipitated sulphur alone seems to have been the article sold to the public. From that time to the present the non-calcareous has been growing in favour, and the calcareous in disfavour with the leading British pharmacists. See "Sulphur" in the Indexes to the *Pharmaceutical Journal*, 1st series, vols. i., ii., and xi.; 2nd series, vols. ix., x.; 3rd series, vols. v., vi., vii. Had success attended a suggestion made sixteen years ago (*Pharmaceutical Journal* [3], vol. v., p. 670) to restrict the names "*Lac Sulphuris*" or "Milk of Sulphur" to the calcareous variety, there might now be some objection to the insertion of those names as synonyms of *Sulphur Præcipitatum* in the next British Pharmacopœia. But

the suggested restriction was never accepted, and is never likely to be; for, as shown in the foregoing paragraphs, it is altogether inconsistent with the history of the names or the substances, and it is quite impracticable, the public often using the name "Milk of Sulphur" for, and most pharmacists recognizing that name as meaning, the purer variety.

Even if the hydrous sulphate of calcium be useful as a diluent, it would be desirable to add it subsequently rather than to precipitate it with the sulphur. In that way a medical practitioner could, obviously, command constant proportions, instead of being obliged to accept the present inconstant proportions of the sulphate to the sulphur. Besides, different prescribers, or any one prescriber at different times, would be able to vary the proportions at discretion, which he cannot easily do at present. However, it will be time enough to enter on the question, if there be any such question, of the diluents of sulphur when the confusion resulting from the use, in Great Britain, of the present names and synonyms of precipitated sulphur has been removed.

As for either the pharmacological or the therapeutical action of the large proportion, often two-thirds, of precipitated hydrous sulphate of calcium ($CaSO_4,2H_2O$) in the calcareous milk of sulphur, it would seem to be unimportant. As already stated, we have no historical evidence that it was ever designed or intended to be present originally, or even that it was known to be present at all. Of course it has none of the properties of plaster of Paris, or nearly anhydrous sulphate of calcium, the official *Calcii Sulphas* ($CaSO_4$), as some persons who have written against the use of calcareous milk of sulphur have asserted; nor, disregarding certain published evidence associated with special pleading, does it appear to have any important laxative medicinal action such as has occasionally been claimed for it. Precipitated sulphate of calcium may, however, well stand on its own therapeutic merits if it have any. It might be prescribed alone, it might be ordered to be mixed with pure precipitated sulphur; or, if the official recognition of "*Lac Sulphuris*" and "Milk of Sulphur" as synonyms of the present *Sulphur Præcipitatum* be regarded as likely to weaken the effect of the decision in what is known as the Runcorn or Knutsford appeal case—only a decision at Quarter Sessions, on *ex parte* evidence and argument; a decision which allows the calcareous precipitated sulphur to be sold as "milk of sulphur"—the precipitated mixture now under consideration might be prescribed by or sold under any one of the following four names: "Sulphur Præcipitatum, P.L. 1746," "*Lac Sulphuris*, P.L. 1746," "Precipitated Sulphur, P.L. 1746," "Milk of Sulphur, P.L. 1746." The effect would be that if "Milk of Sulphur" were asked for by a purchaser without any qualification of those words, the non-calcareous variety only would properly be supplied; a sale of the calcareous variety, even though labelled "Milk of Sulphur, P.L. 1746," would not exonerate the vendor; while if, as between purchaser and vendor, there were a clear understanding that the calcareous variety was required, by whatever name called, its sale under the label "Milk of Sulphur, P.L. 1746," would fully protect the vendor. The wishes, interests and demands of physician, pharmacist, and purchaser would thus be provided for, while any little trouble would rest where, all things considered, it perhaps ought to rest. Besides, the insertion of the suggested two synonyms need not be effected, unless distinctly desired by pharmacists, until the next edition of the British Pharmacopœia is published, when all parties will have had ample notice of a change, or course of action, or rather, a slight remarshalling of nomenclature, of no great moment in itself, though somewhat far-reaching, because affecting a question that has raised much warmth of feeling in Great Britain and no little inconvenience; a course of action that will harm none and benefit all, and produce harmony where hitherto has been discord.

The foregoing facts and considerations may be summarized as follows. The calcareous precipitated sulphur has long ceased to be a Pharmacopœia article in this country. It is not and never has been used in other countries. It has long ceased to be generally prescribed by British medical practitioners. Its sale has increasingly been discouraged by British pharmacists in favour of the non-calcareous precipitated sulphur. Should this tendency to displace calcareous precipitated sulphur by non-calcareous precipitated sulphur be encouraged? Probably everybody would reply in the affirmative if there were only some reasonable guarantee that pharmacists, in vending calcareous milk of sulphur to purchasers who apparently desire to possess that variety, would not be liable to be accused of fraud, and would not be liable to be put to the trouble of defending themselves from the charge of having done an illegal act. A choice of two modes of reaching such a guarantee is at their disposal. The one has already been found to be impracticable and also has the demerit of encouraging rather than discouraging the use of calcareous milk of sulphur. It is the restriction of the name "Milk of Sulphur" to the calcareous variety. The other is perfectly practicable, and has the merit not of prohibiting but of discouraging rather than encouraging the use of the calcareous variety. It is the use of the label, "Milk of Sulphur, P.L. 1746." The attempt to introduce the former method is worthy rather of mere druggists, who, aiming only to please purchasers, and knowing nothing of the mystery of P.L. and B.P., desire simple and distinct names under which to sell "Precipitated Sulphur" and "Milk of Sulphur." The adoption of the other method would, at least, have some little tendency in the direction of the restriction of the sale of drugs to those who are legally qualified for the duty, would be consistent with the spirit of the Merchandise Marks Act, of the Food and Drugs Act, and of the Pharmacopœia clauses of the Medical Acts and the Pharmacy Acts, and would be in harmony with the aims of medical practitioners and pharmacists, and with the true interests of the public.

The writer having long and dispassionately considered this subject, and having during the forty years of his close connection with pharmacy, carefully watched the development of the somewhat tender subject of the synonyms of sulphur, both on its own merits and as illustrative of the still wider subject of official synonyms, strongly recommends British pharmacists to adopt the course now suggested respecting "*Lac Sulphuris*" and "Milk of Sulphur" as official synonyms of "*Sulphur Præcipitatum*." He further strongly recommends pharmacists in their own best commercial and professional interests to adopt a similar course respecting official synonyms generally.

ANSWERS TO CORRESPONDENTS.

C. Skrine.—We do not know enough of the case to justify us in adopting the course suggested.

D. H. Oxen.—Your letter, and the previous one, appear to have been written under a misapprehension of the facts. No well authenticated case, concerning which information is furnished to the Council, is neglected.

W. Moore.—*Camelina sativa.*

D. Dickinson.—*Epipactis latifolia.*

H. G. Maddison.—The occurrence is not a very uncommon one. Some information as to the probable cause of the explosion will be found in a paper by Mr. Hawkins, *Pharm. Journ.*, [3], xix., 775.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Siebold, Forret, Cornish, Humphrey, Austen, Gibson, Ransom, Buck.

LIBRARY

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, AUGUST 22, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE CONFERENCE AT CARDIFF.

DURING the past week the twenty-eighth annual meeting of the British Pharmaceutical Conference has been held in Cardiff, and although the attendance was not so large as it has been in some previous years, when the place of meeting has been more central, it is satisfactory to be able to say that the second gathering of the Association in the principality of Wales has been on the whole a success and the attendance good.

Reception.

The proceedings commenced on Monday evening with a Reception by the President, Mr. WILLIAM MARTINDALE, and other officers of the Conference, held in the Assembly Rooms in the Town Hall. Among the earliest arrivals was the Mayor of Cardiff, the Most Honourable Marquess of BUTE, K.T. The reception was followed by a Conversazione, varied by an exhibition of objects of scientific interest and an excellent chamber concert.

Preliminary Business.

On Tuesday morning, at ten o'clock, the members of the Conference met in the Lecture Theatre of the University College of South Wales and Monmouthshire, when the Marquess of BUTE was again in attendance, and as Mayor of Cardiff and President of the College, gave them a hearty welcome. After a suitable acknowledgment by the PRESIDENT, the Senior Honorary General Secretary read a list of Delegates accredited from various associations, and several letters of apology from absent members of the Conference.

Financial Statement.

The regular business commenced with the reading of the Financial Statement by the Treasurer, Mr. R. H. DAVIES. It contained the usual items, and resembled some of its more recent predecessors in showing that the expenditure had again exceeded the receipts by a few pounds. The principal sources of income had been the members' subscriptions, amounting to £476 12*s.* 3*d.* (representing 1271 annual payments), or about £50 less than in the previous year, and £135 7*s.* 6*d.* on account of 'Year-Book' advertisements and sales. On the other side the principal outlay had been in connection with the production of the 'Year-Book,' amounting to £515 0*s.* 4*d.*

Report of Executive Committee.

The Report of the Executive Committee, which was then read by the senior Honorary General Secretary, was not very startling or even cheerful in its character. It commenced with a statement as to the work of the Unofficial Formulary Committee which was also subsequently made the subject of a special report, and then briefly referred to the resignation of the late Assistant Secretary and the appointment of a successor, the presentation of an Address to the Pharmaceutical Society on the occasion of its Jubilee celebration, and the revision of the 'blue list.' Mention was then made in suitable terms of the irreparable loss sustained by the Conference in the death of its former President, Mr. H. B. BRADY. The only other important paragraph was one containing an expression of regret that the special efforts made since the last meeting to increase the membership of the Conference have failed to realize the anticipated success. On the motion of Mr. MUNDAY, seconded by Emeritus Professor REDWOOD, the report was unanimously adopted.

The PRESIDENT then rose to deliver his address, which is printed in full in another part of this Journal.

President's Address.

Commencing with a brief reference to the fact that the present was the second visit of the Conference to Wales, and some complimentary remarks as to his predecessors in the chair, the speaker proceeded to discuss first the relations of the pharmacist to the public. Tracing an analogy in the recognized position of the press in politics as the fourth estate of the realm to that of pharmacy as the fourth estate of medicine, he expressed a fear that this latter position was not always accorded, and that there was now almost a risk of the pharmacist having to give precedence to the nurse. This was partly accounted for by the fact that the pharmacist does not come into such close contact with the patient during the time of suffering, his meed of gratitude being often the thankless one of having supplied nasty physic. In his relations, however, with the medical profession the pharmacist met with more appreciation, as evidenced by the "acknowledged position" accorded to him by the Medical Council in the compilation of the recently published Additions to the Pharmacopœia. The speaker then proceeded to refer to some of the advances that have been made in recent years in the treatment of disease by medicines, and referred to some of the services that had been and might be performed by the pharmacist. The tendency of pharmacy, of late, it was pointed out, had been to prepare medicines in as definite and stable a form as possible, and to provide chemical substances of

which the purity could be tested. Modern chemistry had in many cases isolated from valued drugs definite active principles, which, having to some extent the same properties as the crude drugs, had been so far accepted medically as possessing the same therapeutic action; but still in this direction much was left undone. In many investigations the therapeutist and the pharmacist came between the physiologist on the one hand and the chemist and botanist on the other. The advances in chemical science and the experimental investigation of recent physiologists and therapeutists had tended to prove that the physiological action on the system of the simpler chemical compounds is, in many cases, a chemical and physical action of the elements of which they are composed, "modified to some extent by what is called life." In the more complex organic substances also there was a marked connection between physiological action and chemical constitution. The physiological action of a certain compound having been ascertained, chemists had endeavoured by introducing certain elements or groups of elements of known properties to modify the action of the original compound in the direction desired by the physiologist or therapeutist. Generally the chemist had been in advance of the physiologist, but the physiologist had at times, by a process of induction, indicated the direction in which he desired the chemist to work. But progress was still hampered by the want of clearer knowledge as to the constitution of many of these complex bodies and their derivatives. These points were illustrated by references to the researches on the relative constitution of morphine and codeine, and of caffeine, theobromine and xanthine; the work of Stahlschmidt, Brown and Fraser, and Tafel on the methyl and ethyl derivatives of strychnine; and the gradual building up of kairine, kairoline, thallin, antipyrin and other compounds. But it was pointed out that the prognostications as to the effect of the new compounds on disease are not always fulfilled, as in the case of tetronal. The President then passed on to other forms of the treatment of disease which have recently attracted attention, speaking especially of the medical use of various lymphs, the preparation of which might one day, he thought, form part of the occupation of the pharmacist. But all these novelties notwithstanding it was thought probable that physicians would long continue to order the pure active principles, or extracts or solutions of natural drugs, and in the preparation of these the pharmacist would be in his element. From this point of view, the work that had been done in respect to standardization was important, and the communications of Messrs. Farr and Wright, published in this journal, showed the necessity for further uniformity. Still this might be overdone, for how could the medicinal action of rhubarb, cascara, or senna, or the appetizing effect of compound infusion of gentian be standardized? Reference was then made to the present imperfect provision for teaching pharmacy to the medical student, and the opinion was expressed that a course of six months' practice under the eye of a pharmacist would be of great service to the embryo medical practitioner before commencing his hospital career. It was pointed out that if the coming race of medical practitioners receive no practical training in pharmacy, they will have no confidence in prescribing, because they will never have known their medicines, and that they will consequently become a prey to the advertising manufacturers of ready-made mixtures and specialties, instead of making use of official preparations. It was recognized, however, that the making of preparations in a wholesale manner might in some cases be for the public weal, though to the detriment of the pharmacist's interests. Some remarks upon the position of the chemist and druggist in respect to the sale of nostrums, and the onus that lies upon him to supply the identical article asked for if he supplies any, led up to a discussion of the question of the introduction of synonyms into the Pharmacopœia. Upon this the opinion was expressed that, notwithstanding Dr. Attfield's reasoning in his recent report, if the British Pharmacopœia is to be made the commercial as well as the medical standard for the articles it contains, and the proposed synonyms are tacked on to the official preparations, pharmacists will often be placed in greater doubt and difficulty, or even danger, than they are at present. If the official list of synonyms were to be extended it would require to be carefully watched, else pharmacists would be placed at great disadvantage as compared with the drysalter in supplying many substances used in the arts and manufactures in a more or less crude condition. After allusions to the work done in the Research Laboratory and the celebration of the Jubilee of the Pharmaceutical Society, a word or two was said as to the desirability of extending the scope of the Preliminary examination, and the address concluded with a record of the loss the Conference had suffered since the previous meeting by the death of its former Treasurer and President, Henry Bowman Brady. At the conclusion of the Address a vote of thanks to the President, moved by Mr. G. F. Schacht and seconded by Emeritus Professor Redwood in an interesting autobiographical speech that will be found on another page, was carried by acclamation.

Before proceeding to the reading of the papers the President, as Chairman of the Unofficial Formulary Committee, presented a report. This was very short, being practically limited to a statement

Report of Formulary Committee.

that a new edition of the Formulary had been issued, in which the nine formulæ authorized in 1889 had been incorporated, together with six others; while seven formulæ had been deleted on account of their having been now accorded a place in the official Additions to the British Pharmacopœia.

The reading of papers was then commenced. These will be published *in extenso* as in former years, with the discussions that followed them; meanwhile their substance is represented in the following summary. The first was a report upon Ipecacuanha, by Messrs. Cripps and Whitby, which was the communication referred to in the report of the Executive Committee as the first instalment of an investigation in aid of which a grant was made from the Conference funds some time ago. The investigation had its origin in the need felt to exist for a thorough chemical examination of ipecacuanha root, on account of the conflicting statements that have been made as to the quantity of emetine it contains and the comparative ignorance as to the other constituents of the drug. The paper contained the details of a general proximate analysis, for which purpose ipecacuanha root in No. 80 powder was exhausted successively with petroleum ether, absolute ether, 65 per cent. alcohol, cold distilled water, and 0·2 per cent. solution of sodic hydrate. From the general results it appeared that the total alkaloid obtained amounted to 2·42 per cent., which probably was not all emetine, though no confirmation was afforded to the alleged presence of a volatile base in the root. Saccharose was found to the extent of 2·12 per cent., dextrose 4·06 per cent., dextrin 2·08 per cent., and starch 44·44 per cent. Among the other constituents observed were a trace of volatile oil, tannin, free fatty acid, neutral fat, various resins, and a glucoside which gave a frothy solution in water, but was not saponin.

Cripps and Whitby on Ipecacuanha.

This was followed by a short note, not included in the printed programme, in which Mr. W. H. Symons described the preparation of an ammoniated tincture of ipecacuanha, which had remained clear although made five years ago. The formula was to moisten one ounce of ipecacuanha with one drachm of 10 per cent. solution of ammonia and then slowly percolate to twenty ounces with 10 per cent. spirit. It seems to be a subject worthy of consideration by the Executive whether papers received at so late a period as almost to preclude proper supervision before reading them may always prove as unobjectionable as the one under notice.

Symons on Ipecacuanha Preparations.

Extractum Euonymi Siccum was the subject of the next note by Mr. M. Conroy. In it the author criticized the statement made in the Additions to the B.P. that when this extract is prepared according to the official formula "the mass may be powdered and kept in a well-corked bottle." Mr. Conroy says that the preparation, when made on the large scale, is really so hygroscopic that the operation of powdering has to be performed in a warm dry room, whilst even then it is very difficult to obtain a satisfactory result, and the resulting powder soon coheres and forms a mass. By drying the extract without the sugar of milk and adding the sugar during the powdering more satisfactory results were obtained. But another plan, which the author says proved in every way a success, was to add light calcined magnesia instead of sugar of milk to the soft extract. The operation of powdering was then performed under ordinary atmospheric conditions without any precaution, and the pulverized extract remained a perfectly mobile powder. The paper led to considerable discussion, some objection being raised to the introduction of so much of an insoluble substance like carbonate of magnesia, while Mr. Naylor said the hygroscopicity of the preparation is due to extractive which is not present in the preparation upon which euonymin gained its reputation.

Conroy on Extractum Euonymi Siccum.

The next paper read was a practical communication upon "Indian Gums for Pharmacy Work," by Dr. Rideal and Mr. W. E. Youle. The gums from India which find their way into the English market were divided for the purposes of this paper into two classes, those which are entirely soluble in water and exude from species of acacia, of which "amrad" is the most important, and those not entirely soluble in water and not derived from species of acacia, which are known under the generic name "ghatti gum." It is the latter class of gums that form the principal subject of the paper, the "amrad" gums being simply referred to as not of much importance from a pharmaceutical point of view, and as resembling in physical properties second-rate gum arabics. The authors, whilst differing from other observers as to the amount of ash yielded by ghatti gum, which they find to be about 26 per cent., or somewhat less than the ash from genuine gum arabic, confirm previous statements that the mucilage formed from it is decidedly more viscid than that from ordinary gum arabic. The "absolute viscosity," as determined by a specially constructed apparatus, ranged for 10 per cent. solutions of gum arabic from ·0639 to ·1850; whilst 10 per cent. mucilages of "ghatti" ranged from ·2880 to ·3621 and 5 per cent. from ·1350 to ·1760. The authors are of opinion therefore that to produce from average ghatti gum a mucilage corresponding in viscosity to the B.P. mucilage of acacia it would be necessary to use not less than 8 parts of water to 1 part of gum. The reagents best suited for the detection of ghatti gum were stated to be ammonium oxalate, which produces in the

Rideal and Youle on Indian Gums.

mucilage only a slight turbidity as compared with the copious white precipitate thrown down from gum arabic; ferric chloride, which causes a slight darkening and a gelatinous precipitate; alcohol, which throws down only a slight precipitate; and mercuric chloride, which produces a white, stringy precipitate, whilst with gum arabic it gives no perceptible reaction. Ghatti mucilage is described by the authors as yellowish or light brown in colour when properly made, and as being much more permanent and retaining its viscosity unimpaired for a longer time than mucilages of inferior gum arabics from Senegal and Barbary. As is known, commercial samples of ghatti gum are generally dirty and mixed with fragments of bark, the tannin from which, if it goes into solution, spoils the colour of the mucilage and causes a further darkening in contact with iron salts. In order to avoid this objection it is recommended that the gum be powdered in porcelain or stone ware, the powder treated with half the quantity of cold water required for the finished mucilage, the whole well stirred until the swollen metarabin has separated from the soluble gum, then strained through muslin, and the swollen pieces of insoluble gum picked out and submitted to similar treatment with the remainder of the water. In this way a strong mucilage can be obtained before the cold water has had time to dissolve out the tannin from the *débris* to any appreciable extent. In the authors' opinion mucilage made in accordance with these directions is quite capable of replacing gum acacia for pharmaceutical work. In the discussion of the paper, however, this position was disputed by several speakers; at the same time it was admitted that for many technical purposes gum ghatti forms a useful substitute for gum acacia.

The Conference then adjourned for luncheon, and on resuming a paper was read on the Estimation of Volatile Oil in Copaiba, in which Mr. CRIPPS described an apparatus he had devised for the purpose. In this the copaiba is submitted to the action of a current of steam, which rapidly removes the volatile oil and leaves the resin in an unaltered condition. Incidentally it was mentioned that in eleven commercial samples of copaiba quantities of volatile oil varying from 40·95 to 59·6 per cent. had been found, and that turpentine appears to be now seldom employed to adulterate copaiba.

Cripps on Volatile Oil in Copaiba.

The occurrence in commerce in recent years of a "Liquid Persian Galbanum," in the form of a reddish-brown liquid of the consistence of Venice turpentine, has led Mr. E. M. HOLMES to attempt to clear up the local and botanical origin of the different varieties of galbanum, and his conclusions were given in the paper next read. Galbanum is usually spoken of either as "Levant" or "Persian," the sorts termed "Persian" differing from the "Levant" in the possession of a turpentiny odour in addition to that of galbanum. Mr. HOLMES is of the opinion that all the varieties of galbanum of commerce under either name come through Persia. As to the botanical origin, so far as evidence is at present obtainable, it appears probable that "Levant" galbanum is yielded by *Ferula galbaniflua* and its variety *β-Aucheri*, and the solid "Persian" galbanum possibly by *Ferula Schair*, Borszcz., but the liquid Persian galbanum by a species nearly allied to *F. galbaniflua*, judging from the fruits found in it. It would appear also that the "*Ferula galbaniflua*" found by Dr. AITCHISON in Afghanistan is not identical with the *Ferula galbaniflua* of BOISSIER, and that neither it nor *Ferula rubicaulis* yield galbanum.

Holmes on Liquid Persian Galbanum.

A Short Description of the Present and Future Water Supply of Cardiff was then read by Mr. THOMAS HUGHES, the borough analyst. The present sources of water supply to Cardiff are the Ely pumping station and the gathering grounds of Lisvane and Llanishen. The water from the Ely pumping station is obtained from headings or culverts driven into the magnesian limestone, and has a total hardness of from 28 to 30 parts. The water from the gathering grounds of Lisvane and Llanishen is also somewhat hard and not too free from organic pollution, which is likely to increase. The two sources yield about twenty gallons per head of the population of the district served, and in order to augment this quantity and provide for increasing numbers the Cardiff Corporation has commenced the necessary works for obtaining a large and pure supply from the Upper Taff Valley. The quality of the water from this gathering ground, which consists of mountain pasture land, is said to be excellent, being very soft and "favourably free from organic contamination," while the bleak and uncultivated character of the district, and its distance from any centres of population, are considered sufficient to guarantee safety from future pollution.

Hughes on the Cardiff Water Supply.

Next, Mr. A. W. GERRARD followed up his paper of last year on the Alkaloidal Values of Henbane grown in this country, by a report on the results of analyses of commercial samples from Germany and France. The German sample, which is described as having had "a rough look, somewhat musty and narcotic odour and dull green colour," was composed largely of the entire annual plant, with about one-fourth of its weight of first year's biennial leaves, in some cases with the roots attached. The French variety had a fair appearance, was pale green, and had a mildly narcotic odour, and consisted entirely of the first year's biennial plant, mainly leaves, with here and there a root attached. Both samples appeared to have been collected at least two years,

Gerrard on Commercial Henbanes.

and they were therefore compared with English specimens of corresponding age. The yields of alkaloid were, from the German 0·0295 per cent.; from the French 0·0398 per cent.; from the English first year's biennial leaves 0·0390 per cent., and from second year's biennial tops 0·0451 per cent. As the average yield from the fresh English leaves, as reported last year, was 0·0665 per cent., it would appear evident that changes detrimental to the quality of the drug must take place with the ageing of a sample.

Ransom on the Constituents of Henbane Seed.

The last paper read on Tuesday was on the Constituents of Henbane Seed, by Mr. F. Ransom, in which the author contributed more definite information as to the amount of alkaloid these seeds contain, previous statements as to which vary from 0·05 to 0·16 per cent. Working by a process that he describes, on seeds from biennial plants of *Hyoscyamus niger* grown at Hitchin, he obtained a quantity of crystalline alkaloid corresponding to 0·058 per cent. in the dried seed. This is rather less than the quantity of alkaloid obtained by Mr. Gerrard from biennial leaves, as reported by him to the Conference last year, and fails to sustain current impressions as to the relative richness of the seeds in alkaloid. For this reason, and on account of the large quantity of fixed oil the seeds contain (18·8 per cent.), Mr. Ransom does not think they can be advantageously used for galenical preparations.

At the conclusion of this sitting most of the members and a good number of ladies made their way to the Pier Head, where they embarked for a channel trip past Penarth Head to Barry island. The weather was not propitious, rain falling heavily during the entire passage, but it cleared up on landing, and after a somewhat long and unpleasant walk, made longer than it need have been by some uncertainty as to the right destination, the company arrived at the Barry Dock Hotel, where tea had been provided. By the time this had been disposed of the boat had been brought into the dock, closer to the hotel, and the company having again embarked, the return passage was made to Cardiff, which was reached about nine o'clock.

On Wednesday morning the Conference reassembled soon after ten o'clock. In the first paper read, on Glacial Phosphoric Acid, Mr. John Hodgkin recorded the results of the analysis of a series of English and foreign samples, which he was induced to undertake by the discovery that a sample of glacial phosphoric acid, represented as being of the quality usually imported into the American market, contained a large proportion of sodium. A sample prepared especially from syrupy phosphoric acid and ammonia, which was obtained in bright colourless lumps, deliquescent to a certain extent, showed upon analysis that it is impossible to drive off all the ammonia by heat, the amount left being equal to 8·05 per cent. of ammonium; it also contained a little silica. The total acid, taken as HPO_3, amounted to 91·52 per cent., of which 48 per cent. was free. A sample of English make, in bright colourless, somewhat deliquescent lumps, contained both ammonia and soda, as well as arsenic, the total acid as HPO_3 amounting to 92·8 per cent., of which 52·8 was free. Four other samples, one in sticks, contained diminishing amounts of free acid, showing respectively 85·44 per cent. of HPO_3, with 46·08 free; 84·48 per cent., with 31·68 per cent. free; 83·84 per cent., with 36·48 free, and 80·10 per cent., with 42·21 per cent. free, the base in each case being practically sodium. A sample made by adding sodium phosphate to ammonium phosphate liquor and calcining retained nearly 5 per cent. of ammonium, whilst one made by calcining microcosmic salt proved to be pure sodium metaphosphate. Speaking of the four samples referred to above together, Mr. Hodgkin expressed the opinion that there is absolutely no reason for such large additions of sodium phosphate, except that it enables the manufacturer, in the absence of any official standard of purity, to undersell the honestly made article.

Hodgkin on Glacial Phosphoric Acid.

Mr. M. Conroy then read a Note on a Proposed Method of Standardizing the Extracts of Nux Vomica and Opium, in which he attempted to deal with the inconveniences resulting from the consistence of these extracts when standardized according to the official formulæ. The modification proposed is to exhaust the drug as at present, then to evaporate to a pilular consistence, test the alkaloidal strength and make up to the correct standard by the addition of glucose. It was also pointed out that genuine Asia Minor opium, dried and powdered as directed, yields 13 to 15 per cent. of morphine by the official test, and that as such opium yields about 50 per cent. of extractive, an extract of opium of 20 per cent. morphine strength is always too soft if fine opium has been used in its preparation. Mr. Conroy is of opinion the standard of the dry powdered drug should be at least 12½ per cent., the official preparations being correspondingly increased in strength. In the discussion that followed Mr. J. C. Umney said a nux vomica extract that was too thin could be stiffened by adding to it extractive obtained by treating the marc from the first operation with a more dilute spirit. Mr. J. Barclay said extract of opium could be similarly stiffened with an extractive obtained by treating opium with hot water, but it was pointed out that such an extractive might contain narcotine and other objectionable substances. The President was inclined to favour the use of sugar of milk

Conroy on Extracts of Nux Vomica and Opium.

rather than glucose if an extraneous agent were employed at all.

In the succeeding paper Mr. A. H. ALLEN offered a contribution to the solution of the difficult question of the assay of aconite preparations. Apparently the best method would depend upon the determination of the quantity of crystallizable alkaloid, but a difficulty arises in the uncertainty as to the extraction of all the crystallizable alkaloid in that condition. The method that commends itself to Mr. ALLEN depends upon the ready saponification of the aconite alkaloids. After extracting the alkaloid by FARR and WRIGHT'S process and converting it into hydrochloride it is saponified by boiling with sodium hydrate, the products being, in the case of aconitine, benzoic acid and aconine. The benzoic acid, dissolved out with ether, is titrated with $\frac{1}{50}$ normal baryta water in the presence of phenolphthalein, and the results are then calculated out on the assumption that each equivalent of benzoic acid represents an equivalent of crystalline aconitine. The correctness of this assumption was, however, afterwards questioned by Mr. J. C. UMNEY, who said that he could confirm the statements of WRIGHT and JURGENS, that *Aconitum Napellus* contains, besides crystalline aconitine, a gummy base that yields on saponification a larger proportion of benzoic acid, which would by this method be reckoned in terms of aconitine, although he had taken a grain of it without inconvenience.

Allen on Assay of Aconite Preparations.

The next paper, by Messrs. R. H. DAVIES and PEARMAN, apparently had its origin in an attempt to answer a question on the 'blue list,' as to whether the time has not arrived when it is possible to give a better definition of Oleum eucalypti, B.P. The authors recorded the results of a large number of experiments upon the chemical and physical properties of a series of essential oils from different species of *Eucalyptus*. A definite answer to the question has not, however, been arrived at; but if it be granted that eucalyptol is the most important constituent of eucalyptus oil, some indications as to the relative value of an oil may be given by its effect on polarized light, pure eucalyptol being practically inactive. An oil with a rotatory action equal to that exerted by ordinary "amygdalina" would therefore be relatively of low value. The "globulus" oil is known to contain a fair amount of eucalyptol, and to it may be added, according to the authors, the "oleosa" and "dumosa" oils.

Davies on Eucalyptus Oil and Eucalyptol.

The Conference then adjourned for luncheon, and on resuming Mr. JOHN MOSS read a communication upon Cascara Bark and its Extracts, which possibly may lead to a modification of the official formula for one of the preparations of this drug. The author has found that although boiling water does extract all the active constituent of the bark, the whole of these are not retained when the decoction is concentrated, and the deposit is not redissolved upon the addition of rectified spirit as ordered in the official formula. He concludes, therefore, that an aqueous liquid extract does not represent the full activity of the bark. On the other hand, he states that proof spirit exhausts the bark completely, and throws down no deposit of therapeutic value, a proof spirit liquid extract being more powerful as a laxative and an aperient than one made by the official method. Further, from some observations made upon the therapeutic action of liquid and solid extracts of samples of cascara sagrada collected in the spring of 1888, 1889 and 1890, and in the summer of 1890, it appeared that bark collected in late summer is in no way inferior to that gathered in the spring, and that the older the bark the more benign is its action. The bark from South Oregon seems also to be preferable to that collected in North Oregon.

Moss on Cascara Sagrada and Extracts.

Mr. S. M. BURROUGHS then read a short note on a preparation of castor oil and malt extract, flavoured with essential oil, in which the flavour of castor oil is hardly perceptible. It is made by rubbing up malt extract in a warm mortar until moderately liquefied and then triturating with it an equal volume of castor oil and flavouring according to taste. Mr. BURROUGHS was undecided as to whether the preparation is a solution or an emulsion, but on the addition of water it forms a milky emulsion.

Burroughs on Castor Oil and Malt Extract.

The next paper read, on the Opium used in Medicine, by Mr. E. M. HOLMES, contained a suggestion that appears to be worthy the consideration of the Indian Government. It is well known that, apart from the efforts that are being made to persuade the Indian Government to discontinue the cultivation of opium for introduction into China, there is a probability that the Indian industry will soon be largely affected by the increased production of opium in China for home consumption. Mr. HOLMES points out that the opium used in Great Britain and her colonies for medicinal purposes is now almost exclusively obtained from Turkey. He thinks that an opium containing the requisite proportion of morphine could be produced in the hilly districts of India, and in view of the probable partial collapse of the trade in the drug with China, he suggests that attention should be paid in India to the production of a medicinal opium that should compete in appearance and strength with Turkey opium in the British and colonial markets.

Holmes on Opium.

In a report upon Medicated Lozenges, B.P., Mr. DAVIS gave the results of analyses of samples

of the thirteen official lozenges obtained from six "leading manufacturers." In respect to weight it was found that the lozenges of the various makers differed from one another very materially, and, not only so, but that lozenges from the same makers, and even in the same parcels, varied to the extent of two grains. As to the quantity of active ingredient, when the average quantity in half a pound of lozenges was taken the result was satisfactory in some few cases and very unsatisfactory in others; but when individual lozenges were taken deficiency or excess of active ingredient became apparent. Tables were appended to the paper showing the weights of the lozenges and the quantities of the active ingredient found. Referring to the gum employed in making the lozenge, the author stated that three out of the six sets of samples contained no gum acacia, but either tragacanth or tragacanth and dextrin. In two others a mixture of acacia and tragacanth had been employed, whilst in the sixth some of the acacia had been replaced by dextrin. Mr. DAVIS is not satisfied with this state of affairs, and he suggests that either the pharmacist should prepare his own lozenges so that each should have a definite weight; or that the Pharmacopœia should state the exact weight of each lozenge, instead of ordering a certain mass to be divided into a certain number of parts; or that the lozenges should be omitted from the Pharmacopœia altogether.

Davis on Medicated Lozenges.

A short note by Mr. SHEPHEARD called attention to a possible danger that may attend the dispensing of prescriptions ordering liquor strychninæ together with an alkaline liquid. In the case mentioned Liq. Fowleri ℥iss was ordered with an equal quantity of Liquor Strychninæ, to be made up to ℥iv with distilled water. Fine acicular crystals were thrown down, which dissolved upon the addition of a few drops of hydrochloric acid and remained in solution. It was suggested that in such a case the prescriber should order Liquor Strychninæ Hydrochloratis.

Shepheard on Dispensing Liquor Strychninæ.

The last paper read was the fifth in a series of communications by Messrs. FARR and WRIGHT on the Solvent Action of Alcohol of Different Degrees of Strength on Drugs used in making Pharmacopœial Tinctures, the four preceding ones having appeared in this Journal. The subject of this paper was tincture of henbane, and from the authors' results it appeared that perfect exhaustion of the alkaloid from the drug may be effected by the use of either strong or dilute alcohol. The authors seem to favour the use of a 50 per cent. menstruum on the ground that it is desirable to exclude chlorophyll from a tincture where this can be done without lessening the medical activity. They recommend that the tincture should be standardized to contain 0·01 per cent. of alkaloid.

Farr and Wright on Tinctures.

The PRESIDENT then proceeded to make the presentation of books provided from the BELL and HILLS Fund. This is usually made to the library of an association of chemists and druggists meeting in the town visited by the Conference. In Cardiff, however, there is at present no such local association, but an arrangement has been made to place the books in the reference department of the free library of the town, where they will be always accessible to any person who wishes to consult them.

Bell and Hills Fund.

The Unofficial Formulary Committee having been thanked and reappointed, an invitation conveyed by Mr. PETER BOA and Mr. D. B. DOTT in cordial terms to the Conference to meet in Edinburgh next year was accepted. Mr. PAYNE broached the question as to the advisability of meeting in the same town as the British Association, and after some conversation gave notice of a motion that will raise the question formally at the next meeting of the Conference.

Place of Meeting in 1892.

The following gentlemen were then elected officers of the Conference for the ensuing year, after a protest from Mr. PAYNE that Ireland was not represented on the Executive, and an inquiry, by Mr. A. H. MASON, answered in the negative, as to whether Mr. MARTINDALE could not be persuaded to serve a second year:—

President—E. C. C. Stanford, F.I.C., F.C.S., Dalmuir.

Vice-Presidents—M. Carteighe, London; W. Gilmour, Edinburgh; Dr. Thresh, Chelmsford; and J. R. Young, Edinburgh.

Treasurer—R. H. Davies, London.

Hon. General Secretaries—W. A. H. Naylor, London; and F. Ransom, Hitchin.

Members of Committee—D. B. Dott, Edinburgh; A. W. Gerrard, London; Professor Green, London; Alfred Coleman, Cardiff; J. Hodgkin, London; E. M. Holmes, London; W. Kirkby, Manchester; J. Munday, Cardiff; and J. L. Ewing, Edinburgh.

Auditors—D. Anthony, Cardiff; and Thomas Thompson, Edinburgh.

Hon. Local Secretaries—Peter Boa and Claude F. Henry, Edinburgh.

Hearty thanks were then voted to the local members, and especially to Messrs. COLEMAN, MUNDAY, YORATH and ANTHONY, for making the arrangements necessary for the entertainment of the Conference; to the Mayor and Corporation of Cardiff for the use of the Town Hall Assembly Rooms for the reception, and to Principal V. JONES and the Council of the University College of South Wales for the use of the lecture theatre in which the meetings of the Conference were held. Lastly came the vote of thanks to the PRESIDENT, moved in happy terms by Mr. S. R. ATKINS and seconded by Mr. TYRER and adopted with an enthusiasm that must have convinced Mr. MARTINDALE of the general appreciation of the admirable manner he had fulfilled the duties of the chair.

Votes of Thanks.

After the conclusion of the business, a party numbering about one hundred and fifty were conveyed in brakes to Caerphilly Castle, where they were entertained to tea in the ancient banquetting hall by the Mayor of Cardiff, after which a lucid sketch of the history of the castle was given by Mr. ROBERT DRANE. The drive was through a beautiful district, but the enjoyment was again marred to some extent by the fall of several very heavy showers.

Thursday morning was fairly fine, and about one hundred and fifty of the members of the Conference and their friends met at the Great Western Station for the final excursion. The first stage was by the South Wales Railway, *viâ* Newport and Chepstow to Lydney. Here vehicles were waiting, in which the party was driven through a beautiful country to the Speech House, in the Forest of Dean. An excellent luncheon having been dis-

Final Excursion.

posed of, the opportunity was taken to thank the local committee of ladies and the managers of the excursion, and after a short interval the carriages were entered and a start was made for Symon's Yat. By this time, however, rain had again set in, and continued almost without cessation to the end of the day. It did not, however, spoil all the pleasure, and the wonderful view of the winding Wye from the top of the Yat, although obscured to some extent, won the admiration of all who saw it for the first time. Tea was served in the Rock Lea House, and that over a special train conveyed the party past Monmouth, Tintern and Chepstow, back to Cardiff, which was reached soon after half-past eight.

British Pharmaceutical Conference.

MEETING AT CARDIFF.

The twenty-eighth annual meeting of the British Pharmaceutical Conference commenced its business on Tuesday morning, the 18th inst., in the Chemical Lecture Room of University College, Cardiff, under the presidency of Mr. Wm. Martindale, F.C.S.

Welcome by the Mayor.

The Mayor of Cardiff (the Most Hon. the Marquess of Bute) opened the proceedings by a brief speech, in which he tendered on behalf of the inhabitants of Cardiff an official welcome to the Conference, assuring his hearers of the cordiality with which they were received, and expressing a hope that the visit would be as pleasurable as he felt sure it would be profitable.

The President thanked his lordship for the cordial welcome extended to the Conference, and expressed his satisfaction that the rapid growth of Cardiff in the matter of wealth and population had been accompanied by equal progress in educational matters, a pleasing illustration of which was afforded by the building in which they were assembled.

Reception of Delegates.

The Honorary Secretary (Mr. Naylor) then read the list of delegates as follows :—

Pharmaceutical Society of Great Britain.—The President, M. Carteighe, Vice-President, Alex. Bottle, Messrs. Abraham, Atkins, Cross, Evans, Hills, Leigh, Southall, Schacht, Editor, Sub-Editor and Secretary.

North British Branch Pharmaceutical Society.—Mr. Peter Boa and Mr. D. B. Dott.

Pharmaceutical Society of Ireland.—The Vice-President, Mr. W. F. Wells, Junr., Dublin, Mr. G. D. Beggs, of Dalkey, Mr. J. C. C. Payne, Belfast.

Liverpool Chemists' Association.—Messrs. Abraham, Bain, Conroy, Ward and Wellings.

Brighton Chemists' Association.—Messrs. D. Savage and Marshall Leigh.

Brighton Junior Association of Pharmacy.—Mr. Kilby Pears.

The North of England Association.—The President, the Vice-President, the Secretary and Treasurer.

Aberdeen and North of Scotland.—Mr. James Paterson and Mr. Kay.

FINANCIAL STATEMENT FOR THE YEAR ENDING JUNE 30, 1891.

The Hon. Treasurer in Account with the British Pharmaceutical Conference.

July 1, 1890. *Dr.*	£	s.	d.	£	s.	d.
To Assets forward from last year—						
,, Balance in hand at Bank				83	0	8
,, Cash in Secretary's hands				3	17	10
,, Messrs. Churchill's Account				107	3	0
June 30, 1891.						
To Sale of Year-Book by Publishers				24	6	8
,, Advertisements, 1890 volume	107	10	4			
,, ,, 1889 ,,	3	10	6			
				111	0	10
,, Members' Subscriptions, Amount received for year ending July 1, 1890, to June 30, 1891				476	12	3
,, Index to Year-Book, sale by Secretary				0	5	0
,, Outstanding Liabilities, Messrs. McCorquodale and Co.				3	4	6
,, Unofficial Formulary, sale by Publishers				6	7	1½
				£815	17	10½

June 30, 1891. *Cr.*	£	s.	d.	£	s.	d.
By Expenses connected with Year-Book :—						
Printing, Binding, Publishing, etc.	293	13	8			
Postages and Distribution	35	11	0			
Advertising and Publishers' charges	30	0	2			
Editor's Salary	150	0	0			
Foreign Journals for Editor	5	15	6			
				515	0	4
,, Unofficial Formulary :—						
Advertising	0	18	6			
Publishers' Commission	0	12	8½			
				1	11	2½
,, Sundry Expenses :—						
Newcastle Portrait Group	4	13	3			
Authors' copies of Papers	0	10	2			
Expenses of Assist. Sec. at Leeds	10	0	0			
Illuminated Address to Pharmaceutical Society	1	10	0			
				16	13	5
,, Assist. Sec.'s Salary from July 1, 1890, to June 30, 1891	45	0	0			
,, Rent of Office	10	0	0			
				55	0	0
,, Blue Lists, Printing	3	4	6			
Postages	2	19	7			
				6	4	1
,, Postages				10	19	3
,, Printing and Stationery				19	17	0
,, Bank Charges, as per Bank Book				0	4	7
,, Petty Cash				4	7	4
,, Liabilities of last year, since paid				0	8	6
,, Outstanding Assets—Messrs. Churchill's Account				110	3	3
,, Balance at Bank	74	4	9			
,, Balance in Secretary's hands	*1	4	2			
				75	8	11
				£815	17	10½

* For Postages, £1 3*s.* 3*d.*; Petty Cash, 11*d.*

THE BELL AND HILLS FUND.

1890.		£	s.	d.	£	s.	d.
July 1.	To Balance in hand	17	4	6			
	,, One Year's Dividend on £360 Consols	9	13	4			
					26	17	10
1890. Oct. 11.	By Purchase of Books for Leeds				10	5	2
	Balance				16	12	8
	Assets—						
	Cash—Balance at Bank				16	12	8
	Consols				360	0	0

Audited and found correct { E. YEWDALL, Leeds. / D. ANTHONY, Cardiff. } *Auditors.*

Western Chemists' Association (of London).—Messrs. W. Martindale, Arkenstall and J. H. Mathews.

LETTERS OF APOLOGY FOR ABSENCE.

The Secretary also stated that letters of regret at not being able to be present had been received from Messrs. Groves (Weymouth), Bentley (London), Hopkin (London), Kirkby (Manchester), Stephenson (Edinburgh), R. Wright (Buxton), Dr. Thresh Ward (Sheffield), Cross (Shrewsbury), Reynolds (Leeds), Benger (Manchester), and others.

FINANCIAL STATEMENT.

Mr. W. H. DAVIES (Treasurer) read the financial statement, printed on the opposite side.

Mr. D. ANTHONY (Auditor) testified to the correctness of the figures.

REPORT OF THE EXECUTIVE COMMITTEE.

Mr. NAYLOR (Hon. Sec.) read the report of the Executive Committee as follows:—

Report of the Executive Committee.

During the past year your Committee has met on various occasions to transact the business of the Conference.

The last edition of the Unofficial Formulary having been exhausted, a revised one has recently been issued. In the revision advantage was taken of the opportunity to make such alterations as circumstances had rendered necessary. With the sanction of the Executive a number of new formulæ have been added, whilst others have been eliminated owing to their adoption by the Medical Council on the recommendation of the Pharmacopœia Committee and their official recognition by publication in the Addendum of the British Pharmacopœia of 1885. Your Committee regards their adoption by the Medical Council as one indication of the usefulness of the formulæ and as an evidence of appreciation of the work done by the Formulary Committee.

The resignation, in December last, by Mr. J. C. Nightingale, of the office of Assistant Secretary, which he had held for the past three and a half years, was received with feelings of regret, and your Committee placed on record an expression of their acknowledgment of the thoroughness with which he had discharged the duties of his post. Mr. M. K. Johnson, Associate of the Pharmaceutical Society, was unanimously chosen and duly appointed to fill the vacancy.

On behalf of the Conference the Executive presented a congratulatory address to the Pharmaceutical Society of Great Britain on the occasion of its Jubilee, which was celebrated in May of the present year.

Some slight alterations were made in the Blue List prior to its distribution. Members are invited to suggest subjects requiring investigation with a view to their inclusion in the next issue of the List.

The Conference has suffered an irreparable loss by the death of H. B. Brady, LL.D., F.R.S., which occurred at Bournemouth in January last. Mr. Brady was one of the Founders of the Conference, and it was to his conspicuous ability and to his untiring zeal in promoting the highest interests of pharmacy that the success of our Association is largely due. He occupied the office of President for two consecutive years—at Brighton in 1872, and at Bradford in 1873. Although during the last few years he was unable to take so active a share as formerly in the business of the Conference, yet his interest in its welfare continued undiminished. The many honours bestowed upon him both in his own country and abroad bespoke the high appreciation in which he was held by the scientific world.

Attention was directed in the last annual report to special efforts that were being made to increase the membership of the Conference. It is a subject for regret that those efforts have failed to realize the degree of success that was anticipated.

No applications for assistance to defray expenses in connection with research have been received during the year. The Committee would again remind members that funds are available for this purpose.

Mr. R. A. Cripps, in conjunction with Mr. Whitby, will present to this meeting a first instalment of their work on ipecacuanha, in aid of which a grant was made some time ago.

The reception held last night by the President and officers of the Conference and the Conversazione which followed were, as usual, largely attended, and formed an attractive preliminary to the serious business of the Conference.

In December last, Mr. Louis Siebold, F.I.C., F.C.S., was re-appointed Editor of the 'Year-Book.' The MS. of the forthcoming volume, so far as it can be completed, is now in the hands of the printers.

It was moved by Mr. MUNDAY, seconded by Professor REDWOOD, and carried unanimously, that the report and statement of accounts be received and adopted.

The PRESIDENT then gave the following address:—

THE PRESIDENT'S ADDRESS.

Ladies and Gentlemen,—For a second time in the history of the Conference we are met in South Wales, in this land of mountains, bards, and song, with its historical reminiscences dwelling in the hearts of its people, who cling to their ancient language and customs with a spirit shown by their annual national festival, or Eisteddfod, held simultaneously with this meeting.

Our former session in Wales was at Swansea, in 1880, under the presidency of my late friend, Mr. William Southall, and in the decade that has elapsed since then, the great centre of industry in which we are now gathered has so largely developed in wealth and importance, that the percentage of its increase in population is double that of any of the other large towns in the kingdom. This shows the great progress that has been made in arts and manufactures by the energy of the Welsh people, aided by the geographical position and mineral wealth of this important district, and the extraordinary facilities that exist for the distribution of its products by sea and land.

It is with great diffidence that I venture to address you, and I feel my incapacity the more in having to follow the many honoured pharmacists who have preceded me in this office, particularly Mr. Umney, who, in his practical addresses at Newcastle and Leeds, dealt in a masterly manner with subjects appertaining to pharmacy from his point of view as a wholesale chemist and manufacturer of pharmaceutical preparations.

May I be allowed, in the first place, to refer to the pharmacist in his relations to the public. As in politics the press is considered the fourth estate of the realm, and perhaps the most powerful, so pharmacy is sometimes regarded as the fourth estate of medicine. It is true that pharmacy is in a position different from that of the press in politics; yet, on account of the assiduous care and attention we have to bestow on our calling, it might be justly claimed that it is far from being the least important section of medicine, especially when we regard the direct bearing it has on the patient. This position is, however, I fear, not always accorded, and we run a risk of having to give

place to the nurse, whose calling is now almost assuming the pretensions of a profession.

Who, when passing through the dark valley has not expressed gratitude to his medical or spiritual adviser, and given thanks for the mother's care, or the fair soft hand of wife, sister, daughter, or even trained nurse, that has smoothed his pillow? But we, as pharmacists, are not brought into such close contact with the patients, as we rarely, if ever, see them while suffering acutely; and notwithstanding our engrossing occupation and poor remuneration, the meed of gratitude we obtain is often the thankless one of having supplied nasty physic.

I will not dwell on the hard times of which we often complain. These are not changed. Shakespeare's apothecary was poor, and although, 'being holiday, the beggar's shop' was shut, the *genius loci* was in the interior, as will generally be found on public holidays at the present day.

In our relations with the medical profession I think we meet with more appreciation. In the compilation of the 'Additions to the British Pharmacopœia,' recently published, the General Medical Council accorded us an acknowledged position, which, in any future revision of our national Pharmacopœia will, I trust, be continued and even extended.

The tendency of the medical mind is to be conservative as to the use of new drugs, and to know those that are used and their properties well. But opposed to this conservatism is the element of progress in physiological and therapeutical investigation, the search after truth, and the desire for the relief and cure of human and animal suffering arising from disease and pain. There can be no finality to these investigations. As the corporeal substance as well as the mental characters of individuals differ, so do the marked characteristics of well-defined diseases vary. Not only so, but in nature drugs themselves vary, and so much has this been a reproach to our craft that the tendency of pharmacy of late has been to prepare medicines in as definite and stable a form as possible, and to provide chemical substances whose purity can be tested, where definite medicinal action is required. But, as I have said, the characters of a disease also vary in individuals, and the physician is, therefore, often compelled to treat the patient's symptoms, rather than the disease as a whole.

According to Dr. Lauder Brunton,* pharmacology may be said to have passed through four transition periods in the treatment of disease. "In the first stage, crude drugs were employed, prepared in the roughest manner, such as powered cinchona or metallic antimony. In the next stage these were converted into more active and more manageable forms, such as extracts or solutions, watery or alcoholic. In the third stage, the pure active principles, separated from the crude drugs, were employed, for example, morphine and quinine. In the fourth stage, instead of attempting to extract our medicines from the natural products in which they are contained, we seek to make for ourselves such substances as shall possess the particular action we desire. Now, just as we find stone and iron implements occasionally used together in the same country, so we find that drugs, belonging to the different stages mentioned, are used at the same time. For example, we may find crude powders, alcoholic extracts and pure alkaloids, all contained in the same pill. Nay more, we may sometimes give to the patient, in addition to all these, a medicine made artificially. But while this condition still exists, we notice that crude drugs are being less and less used, and their place is gradually being taken by pure active principles. We may say, then, that we are passing at present from the stone age into the bronze age of pharmacology, and may, indeed, be said to be just entering on the iron age." The last may be called the rational or scientific, as distinct from the empirical, treatment of disease.

Hitherto, the knowledge which we possess of the action of drugs is principally inherited, and most of it has, until recently, been obtained empirically. The search for new remedies was conducted on the basis of their attested reputation. The medicinal properties of opium, cinchona, digitalis, ergot and coca have been accepted as facts from their empirical history. It is true modern chemistry has, in many cases, isolated definite active principles to which the medicinal properties of these and other drugs are more or less due, yet in this direction much is still left undone. These principles, having to some extent the same properties as the crude drugs from which they have been prepared, have generally been accepted medically as possessing the same therapeutic action. For example, it had long been known that the galenical preparations of coca exercised a soothing influence when applied to irritated conditions of the larynx. Niemann, the discoverer of cocaine, in 1860, Schroff, in 1862, and von Anrep, in 1880, seem to have obtained an inkling of the local anæsthetic action of cocaine. Yet it was left for Koller, after reasoning from the premise that a substance which paralyses the terminal sensory nerves of the mucous membrane of the tongue would probably act similarly on those of the cornea and conjunctiva, to demonstrate by experiment with an aqueous solution of the hydrochlorate of cocaine on the eyes of guinea pigs, rabbits and dogs, that this alkaloid as a local anæsthetic would be a most valuable addition to the materia medica.

The advances made in chemical science during the present century, and the experimental investigations of recent physiologists and therapeutists, tend to prove that the physiological action on the animal system of the simpler chemical compounds, in many cases, is a chemical and physical action of the elements of which they are composed, modified to some extent by what constitutes life; and that the elements themselves act somewhat in accordance with what might be expected from their chemical alliances and the positions they occupy in regard to the periodic law of Mendelejeff. For example, the action of iron and manganese, of arsenic and phosphorus, and of the allied metals of the alkaline earths, calcium, strontium and barium, present striking instances of resemblance in this respect, which are modified by their chemical affinities. Such an action is the strong che-

* *Brit. Med. Journ.*, vol. ii., 1886, p. 329.

mical affinity exercised by oxalic acid for calcium, and its power of withdrawing that element from the circulatory system, as shown by Dr. Ringer.* Calcium being essential to circulation in the animal system, oxalic acid is thus rendered a powerful poison.

Following such investigations, the therapeutist and the pharmacist come between the physiologist, on the one hand, and the chemist and botanist on the other. The former naturally watch the work of the latter with interest. The vegetable kingdom has yielded the principal supply of medicines which have come into use empirically; but, on the other hand, it is to the experimental work of the chemist and physiologist we owe the great advances in inductive therapeutics and pharmacy upon which, latterly, attempts have been made to found the system of rational therapeutics to which I have referred. I have mentioned that the simpler chemical compounds act in accordance with their alliances. In the more complex organic substances there is also a marked connection between physiological action and chemical constitution. The physiological action of a certain compound having been ascertained by experiment, chemists have endeavoured to produce substitution derivatives by replacing certain of its elements or groups by others, thus altering the molecule of the original substance in such a manner as to modify its action at the will of the physiologist or to satisfy the requirements of the physician. Knowing what the effect of an alteration has been in one substance, they are able to anticipate the results that will be obtained by a similar alteration in other cases, and by inferences drawn from the physiological action of these compounds, to place therapeutics on a scientific basis, being, as Dr. Richardson predicted,† "able to manufacture, in our laboratories, drugs which would produce in the animal body any effect that we might desire, without our having to obtain them, as one might say, haphazard, from various plants or other sources."

Generally the chemist has been in advance of the physiologist, but the latter at times, by a process of induction, has indicated the direction in which he desires the chemist to work. The chemist, it is true, in attempting to formulate the constitution of the alkaloids, has been meeting the physiologist by working along the line of his own investigations, and clearing up the relationship which several of these bodies have one to another. Thus codeine has been shown to be mono-methyl-morphine, whilst caffeine and theobromine are respectively tri- and di-methyl-xanthine, and the connection between these and guanine and urea has been demonstrated, also the relation of cocaine to atropine as well as that of pyridine to piperidine.

Some of the first experiments in this direction were conducted by Drs. Crum Brown and Fraser, the former now President of the Chemical Society, who worked with salts of ethyl and methyl addition products of strychnine and atropine, and obtained results showing that these bodies, although apparently changed little in chemical structure and properties from the original alkaloids, possess physiological actions differing from those of the mother substances in a very marked degree. But the ignorance of chemists with respect to the chemical constitution of alkaloids minimizes at present the value of the results of biological experiments performed with a view of ascertaining the relation between substituting groups and physiological action. The relation of the modified compound to the mother alkaloid may not be understood, and it may be a subject of doubt whether the introduction of an alkyl group into a molecule may result in a simple substitution or be accompanied by a radical change in the molecular structure. For example, the results obtained by Brown and Fraser led them to the conclusion that the addition of a methyl or ethyl group to strychnine, as in the iodide of methyl strychnium, changes it from a poison which tetanizes the spinal cord into one which paralyses the motor nerves. Stahlschmidt, however, had previously arrived at a different conclusion as to the effect of the introduction of the alkyl group, and this apparent conflict in results is expressly mentioned by Brown and Fraser as giving rise to their investigation. But recent investigation has shown that the methyl strychnine used by Stahlschmidt, which he prepared from iodide of methyl strychnium, was not a simple substitution product, but an isomeric compound that readily reverts to methyl strychnium salts under the influence of acids. But in alkaline solution it appears to be more stable, and it has now been found that when methyl strychnine is subcutaneously injected it produces all the symptoms characteristic of strychnine poisoning.

Up to the present, co-operation between the physiologist and chemist has been most successful when the chemist has started with a body the molecular construction of which was sufficiently well understood. Thus the therapeutic deficiencies of quinoline, which constitutes the nucleus of many natural alkaloids, led to experiments as to the influence on its therapeutic action of certain modifications. By the introduction of a methyl or ethyl group into tetrahydroquinoline, the tertiary bases known as methyl and ethyl kairolin were produced. The employment of an oxyquinoline in place of quinoline was found to yield several more valuable antipyretics, since from ortho-oxyquinoline the methyl and ethyl kairins were prepared, and some time afterwards from para-oxyquinoline were obtained the methyl and ethyl thallins, which are stil used to some extent, although the kairolins and kairins have practically been superseded. The connection with antipyrin is not far to seek, for whereas the oxyquinoline derivatives may be prepared by the action of aceto-acetic ether on amidophenol, the pyrazolon derivatives, of which antipyrin is the best known, result from the reaction of aceto-acetic ether with phenyl-hydrazine.

In fact, it is in the rich field of chemical research opened up originally in the investigation of the constituents of coal tar, which has given such an impetus to the synthesis of organic compounds, that pharmacology has been following chemistry, and sometimes, as I have said, indicating the way in which

* *Pract.*, xxxiv., p. 81.
† 'Brit. Assoc. Reports,' 1868, p. 186.

the more exact science should proceed. It is about thirty-five years ago since Dr. Hoffmann induced Dr. Perkin to undertake a research with a view to building up quinine artificially from derivatives of coal tar. This investigation was unsuccessful, though it resulted in the discovery of mauve, and soon led to the preparation of the various brilliant colours which have dazzled our eyes during the latter part of this century. But although quinine has not yet been prepared synthetically, other organic substances, as has already been shown, have been synthesized, which have tended to displace that valuable alkaloid from the pinnacle on which it stood twenty years ago. The commercial value of the medicinal substances produced in this way is, indeed, still small compared with that of the dye products; yet even the former are of such importance that one, which I have already mentioned, antipyrin, is in great demand at a price more than three times that of quinine, which it has to a considerable extent displaced, and this notwithstanding also that a much larger dose of it is required. Time would fail me to review all the synthetical products that have been introduced into medical use during the last few years, and as this was so well done by Mr. Hodgkin at our last meeting at Leeds, it is the less necessary now.

The most important of the new remedies obtained from this source may be placed in classes as:—antipyretics, which lessen temperature; analgesics, which relieve pain; hypnotics, which produce sleep; the nitrites, or arterial dilators; antiseptics, or germ-killers; and anæsthetics, which produce unconsciousness or nervous insensibility, and suspend the mental perception of pain. Most of them belong to more than one class, but generally one or other action predominates, and determines the class to which, as Dr. Lauder Brunton says, it may be assigned. These remedies have not been taken haphazard from the innumerable substances known to the chemist, but have been selected from certain groups, the members of which have been ascertained to possess the desired action in varying degrees. Dr. Brunton hopes that we may ere long have a series of remedies having an action upon the heart and vessels like digitalis, strophanthus, sparteine, or erythrophlœum, but possessing an advantage over these drugs in one most important point, viz., in their chemical structure being known to us. It will then be possible to modify them in the laboratory in one way or another until the product is secured which will have the particular effect desired in any given case.

The prognostications as to the effect of these compounds on disease have not, however, always been fulfilled. For example, the use of tetronal in place of sulphonal as a hypnotic has not proved as satisfactory as was anticipated by Baumann and Kast. On the other hand, no reasoning based upon existing knowledge of physiology could have demonstrated that the abstraction of the elements of water from the morphine molecule would convert hydrochlorate of morphine, which is a powerful sedative and hypnotic, into the hydrochlorate of apomorphine, which produces such prompt emesis. For practical purposes, therefore, the physician is obliged to fall back on the accumulated experience of others for much of his therapeutic treatment.

Having spoken of the scientific and empirical treatments of disease, I pass over other forms of treatment which have attracted more or less attention at times, but do not concern pharmacists, such as hydropathy, galvanism, massage, metallotherapy, faith-curing, and hypnotism or mesmerism, which has more especially been investigated during the last year. But I may, in passing, refer to the medical use of various lymphs, the preparation of which may one day form part of the occupation of the pharmacist. Inoculation with smallpox virus, I am happy to say, is now obsolete, but the beneficent use of vaccine lymph against smallpox, and of Pasteur's cultures for hydrophobia, led Professor Koch to endeavour to destroy the tubercle bacillus with an analogous substance. He attempts this by hypodermic injections, but his fluid, now called "tuberculin"—the exact process of its production has not been published—does not correspond to vaccine lymph. It is stated to be a glycerine extract of pure cultivations of tubercle bacilli. The cultivations are pure in the sense that they are not mixed, as by repeated operations all other microbes are removed from the cultivating medium. The glycerine solution, which according to Koch contains only a fraction of one per cent. of the active principle, is a powerful poison to tuberculous tissue. Recent researches tend, however, to show that the characteristic action of tuberculin is referable to at least three of its constituents, and that the remedial portion, which appears to consist of albumoses, can be separated from the constituents that cause fever and inflammation. According to Koch it is not a direct germicide to the bacillus, but acts by destroying the tissue in which the bacillus is located. Tuberculin would appear to bear the same relation to the tubercle bacillus that alcohol does to the yeast plant, though it is of quite a different chemical nature. We all remember the great sensation it produced about nine months ago. I am sorry it has not proved so successful as was anticipated. Yet, if its preparation be modified and, as I have mentioned, certain principles be removed from it, favourable opinions are still held of its ultimate success, and I am informed, that of the tuberculous diseases phthisis will probably prove the most amenable to its treatment.

Competitors in this line of treatment have not been wanting, amongst these the use by Liebreich of cantharidate of potassium has been most extolled as a cure for phthisis, but the reports on the use of this also have not been favourable. Other agents destructive of the tubercle bacillus have been suggested for therapeutic use, such as would act on the lung tissue by means of the circulatory system; for example, helenin or alant-camphor, and phenyl-acetic and phenyl-propionic acids. These substances have been found to exert a germicidal effect on the tubercle bacillus under various conditions. In Paris sulphuretted hydrogen, diluted with carbonic acid, administered in the form of enemata, the inhalation of an atmosphere charged with creasote and eucalyptol under pressure, and a ten per cent. solution of chloride of zinc injected deeply into the parts surrounding the tuber-

culous tissue, have also been used with a similar object, as likewise have injections of the serum of the blood of goats and of dogs, the goat being quite, and the dog to a great extent, immune from attacks of tuberculosis.

But notwithstanding the importance and value of these new weapons for the combating of disease, physicians will probably long continue to use the natural forms of medicine of the third or second groups referred to by Dr. Brunton—that is, the pure active principles or extracts or solutions, and the pharmacist will still be in his element in preparing these.

Such medicines have hitherto, as I have said, been principally obtained from the vegetable kingdom; in fact, the empirical search for medicines has probably done more to encourage and stimulate the study of botany than the search for food, or other economic considerations, and a knowledge of this science is absolutely necessary to enable us to supply the various parts of plants used medicinally free from admixture with others. We are bound to use all diligence to supply them in this condition, as well as to exercise our art in preparing them in a suitable and stable condition for administration. Whether medicines be introduced empirically or rationally, pharmaceutical enterprise should not be behindhand, either in commercial supply, in the preparation of galenical compounds, or in the isolation of the active principles of the drugs.

In order to make our galenical preparations more definite, many of them containing recognized active principles have in recent years been officially directed to be standardized. The interesting communications of Messrs. Farr and Wright, read at our last meeting, and others by the same authors which have been published since, have shown the necessity of the further use of this mode of obtaining pharmaceutical uniformity, although it may be overdone. The medicinal properties of many of our drugs do not depend on one alkaloid or active principle, but on the blending which has been produced by nature. For example, how could we standardize, with any degree of accuracy, the medicinal action of rhubarb, cascara or senna, or the appetising effect of compound infusion of gentian?

When we turn from physic to food this is still more evident. Nature supplies our food, from both the vegetable and animal kingdoms, of most complex and varied materials. It is true we roughly estimate their richness in nitrogen and carbon; but in health no one thinks of first isolating and then mixing definite quantities of starch, gluten, oil, fat, gelatin, fibrin, casein, and albumen, with water, under any condition, and making a meal of them. The natural flavours would be lost, and appetite would pall before such a *menu*.

The practice of medicine and pharmacy combined, as is frequently the case in this country, is detrimental in many ways, both to those who carry on such practice, and to the public. Originally an apprentice to an apothecary served five years; this was afterwards reduced to one year, the other four being devoted to a compulsory curriculum after registration as a student, before he could present himself for his "pass" examination. Now the Apothecaries' Hall only requires a three months' course of pharmacy and dispensing, and the conjoint board of the Royal Colleges of Physicians and Surgeons requires no stipulated time to be devoted to the subjects of pharmacy and materia medica, or even to chemistry. All that is necessary is that the schedules are signed to the effect that the student has received instruction in the different subjects to the satisfaction of a teacher, who, for pharmacy, may be a member of the Pharmaceutical Society. As there is no examination in practical dispensing, I fear the work is generally done in a very perfunctory manner, and that the knowledge gained of this subject is, in many cases, the minimum.

As it is much more important for a surgeon to know a sharp knife than to know the varieties of iron ore, so a physician ought to be acquainted with the medicinal preparations he prescribes, rather than with the crude drugs from which they are obtained. He should not be like the medical student, who, parrot-like, said of gum arabic, "it is soluble in alcohol and insoluble in water, or the reverse, but I am not sure which."

It is proposed that the compulsory course of medical study be extended to five years; but as these subjects, chemistry, pharmacy, and materia medica may be studied prior to registration as a medical student, I think a course of six months' practice under the eye of a pharmacist would be of great service to the embryo medical practitioner before commencing his hospital career. The courses of chemistry and materia medica might be taken simultaneously, and probably under the same teacher.

If the coming race of medical practitioners receive no practical training in pharmacy they will have no confidence in prescribing, because they will never have known their medicines. They will thus become a prey to the advertising manufacturers of ready-made mixtures and specialties, in place of making use of official or officinal preparations. With the British Pharmacopœia more under the influence of pharmacists, as I expect in future it will be, and our Unofficial Formulary entirely under our own control, I trust in future we may be able to set before prescribers a better array of preparations than they have hitherto had.

If the medical licensing bodies do "throw physic to the dogs" quackery will become more rampant, as the public will have medicines, and have them 'elegant' or agreeable to take. Not only so, but the public demands also to have them convenient for use, and in a stable and portable condition. The division of labour tends to perfect the processes of elegant pharmacy. The irresistible fact must be acknowledged, not only in pharmacy, but in all the arts and manufactures, that though the making of preparations in a wholesale manner may in many cases be detrimental to retailers' interests, yet if it be for the public weal the practice will be irrepressible. The age of boluses is past, and the polypharmacy of former times will not go down in the present day.

As suggested by Mr. Umney last year, there would almost appear to be fashions in medicine. As antiseptics for surgical treatment, carbolic acid, boric acid, salicylic acid, eucalyptus oil, iodoform, permanganate of potassium and chloride of zinc have all in turn found favour with surgeons. Now sublimate (perchloride of mercury) is most in favour, but even this fails to prove

as germicidal as some experimenters have declared. For producing anæsthesia the conflict has for many years been between chloroform and ether, or mixtures of them with alcohol in addition, or by preceding their use by nitrous oxide. Lately, chloroform, although the most generally used, has fallen into great disfavour, on account of the accidents which have occurred during its use. I have never witnessed a death from its effects, but it has twice been my painful experience to be interviewed by anæsthetists soon after a death had occurred while they were administering the anæsthetic. There is something awful in the idea of having put a fellow creature to sleep to wake no more. It would appear to be inherent in the nature of these anæsthetics to occasionally produce fatal results. Since its first introduction, chloroform of British manufacture has borne a good reputation; from whatever source it was made, it had an uniform specific gravity and freedom from known impurity. But no reliance on a manufacturer's name can rid us as pharmacists of the personal duty which we owe to the public, and to the anæsthetist in particular, to examine and test the purity of each lot of chloroform and ether we receive into stock, to store it carefully, and to see that it undergoes no change by exposure to light or other causes, especially if it is to be used for anæsthetic purposes.

The purification of chloroform has attracted much attention of late, through the introduction of M. Raoul Pictet's process of crystallizing it at a low temperature and thus obtaining it in a condition represented to be perfectly pure, stable, and of specific gravity 1·51—a higher gravity than has hitherto been attainable.

Latterly, a vast number of special preparations and nostrums have been introduced, which, on account of their being advertised and in popular demand, we are obliged to supply; still, in regard to these we are not answerable. But, although we cannot breathe a word of praise in their favour, the identical article demanded should be supplied, unless it be to the detriment of the purchaser, in which case we must, in his own interest, advise him. The goods a merchant sells, or a manufacturer makes, represent him; he stamps them with his character; they should be *bonâ fide* what he professes them to be. As pharmacists, our responsibility is great in regard to these points, as we have to judge such a number of drugs and preparations and test their purity. As to the uses to which our wares and medicines are put when they are medically prescribed in proper doses, we are not accountable; but we cannot rid ourselves of a moral responsibility when we retail them in the ordinary conduct of business.

Dr. Attfield's report to the General Medical Council for 1890, on the revision of the British Pharmacopœia, 1885, has just been presented. It deals principally with the question of synonyms. If the British Pharmacopœia is to be the commercial as well as the pharmaceutical, or rather medical, standard for the preparations it contains, and the proposed synonyms are tacked on to the official preparations, I fear that notwithstanding Dr. Attfield's reasoning pharmacists will often be placed in greater doubt or difficulty, and even danger, than they are at the present time. For example, if the synonyms of the British Pharmacopœia are to be accepted commercially, then according to it, if asked for arsenic, we must supply white arsenic or arsenious anhydride; to sell it coloured it will be adulterated, yet we are not allowed to sell it otherwise retail. Although I hold to a high standard of purity for medicines, I think that if the official list of synonyms be extended it must be very carefully watched by pharmacists, else as traders they will be placed at a great disadvantage if it be made to include copperas, blue vitriol, white vitriol or spirit of salt. Drysalters would be able to supply these in the crude condition in which they are used in the arts and agriculture, as they would not supply them as "food or drugs;" whereas pharmacists could not rid themselves of the responsibility of supplying them as *drugs*. Dr. Attfield suggests that nitre and saltpetre shall be synonyms of nitrate of potassium. The impurity in commercial nitre is of little importance to its use for domestic and veterinary purposes. Yet nearly all pharmacists use a purer preparation for dispensing prescriptions.

If we are to be liable to penalties under the Food and Drugs Act for supplying domestic remedies not up to a pharmacopœial standard, which other traders who sell the same are not to be subject to, then I hold we have a right to ask the Legislature to restrict to pharmacists the sale of drugs and preparations defined by the Pharmacopœia.

Most of Dr. Attfield's report is devoted to the vexed "milk of sulphur" question. As he justly says, at the present time two distinct substances are sold under this name. He suggests that in the next revision of the Pharmacopœia "milk of sulphur" shall be a synonym of "precipitated sulphur." Calcareous precipitated sulphur could then only be supplied when the seller knows that the buyer requires this variety; yet it could not be labelled "milk of sulphur," but with a distinctive label, such as "Milk of Sulphur, P.L., 1746." Practically this means the extinction of the sale of calcareous milk of sulphur; and as, so far as I know, milk of sulphur is only used medicinally, although we should lose a relic of ancient pharmacy, yet most pharmacists and the community at large would, I think, part with it without regret.

The everyday routine of dispensing may not develop the common mind, but to others, who observe and reflect, our avocation affords rare opportunities. The manipulative training which produces the expert pharmacist will develop the expert chemist, and if he has a corresponding mental capacity, the early training with a pharmacist enables such an expert, when fortunate enough to obtain a good chemical training, to become one of the best workers in chemistry. But the combination of the manipulative expert with a mental capacity well trained to the work is rare; such men are sought after, and generally leave our ranks, either for more remunerative or more congenial employment. It would be invidious to mention the names of those who have done so, whether living or dead.

During the past year we have had from the Research Laboratory of the Pharmaceutical Society important papers on pure salicylate of sodium, or rather salicylic acid, demonstrating that the purity

of these, when administered internally, should be beyond reproach. From this source also we have had a chemical definition given to the official aconitine, with the promise of further investigations on the aconite alkaloids.

In reviewing the events of the year we cannot overlook those connected with our parent, the Pharmaceutical Society, which has just passed the jubilee of its existence. The cordial greeting it received on this occasion from all quarters showed the general appreciation in which it is held, notwithstanding the difficulties of its position as an educational, examining, and executive corporation. Its Council has endeavoured to promote the interests of pharmacy by attempting to carry through Parliament a Bill which would regulate the course of study before a candidate should come up for his pass examination; but, on account of the block in our legislative machinery, the Bill could not be proceeded with.

A revised syllabus of the examinations of the Society has been issued, and its scope will come into force in October next. This, it is hoped, will better define the course of study for candidates. In an address which I delivered at Sheffield in October last I drew attention more especially to the defects of the Preliminary examination, as a test of knowledge on which to raise a satisfactory superstructure, and suggested that it should be extended to include the rudiments of mathematics and geography, and a knowledge of a modern language, French or German. The subject has since then been much discussed, and there seems to be a widespread feeling of the desirability of such an extension, which is warranted by the facts of the case. An ignoramus is not adapted for our calling. The public considers us to possess general intelligence, and as our pharmacies have an open door it is not slow to make use of our acquirements. The 'schoolmaster is abroad,' and we must be prepared to hold our own in the struggle for existence. Practical men find that only the knowledge they make use of is retained, but no bounds can be set to the requirements of the pharmacist in this respect.

In conclusion, it is with regret that I record the death of a past President, its first Treasurer and a Founder of the Conference. In losing Henry Bowman Brady, who for many years "the cross of suffering bore," and folded his "pale hands so meekly" on the 10th of January last, we lose one of the landmarks of pharmacy. Not only was he an accomplished pharmacist, but a man of science, chemist, biologist and microscopist, whom we all delighted to honour. He has remembered his poorer brethren by a beneficent legacy to the Benevolent Fund of the Pharmaceutical Society, and his name will long be held in reverence in Newcastle, where the Conference had its birth.

Mr. SCHACHT moved that the best thanks of the meeting be given to the President for his able and interesting address. He did so with the greatest pleasure. It was to have been expected that an author who had given to the pharmaceutical and medical world such valuable treatises would on this occasion bring before his hearers a scientific purview of the pharmaceutical world, and all would agree that that anticipation had been abundantly fulfilled. At one moment, indeed, he felt a little nervous lest the President should unduly emphasize the importance of the synthetic remedies lately proposed for use in medicine; for belonging, as he did, to a somewhat older school, he sometimes feared that too much attention was turned in that direction. It was not for him, of course, to indicate what should be the practise of medicine in the future; that depended on the studies and investigations of medical men, but he had never been able to divest himself of the thought that man was a very complex creature, his organization itself being very complex, and an analysis of his organs having not been attempted, and therefore it seemed to him that the application of exact definite positive chemical remedies must be a matter for the future, and probably the instant future, and that for the present they should be content to accept the remedies which nature had provided in a somewhat complex form to meet complex cases. He was very glad, therefore, to find that the President still admitted that galenical preparations might be of very great value to the practitioner. Every line of the address was worthy of careful study, and he would only refer particularly to one other point in which the President had spoken of the advantages to be gained by both pharmacy and medicine, by their combined study and investigation, a matter in which he cordially agreed.

Emeritus Professor REDWOOD said he had much pleasure in seconding the motion. He could say most honestly that he remembered no previous address which had appeared to him more valuable or more apt and suitable to the period at which it was presented. He had only to add that it would appear to him that pharmacy was now progressing towards the later stages of its development, and it was very obvious therefore that a more efficient system of pharmaceutical education should be pursued in future, one in fact far different from that which obtained some seventy years ago, when he commenced his pharmaceutical studies in Cardiff. He considered himself, therefore, as a Cardiff pharmacist, though the time he spent there with his relative, the late Mr. Vachell, was not very lengthy. His ambition was to study pharmacy where it was carried out on a more extensive scale than was possible in the Cardiff of that day, which only had a population of 4000 or 5000, and possessed neither docks nor railways. He therefore made his way to London, where he had spent the remainder of his life. A practical and scientific education was now become absolutely necessary to prepare the pharmacist for his career, and it would be a great gratification to him if in his declining years he could see in Cardiff a good practical and efficient school established for the education of rising pharmacists.

Professor REDWOOD then put the motion, which was carried by acclamation, and shortly acknowledged by the President.

The PRESIDENT then read the following:—

REPORT OF THE UNOFFICIAL FORMULARY COMMITTEE.

A revised edition of the Unofficial Formulary was issued in June, in which the Committee has incorporated the nine formulæ contained in the Addendum of 1889, together with six others, namely, collodion of belladonna, elixir of rhubarb, glycerine of belladonna, ointment of oleate of mercury, and two detannated wines. Seven formulæ have been deleted on account of their having been accepted by the General Medical Council, and inserted in the official additions to the British Pharmacopœia, 1890. It is hoped that this revision will prove useful to both prescribers and dispensers.

August 17, 1891. WM. MARTINDALE,
Chairman of the Unofficial Formulary Committee.

The British Association for the Advancement of Science.

SIXTIETH ANNUAL MEETING.

The sixtieth annual meeting of the above Association commenced on Wednesday, August 19, at Cardiff, under the Presidency of Mr. William Huggins, D.C.L. (Oxon.), LL.D. (Cantab., Edin., et Dubl.), Ph.D. (Lugd. Bat.), F.R.S., F.R.A.S., Hon. F.R.S.E., etc., Correspondant de l'Institut de France.

The President's Address.

It is now many years since this Association has done honour to the science of Astronomy in the selection of its President.

Since Sir George Airy occupied the chair in 1851, and the late Lord Wrottesley nine years later in 1860, other sciences have been represented by the distinguished men who have presided over your meetings.

The very remarkable discoveries in our knowledge of the heavens which have taken place during this period of thirty years—one of amazing and ever-increasing activity in all branches of science—have not passed unnoticed in the addresses of your successive Presidents; still it seems to me fitting that I should speak to you to-night chiefly of those newer methods of astronomical research which have led to those discoveries, and which have become possible by the introduction since 1860 into the observatory of the spectroscope and the modern photographic plate.

In 1866 I had the honour of bringing before this Association, at one of the evening lectures, an account of the first-fruits of the novel and unexpected advances in our knowledge of the celestial bodies which followed rapidly upon Kirchhoff's original work on the solar spectrum and the interpretation of its lines.

Since that time a great harvest has been gathered in the same field by many reapers. Spectroscopic astronomy has become a distinct and acknowledged branch of the science, possessing a large literature of its own and observatories specially devoted to it. The more recent discovery of the gelatine dry plate has given a further great impetus to this modern side of astronomy, and has opened a pathway into the unknown of which even an enthusiast thirty years ago would scarcely have dared to dream.

In no science, perhaps, does the sober statement of the results which have been achieved appeal so strongly to the imagination, and make so evident the almost boundless powers of the mind of man. By means of its light alone to analyse the chemical nature of a far distant body; to be able to reason about its present state in relation to the past and future; to measure within an English mile or less per second the otherwise invisible motion which it may have towards or from us; to do more, to make even that which is darkness to our eyes light, and from vibrations which our organs of sight are powerless to perceive to evolve a revelation in which we see mirrored some of the stages through which the stars may pass in their slow evolutional progress—surely the record of such achievements, however poor the form of words in which they may be described, is worthy to be regarded as the scientific epic of the present century.

I do not purpose to attempt a survey of the progress of spectroscopic astronomy from its birth at Heidelberg in 1859, but to point out what we do know at present, as distinguished from what we do not know, of a few only of its more important problems, giving a prominent place, in accordance with the traditions of this chair, to the work of the last year or two.

In the spectroscope itself advances have been made by Lord Rayleigh by his discussion of the theory of the instrument, and by Professor Rowland in the construction of concave gratings.

Lord Rayleigh has shown that there is not the necessary connection, sometimes supposed, between dispersion and resolving power, as besides the prism or grating other details of construction and of adjustment of a spectroscope must be taken into account.

The resolving power of the prismatic spectroscope is proportional to the length of path in the dispersive medium. For the heavy flint glass used in Lord Rayleigh's experiments the thickness necessary to resolve the sodium lines came out 1·02 c.m. If this be taken as a unit, the resolving power of a prism of similar glass will be in the neighbourhood of the sodium lines equal to the number of centimetres of its thickness. In other parts of the spectrum the resolving power will vary inversely as the third power of the wave-length, so that it will be eight times as great in the violet as in the red. The resolving power of a spectroscope is therefore proportional to the total thickness of the dispersive material in use, irrespective of the number, the angles, or the setting of the separate prisms into which, for the sake of convenience, it may be distributed.

The resolving power of a grating depends upon the total number of lines on its surface, and the order of spectrum in use; about 1000 lines being necessary to resolve the sodium lines in the first spectrum.

As it is often of importance in the record of observations to state the efficiency of the spectroscope with which they were made, Professor Schuster has proposed the use of a unit of purity as well as of resolving power, for the full resolving power of a spectroscope is realized in practice only when a sufficiently narrow slit is used. The unit of purity also is to stand for the separation of two lines differing by one-thousandth of their own wave length; about the separation of the sodium pair at D.

A further limitation may come in from the physiological fact that, as Lord Rayleigh has pointed out, the eye when its full aperture is used is not a perfect instrument. If we wish to realize the full resolving power of a spectroscope, therefore, the emergent beam must not be larger than about one-third of the opening of the pupil.

Up to the present time the standard of reference for nearly all spectroscopic work continues to be Angström's map of the solar spectrum, and his scale based upon his original determinations of absolute wave-length. It is well-known, as was pointed out by Thalén in his work on the spectrum of iron in 1884, that Angström's figures are slightly too small, in consequence of an error existing in a standard mètre used by him. The corrections for this have been introduced into the tables of the wave-lengths of terrestrial spectra collected and revised by a Committee of this Association from 1885 to 1887. Last year the Committee added a table of corrections to Rowland's scale.

The inconvenience caused by a change of standard scale is, for a time at least, considerable; but there is little doubt that in the near future Rowland's photographic map of the solar spectrum, and his scale based on the determinations of absolute wave-length by Pierce and Bell, or the Potsdam scale based on original determinations by Müller and Kempf, which differs very slightly from it, will come to be exclusively adopted.

The great accuracy of Rowland's photographic map is due chiefly to the introduction by him of concave gratings, and of a method for their use, by which the problem of the determination of relative wave-lengths is simplified to measures of coincidences of the lines in different spectra by a micrometer.

The concave grating and its peculiar mounting, in which no lenses or telescope are needed, and in which all the spectra are in focus together, formed a new departure of great importance in the measurement of spectral lines. The valuable method of photographic

sensitizers for different parts of the spectrum has enabled Professor Rowland to include in his map the whole visible solar spectrum, as well as the ultra-violet portion as far as it can get through our atmosphere. Some recent photographs of the solar spectrum, which include A, by Mr. George Higgs, are of great technical beauty.

During the past year the results of three independent researches have appeared, in which the special object of the observers has been to distinguish the lines which are due to our atmosphere from those which are truly solar—the maps of M. Thollon, which, owing to his lamented death just before their final completion, have assumed the character of a memorial of him; maps by Dr. Becker; and sets of photographs of a high and a low sun by Mr. McClean.

At the meeting of this Association in Bath, M. Janssen gave an account of his own researches on the terrestrial lines of the solar spectrum, which owe their origin to the oxygen of our atmosphere. He discovered the remarkable fact that while one class of bands varies as the density of the gas, other diffuse bands vary as the square of the density. These observations are in accordance with the work of Egoroff and of Olszewski, and of Liveing and Dewar on condensed oxygen. In some recent experiments Olszewski, with a layer of liquid oxygen thirty millimètres thick, saw, as well as four other bands, the band coincident with Fraunhofer's A; a remarkable instance of the persistence of absorption through a great range a temperature. The light which passed through the liquid oxygen had a light blue colour resembling that of the sky.

Of not less interest are the experiments of Knut Angström, which show that the carbonic acid and aqueous vapour of the atmosphere reveal their presence by dark bands in the invisible infra-red region, at the positions of bands of emission of these substances.

It is now some thirty years since the spectroscope gave us for the first time certain knowledge of the nature of the heavenly bodies, and revealed the fundamental fact that terrestrial matter is not peculiar to the solar system, but is common to all the stars which are visible to us.

In the case of a star such as Capella, which has a spectrum almost identical with that of the sun, we feel justified in concluding that the matter of which it is built up is similar, and that its temperature is also high, and not very different from the solar temperature. The task of analysing the stars and nebulæ becomes, however, one of very great difficulty when we have to do with spectra differing from the solar type. We are thrown back upon the laboratory for the information necessary to enable us to interpret the indications of the spectroscope as to the chemical nature, the density and pressure, and the temperature of the celestial masses.

What the spectroscope immediately reveals to us are the waves which were set up in the ether filling all interstellar space, years or hundreds of years ago, by the motions of the molecules of the celestial substances. As a rule it is only when a body is gaseous and sufficiently hot that the motions within its molecules can produce bright lines and a corresponding absorption. The spectra of the heavenly bodies are indeed to a great extent absorption spectra, but we have usually to study them through the corresponding emission spectra of bodies brought into the gaseous form and rendered luminous by means of flames or of electric discharges. In both cases, unfortunately, as has been shown recently by Professors Liveing and Dewar, Wüllner, E. Wiedemann, and others, there appears to be no certain direct relation between the luminous radiation as shown in the spectroscope and the temperature of the flame, or of the gaseous contents of the vacuum tube, that is, in the usual sense of the term as applied to the mean motion of all the molecules. In both cases, the vibratory motions within the molecules to which their luminosity is due are almost always much greater than would be produced by encounters of molecules having motions of translation no greater than the average motions which characterize the temperature of the gases as a whole. The temperature of a vacuum tube through which an electric discharge is taking place may be low, as shown by a thermometer, quite apart from the consideration of the extreme smallness of the mass of gas, but the vibrations of the luminous molecules must be violent in whatever way we suppose them to be set up by the discharge; if we take Schuster's view that comparatively few molecules are carrying the discharge, and that it is to the fierce encounters of these alone that the luminosity is due, then if all the molecules had similar motions, the temperature of the gas would be very high.

So in flames where chemical changes are in progress, the vibratory motions of the molecules which are luminous may be, in connection with the energy set free in these changes, very different from those corresponding to the mean temperature of the flame.

Under the ordinary conditions of terrestrial experiments, therefore, the temperature or the mean *vis viva* of the molecules may have no direct relation to the total radiation, which, on the other hand, is the sum of the radiation due to each luminous molecule.

These phenomena have recently been discussed by Ebert from the standpoint of the electro-magnetic theory of light.

Very great caution is therefore called for when we attempt to reason by the aid of laboratory experiments to the temperature of the heavenly bodies from their radiation, especially on the reasonable assumption that in them the luminosity is not ordinarily associated with chemical changes or with electrical discharges, but is due to a simple glowing from the ultimate conversion into molecular motion of the gravitational energy of shrinkage.

In a recent paper Stas maintains that electric spectra are to be regarded as distinct from flame spectra, and from researches of his own, that the pairs of lines of the sodium spectrum other than D are produced only by disruptive electric discharges. As these pairs of lines are found reversed in the solar spectrum, he concludes that the sun's radiation is due mainly to electric discharges. But Wolf and Diacon, and later, Watts, observed the other pairs of lines of the sodium spectrum when the vapour was raised above the ordinary temperature of the Bunsen flame. Recently, Liveing and Dewar saw easily, besides D, the citron and green pairs and sometimes the blue pair and the orange pair, when hydrogen charged with sodium vapour was burning at different pressures in oxygen. In the case of sodium vapour, therefore, and presumably in all other vapours and gases, it is a matter of indifference whether the necessary vibratory motion of the molecules is produced by electric discharges or by flames. The presence of lines in the solar spectrum which we can only produce electrically is an indication, however, as Stas points out, of the high temperature of the sun.

We must not forget that the light from the heavenly bodies may consist of the combined radiations of different layers of gas at different temperatures, and possibly be further complicated to an unknown extent by the absorption of cooler portions of gas outside.

Not less caution is needed if we endeavour to argue from the broadening of lines and the coming in of a continuous spectrum as to the relative pressure of the gas in the celestial atmospheres. On the one hand, it cannot be gainsaid that in the laboratory the widening of the lines in a Plücker's tube follows upon increasing the density of the residue of hydrogen in the

tube, when the vibrations are more frequently disturbed by fresh encounters, and that a broadening of the sodium lines in a flame at ordinary pressure is produced by an increase of the quantity of sodium in the flame; but it is doubtful if pressure, as distinguished from quantity, does produce an increase of the breadth of the lines. An individual molecule of sodium will be sensibly in the same condition, considering the relatively enormous number of the molecules of the other gases, whether the flame is scantily or copiously fed with the sodium salt. With a small quantity of sodium vapour the intensity will be feeble except near the maximum of the lines; when, however, the quantity is increased the comparative transparency on the sides of the maximum will allow the light from the additional molecules met with in the path of the visual ray to strengthen the radiation of the molecules farther back, and so increase the breadth of the lines.

In a gaseous mixture it is found, as a rule, that at the same pressure or temperature, as the encounters with similar molecules become fewer, the spectral lines will be affected as if the body were observed under conditions of reduced quantity or temperature.

In their recent investigation of the spectroscopic behaviour of flames under various pressures up to forty atmospheres, Professors Liveing and Dewar have come to the conclusion that though the prominent feature of the light emitted by flames at high pressure appears to be a strong continuous spectrum, there is not the slightest indication that this continuous spectrum is produced by the broadening of the lines of the same gases at low pressure. On the contrary, photometric observations of the brightness of the continuous spectrum, as the pressure is varied, show that it is mainly produced by the mutual action of the molecules of a gas. Experiments on the sodium spectrum were carried up to a pressure of forty atmospheres without producing any definite effect on the width of the lines which could be ascribed to the pressure. In a similar way the lines of the spectrum of water showed no signs of expansion up to twelve atmospheres; though more intense than at ordinary pressure, they remained narrow and clearly defined.

It follows, therefore, that a continuous spectrum cannot be considered, when taken alone, as a sure indication of matter in the liquid or the solid state. Not only, as in the experiments already mentioned, such a spectrum may be due to gas when under pressure, but, as Maxwell pointed out, if the thickness of a medium, such as sodium vapour, which radiates and absorbs different kinds of light, be very great, and the temperature high, the light emitted will be of exactly the same composition as that emitted by lampblack at the same temperature, for the radiations which are feebly emitted will be also feebly absorbed, and can reach the surface from immense depths. Schuster has shown that oxygen, even in a partially exhausted tube, can give a continuous spectrum when excited by a feeble electric discharge.

Compound bodies are usually distinguished by a banded spectrum; but on the other hand such a spectrum does not necessarily show the presence of compounds, that is, of molecules containing different kinds of atoms, but simply of a more complex molecule, which may be made up of similar atoms, and be therefore an allotropic condition of the same body. In some cases, for example, in the diffuse bands of the absorption spectrum of oxygen, the bands may have an intensity proportional to the square of the density of the gas, and may be due either to the formation of more complex molecules of the gas with increase of pressure, or it may be to the constraint to which the molecules are subject during their encounters with one another.

It may be thought that at least in the coincidences of bright lines we are on the solid ground of certainty, since the length of the waves set up in the ether by a molecule, say of hydrogen, is the most fixed and absolutely permanent quantity in nature, and is so of physical necessity, for with any alteration the molecule would cease to be hydrogen.

Such would be the case if the coincidence were certain; but an absolute coincidence can be only a matter of greater or less probability, depending on the resolving power employed, on the number of the lines which correspond and on their characters. When the coincidences are very numerous, as in the case of iron and the solar spectrum, or the lines are characteristically grouped, as in the case of hydrogen and the solar spectrum, we may regard the coincidence as certain; but the progress of science has been greatly retarded by resting important conclusions upon the apparent coincidence of single lines, in spectroscopes of very small resolving power. In such cases, unless other reasons supporting the coincidence are present, the probability of a real coincidence is almost too small to be of any importance, especially in the case of a heavenly body which may have a motion of approach or of recession of unknown amount.

But even here we are met by the confusion introduced by multiple spectra, corresponding to different molecular groupings of the same substance; and, further, to the influence of substances in vapour upon each other; for when several gases are present together, the phenomena of radiation and reversal by absorption are by no means the same as if the gases were free from each other's influence, and especially is this the case when they are illuminated by an electric discharge.

I have said as much as time will permit, and I think indeed sufficient, to show that it is only by the laborious and slow process of most cautious observation that the foundations of the science of celestial physics can be surely laid. We are at present in a time of transition when the earlier, and, in the nature of things, less precise observations are giving place to work of an order of accuracy much greater than was formerly considered attainable with objects of such small brightness as the stars.

The accuracy of the earlier determinations of the spectra of the terrestrial elements are in most cases insufficient for modern work on the stars as well as on the sun. They fall much below the scale adopted in Rowland's map of the sun, as well as below the degree of accuracy attained at Potsdam by photography in a part of the spectrum for the brighter stars. Increase of resolving power very frequently breaks up into groups, in the spectra of the sun and stars, the lines which had been regarded as single, and their supposed coincidences with terrestrial lines fall to the ground. For this reason many of the early conclusions, based on observation as good as it was possible to make at the time with the less powerful spectroscopes then in use, may not be found to be maintained under the much greater resolving power of modern instruments.

The spectroscope has failed as yet to interpret for us the remarkable spectrum of the Aurora Borealis. Undoubtedly in this phenomenon portions of our atmosphere are lighted up by electric discharges; we should expect, therefore, to recognize the spectra of the gases known to be present in it. As yet we have not been able to obtain similar spectra from these gases artificially, and especially we do not know the origin of the principal line in the green, which often appears alone, and may have therefore an origin independent of that of the other lines. Recently the suggestion has been made that the Aurora is a phenomenon produced by the dust of meteors and falling stars, and that near positions of certain auroral lines to lines or flutings of manganese, lead, barium, thallium, iron, etc., are sufficient to justify us in regarding

meteoric dust in the atmosphere as the origin of the auroral spectrum. Liveing and Dewar have made a conclusive research on this point, by availing themselves of the dust of excessive minuteness thrown off from the surface of electrodes of various metals and meteorites by a disruptive discharge, and carried forward into the tube of observation by a more or less rapid current of air or other gas. These experiments prove than metallic dust, however fine, suspended in a gas will not act like gaseous matter in becoming luminous with its characteristic spectrum in an electric discharge, similar to that of the aurora. Professor Schuster has suggested that the principal line may be due to some very light gas which is present in too small a proportion to be detected by chemical analysis or even by the spectroscope in the presence of the other gases near the earth, but which at the height of the auroral discharges is in a sufficiently greater relative proportion to give a spectrum. Lemström, indeed, states that he saw this line in the silent discharge of a Holtz machine on a mountain in Lapland. The lines may not have been obtained in our laboratories from the atmospheric gases, on account of the difficulty of reproducing in tubes with sufficient nearness the conditions under which the auroral discharges take place.

In the spectra of comets the spectroscope has shown the presence of carbon presumably in combination with hydrogen, and also sometimes with nitrogen; and in the case of comets approaching very near the sun, the lines of sodium, and other lines which have been supposed to belong to iron. Though the researches of Professor H. A. Newton and of Professor Schiaparelli leave no doubt of the close connection of comets with corresponding periodic meteor swarms, and therefore of the probable identity of cometary matter with that of meteorites, with which the spectroscopic evidence agrees, it would be perhaps unwise at present to attempt to define too precisely the exact condition of the matter which forms the nucleus of the comet. In any case the part of the light of the comet which is not reflected solar light can scarcely be attributed to a high temperature produced by the clashing of separate meteoric stones set up within the nucleus by the sun's disturbing force. We must look rather to disruptive electric discharges produced probably by processes of evaporation due to increased solar heat, which would be amply sufficient to set free portions of the occluded gases into the vacuum of space. May it be that these discharges are assisted, and indeed possibly increased, by the recently discovered action of the ultra-violet part of the sun's light? Lenard and Wolf have shown that ultra-violet light can produce a discharge from a negatively electrified piece of metal, while Hallwachs and Righi have shown further that ultra-violet light can even charge positively an unelectrified piece of metal. Similar actions on cometary matter, unscreened as it is by an absorptive atmosphere, at least of any noticeable extent, may well be powerful when a comet approaches the sun, and help to explain an electrified condition of the evaporated matter which would possibly bring it under the sun's repulsive action. We shall have to return to this point in speaking of the solar corona.

A very great advance has been made in our knowledge of the constitution of the sun by the recent work at the Johns Hopkins University by means of photography and concave gratings, in comparing the solar spectrum, under great resolving power, directly with the spectra of the terrestrial elements. Professor Rowland has shown that the lines of thirty-six terrestrial elements at least are certainly present in the solar spectrum, while eight others are doubtful. Fifteen elements, including nitrogen as it shows itself under an electric discharge in a vacuum tube, have not been found in the solar spectrum. Some ten other elements, inclusive of oxygen, have not yet been compared with the sun's spectrum.

Rowland remarks that of the fifteen elements named as not found in the sun, many are so classed because they have few strong lines, or none at all, in the limit of the solar spectrum as compared by him with the arc. Boron has only two strong lines. The lines of bismuth are compound and too diffuse. Therefore even in the case of these fifteen elements there is little evidence that they are really absent from the sun.

It follows that if the whole earth were heated to the temperature of the sun, its spectrum would resemble very closely the solar spectrum.

Rowland has not found any lines common to several elements, and in the case of some accidental coincidences, more accurate investigation reveals some slight difference of wave-length or a common impurity. Further, the relative strength of the lines in the solar spectrum is generally, with a few exceptions, the same as that in the electric arc, so that Rowland considers that his experiments show "very little evidence" of the breaking up of the terrestrial elements in the sun.

(*To be continued.*)

Parliamentary and Law Proceedings.

Prosecutions by the Pharmaceutical Society of Ireland.

At the Dublin Police Court, Southern Division, on Tuesday, August 18, before Mr. Byrne, Q.C., Walter John Anderson, 14, South Richmond Street, was summoned by, at the suit of the Pharmaceutical Society of Ireland, for that he "did sell and keep open shops for retailing and compounding medical prescriptions, and did compound a medical prescription for one Patrick John Waters, at 14, South Richmond Street, contrary to the Pharmacy Act (Ireland) 1875, and 38 and 39 V., cap. 57, sec. 30, not being a person qualified in that behalf according to law."

Mr. Clay appeared for the prosecution, and Mr. E. A. Ennis for the defence.

Mr. Clay said the prosecution was brought under an Act which was passed for the purpose of preventing misadventure to health and life by the compounding of medical prescriptions by unqualified persons. Since this Act was passed a register of chemists qualified to compound medical prescriptions in Ireland was kept by the Pharmaceutical Society. No such person as the defendant was in that register, and it would be proved that on July 21 he kept his shop open and compounded a medical prescription.

Patrick John Waters, 33, Capel Street, was examined, and produced a prescription which he stated that he presented in the shop, 14, Richmond Street, on July 21. Mr. Anderson asked him to call back for the medicine in half an hour. He did so, and received a bottle (produced). Witness paid Mr. Anderson for it. Witness noticed that the name of the shop was "The Richmond Drug Store."

Cross-examined by Mr. Ennis: Mr. Anderson did not say he could not compound the prescription for him.

Do you see the name on the bottle? Yes. It is J. T. Holmes, member of the Pharmaceutical Society of Ireland. But I did not see him there.

Mr. Ennis said his defence was simply that his client was a dentist, and had this shop in South Richmond Street. But there was a man named Holmes, who was a qualified chemist, with whom Mr. Anderson had made an agreement to share the premises with him. Mr. Holmes had portion of the shop for compounding medicines, as he was qualified to compound. He received all the profits of the compounding.

Mr. Arthur Ferrall, Registrar of the Pharmaceutical

Society, was examined, and stated that Mr. Anderson was not a registered member of the Society.

Mr. John Thomas Holmes, examined by Mr. Ennis, stated that he was a registered member of the Pharmaceutical Society since 1875. Mr. Anderson himself was a chemist and druggist and a dentist, and had power to sell poisons. Handed the prescription in question, he could not remember whether he made it up or not. Mr. Anderson acted as his assistant, but he could not say if he ever made up prescriptions. Witness was in the habit of compounding the prescriptions in the shop, and he authorized no person else to compound them. Mr. Anderson took in the prescriptions, and when witness came back he attended to them. He could not swear he was in the defendant's shop on July 21 at all, or that the handwriting on the label was his, or that he made up the prescription. He had been about forty times in the defendant's shop since April 19, the date of the agreement between him and Mr. Anderson. He went in when he liked. He had also entered into an agreement with Mr. Farlow, of Berkeley Road. He did not think he paid for an ounce of the drugs compounded in South Richmond Street. Attention being drawn to the fact that while the agreement between the witness and the defendant was dated April 19, the stamp bore the mark of August 1, witness owned that he did not sign the document on April 19.

Mr. Byrne said he would convict on the part of the summons which charged the defendant with keeping shops open for the compounding of medical prescriptions and the sale of medicine, and if the prosecution wished he would amend the summons.

Mr. Clay said he would adopt his worship's suggestion.

Mr. Ennis said his client was going to leave the business in September. He (Mr. Ennis) would now plead guilty on this and the two other summonses, which were for selling medicines on two subsequent dates. He asked his worship not to impose a heavy fine under the circumstances.

Mr. Clay said his worship had no power to impose a less fine than £5. All he (Mr. Clay) could do was to represent to the Society that this man admitted his offence and was very sorry, and intended to give up business.

Mr. Byrne then imposed fines of £5 and £1 costs of each case. Notice of appeal was handed in.

At the Northern Division, before Mr. Keys, Q.C., Mr. John Farlow, 14, Berkeley Road, was summoned by the Pharmaceutical Society for selling and keeping open a shop for the compounding of medical prescriptions for one Patrick John Waters, Capel Street, the defendant not being a person qualified according to law.

The evidence was similar to that given in the previous case.

The witness Waters deposed that he purchased the medicine from Mr. Farlow. He admitted he saw the name of Holmes on the shop, but was positive that Farlow gave him the medicine.

The defendant stated that he never sold the medicines, and that all prescriptions were made up by Mr. Holmes.

Mr. Keys held that the case was proved, and imposed a fine of £5 for keeping the shop open for sale, and £5 for selling the medicine, with £1 costs in each case.

There were similar summonses against Mr. George R. Price and Mr. William Little, both of 14, Donnybrook Road. They pleaded guilty, and were each fined £5 and £1 costs.

Communications, Letters, etc., have been received from Messrs. Dickinson, Skrine, Symons, Wright.

Obituary.

Notice has been received of the death of the following:—

On the 13th of August, at Paris, Mr. Jules Léon Augustin Creuse, at the age of 56. The deceased resided in New York for many years, and while there he published several valuable papers and took an active part in pharmaceutical affairs. About seven years since he returned to his native country, France, from whence he continued to contribute to the pharmaceutical literature of the States. Among the papers by Mr. Creuse specially worthy of mention are those on the Citrates and some New Preparations of Iron.

On the 10th of August, Mr. John Hayes, Chemist and Druggist, Duckworth Street, Over Darwin. Aged 82 years.

On the 11th of August, Mr. Henry John Rackham, Chemist and Druggist, Lower Marsh, Lambeth. Aged 78 years.

On the 12th of August, Mr. John Rice Boyd, Chemist and Druggist, Atherton. Aged 65 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Preliminary Examination.

Sir,—I have read with much interest the correspondence in your paper on the subject of unqualified assistants, but I cannot help feeling much surprised by an assertion in a letter in a recent issue, namely, that many men who would go in for the qualifying examination are deterred by the necessity of first passing the Preliminary. The writer then suggests that the Preliminary should be remitted in the case of men over thirty-five years of age, who have been in business for a certain number of years.

From this I gather that he believes there is a special difficulty in that examination for people over thirty-five.

I confess I have very little pity or sympathy for men who, though engaged in dispensing for several years, have neglected to qualify, and are now crying out to be relieved from the consequences of their laziness; but perhaps my experience may be a little help and encouragement to them.

I was thirty-nine when I first thought of going in for the Preliminary, and at that time had never done a sum in fractions or read a word of Latin. In spite of these disadvantages I managed to pass after about six months' study.

An Unqualified Assistant, who does not Intend to Remain so.

Mel Boracis.

Sir,—Probably many of your readers, and especially those in districts where small quantities are in demand, will have found considerable inconvenience in retailing borax honey. The preparation is generally too thick to put into an ordinary vial and too liquid for a willow box. I find that this difficulty can easily be overcome by adding to the preparation a little powdered tragacanth, which does not in any way injuriously affect its therapeutic qualities. The following proportions give an article of a consistence convenient to send out in pots or boxes.

℞ Sodæ bibor.	℥ij.
Glycerin	℥j.
Pulv. tragacanth	ʒiss.
Mellis	℥xv., ʒviss.

Rub the first three ingredients together and lastly add the honey.

Wellington, N.Z. Ralph Robinson.

W. Bostock.—The information furnished is beyond our scope for publication, but we are glad to be made acquainted with it.

"THE MONTH."

Benzoyl-tropeine, a New Coca Alkaloid.

The close relationship that exists between ecgonine and tropine has already been demonstrated by the independent investigations of Einhorn and Ladenburg (*Pharm. Journ.*, [3], xix., 1057). From the ready conversion of anhydroecgonine into tropidine it is evident that ecgonine is the carboxylic acid of tropidine, the anhydride of tropine. It is therefore interesting to find that a new alkaloid, isolated by Dr. Giesel from a narrow-leaved coca plant cultivated in Java, has been recognized by Liebermann as a benzoyl-tropeine (*Berichte*, xxiv., 2336). This alkaloid bears some physical resemblance to Einhorn's dextro-cocaine, but it is optically inactive, and is not a true cocaine, since upon hydrolysis it yields only benzoic acid and a base, and no alcohol is split off. The resulting base is isomeric with the tropine derived from atropine, and appears identical with the ψ-tropine described by Ladenburg and Roth as a product of the hydrolysis of hyoscine. As Liebermann has also effected the synthesis of the Java alkaloid from ψ-tropine and benzoic acid, there is apparently no doubt that the new base is a mono-benzoyl derivative of ψ-tropine, isomeric with Ladenburg's benzoyl-tropeine, and belongs to that class of substances termed tropeines by Ladenburg, of which atropine is the best known member. From experiments made by Dr. Liebreich the new alkaloid proves not to be a mydriatic, but in the eyes of rabbits it occasions strong local anæsthesia and a slight enlargement of the pupil, so that it appears probable that other ψ-tropeines may have a mydriatic action. If this proves to be the case, Liebermann suggests that the ψ-tropine obtained from the bye-products of cocaine manufacture may afford a basis for the technical synthesis of mydriactics, just as the ecgonine derived from the amorphous coca alkaloids has already become a cheap source for the technical preparation of cocaine.

Linamarin.

Formerly the occurrence of hydrocyanic acid in association with plant constituents was supposed to be limited to the Rosaceæ, but the acid is now known to be also yielded by many plants belonging to widely separated orders. Recently, Messrs. Jorissen and Hairs have separated from the sproutings of linseed a compound which they describe as resembling amygdalin and laurocerasin in splitting up under certain conditions into sugar and hydrocyanic acid, but differing from those compounds in several chemical and physical properties (*Pharm. Post*, Aug. 23, p. 659). It was obtained in colourless needles grouped round a common centre, and having a cooling, very bitter taste. "Linamarin," for so the new compound has been designated, is stated to differ from amygdalin in being soluble in an equal weight of cold water, losing no water at 120° C., melting at 134°, giving scarcely any colour with concentrated sulphuric acid, and containing a larger proportion of nitrogen. It is scarcely acted upon by an emulsion of sweet almonds, but it is broken up by an emulsion of linseed, no benzaldehyde occurring among the products of decomposition.

Solutions of Cresols.

In consequence of the insolubility of the cresols in water, when prepared for disinfecting purposes they are usually emulsified by means of soap solutions or themselves saponified by treatment with an alkali. As such products are open to various objections when required for medicinal purposes, attempts have been made to prepare neutral aqueous solutions of the cresols. It is now stated (*Chem. Zeit. Rep.*, Aug. 15, p. 216) that by adding cresol to a very concentrated aqueous solution of sodium salicylate a mixture is obtained which allows of being diluted at pleasure with water without separation of the cresol taking place upon standing. No double compound, it is said, is formed, but a neutral aqueous solution of the cresol is obtained. It is almost a matter of indifference whether ortho-, meta-, or paracresol is used, or mixtures of them with one another or with the higher boiling phenols. The sodium salicylate also may be replaced by other salicylates, by the salts of ortho-oxybenzolcarboxylic acid, and by salts of phenols and naphthols. Somewhat less solvent action is exercised by the salts of ortho-oxybenzolsulphonic acid, as well as by sodium benzoate and sodium benzolsulphonate and their homologues. Naphthalin derivatives, on the other hand, seem to possess the power in a higher degree. As the result of some bacteriological experiments solutions of ortho-, meta- and paracresol prepared by means of sodium cresotinate are recommended as best suited for medicinal and surgical purposes. A 0·5 per cent. solution is said to be sufficiently strong for most purposes, free from irritant or caustic action, and more energetic against bacteria than even a 5 per cent. solution of carbolic acid.

Borax and Chloral.

The growing practice of ordering "borated chloral," or a mixture of borax and chloral, for certain throat affections has induced a French pharmacist, M. Dujardin, to publish a note calling attention to the fact that the product supplied will vary with the temperature at which it is prepared (*Bull. Gén. Thér.*, July, p. 91). When the solution is made in the cold, as the borax is without perceptible action on chloral at a low temperature, the latter will remain intact in the solution. With the application of heat, however, the two compounds will react and chloroform will be liberated from the chloral and may remain in the liquid. Should the liquid be allowed to boil for a few moments the whole of the chloral would be decomposed, and the resulting chloroform would volatilize. M. Dujardin therefore recommends that if in making this preparation heat be used to dissolve the borax, the solution should be allowed to cool before adding the chloral.

Eucalyptus Oil.

At the last meeting of the Berlin Pharmaceutical Society Dr. Thoms called attention to a variety of eucalyptus oil that has been recently pushed very energetically in Germany by a Queensland firm, who claim for it a high position as an antiseptic (*Pharm. Centralh.*, Aug. 13, p. 469). The oil is said to be a distillate from the leaves of *Eucalyptus maculata*, var. *citriodora*, and is described as being a faintly yellowish-coloured liquid, having an odour strongly recalling that of melissa. Some time since this citriodora oil was examined by Schimmel and Co., who reported the occurrence in it of the aldehyde discovered in citronelle oil by Dodge, which they named "citronellon" ($C_{10}H_{18}O$); no eucalyptol was, however, found in it. Dr. Thoms confirms these results. Upon distilling a sample of the oil he found

that the greater part of it passed over between 200° and 205° C., the thermometer remaining stationary for some time at 200°, which according to Gladstone is the boiling-point for pure citronelle oil. In other respects, also, the distillate corresponded to the characters attributed to the principal constituent of citronelle oil. In the absence, therefore, of eucalyptol, Dr. Thoms is evidently sceptical as to this *Eucalyptus citriodora* oil possessing any therapeutic properties that are not equally shared by citronelle oil.

Croton flavens as an Insecticide.

At the same meeting Dr. Thoms read a communication upon *Croton flavens*, which had been brought before the Society a few months since as a possible substitute for Persian insect powder (*Pharm. Journ.*, [3], xxi., 561). From experiments Dr. Thoms has arrived at the conclusion that the powder of the plant, and an alcoholic and an ethereal extract prepared from it, are equally without toxic action and useless for the purpose suggested.

Spontaneous Ignition of Coal.

The spontaneous ignition of coal, although sometimes disastrous in its consequencs, is a phenomenon that has not yet been satisfactorily explained, Berzelius's suggestion that it may be connected with the development of heat resulting from the oxidation of pyrites being most generally accepted. According, however, to Professor Lewes, who brought this subject before the Chemical Section of the British Association, the coal most liable to spontaneous ignition often contains as little as 0·8 per cent. of pyrites, and rarely more than 2 per cent. Such a quantity concentrated in one spot and oxidized with the greatest rapidity, instead of being diffused and occupying months in the reaction, could not cause a rise of temperature adequate to cause ignition of the coal. Moreover, heaps of pure pyrites do not show any tendency to serious heating. Professor Lewes is of opinion that the true explanation is to be found in the power of freshly won coal to absorb one and a half to three times its volume of oxygen from the air, and this oxygen attacking and decomposing some of the bituminous hydrocarbons in the coal. Up to 30° C. the absorption goes on slowly and the chemical action is so slight that there is little danger of undue heating ; but directly this temperature is exceeded in some classes of coal ignition becomes only a question of time and mass. Professor Lewes says that the action of mass, condition and temperature can be traced in the statistics of spontaneous ignition in coal cargoes, and he attributes the increasingly frequent bunker fires on fast liners to rise of temperature consequent upon the bunker bulkheads being too close to the hot air upcast shafts from the boilers and furnaces.

Metallic Compounds of Carbon Monoxide.

Since the discovery of the volatile nickel carbon monoxide $Ni(CO)_4$ by Messrs. Mond, Langer and Quincke (*Pharm. Journ.*, [3], xxi., 154) increased attention has been accorded to the possibility of preparing other metallic compounds of the gas. Messrs. Mond and Quincke describe (*Berichte*, xxiv., 2248) a similar volatile compound with iron, obtained by passing a stream of carbon monoxide over finely divided iron at 80° C., prepared by the reduction of the metallic oxalate in hydrogen at 400° C. The reaction, however, does not occur so readily as with nickel, since only one-sixth of twelve grams of iron was volatilized after continuous treatment for six weeks. On this account great difficulty was experienced in separating the metallic compound from the diluent carbon monoxide gas, one litre only containing about 0·004 gram iron, or 2 c.c. of the compound, supposing it to have a composition analogous to that of the nickel compound. It is absorbed by concentrated sulphuric acid, but decomposition speedily occurs, and the best solvent was found to be mineral oil with a boiling point 250–300° C. By determining the amount of carbon monoxide eliminated from this solvent upon heating and the weight of iron deposited, the formula of the volatile iron compound is calculated to be $Fe(CO)_4$. M. Berthelot (*Compt. Rend.*, cxii., 1343) publishes similar results concerning this volatile iron compound almost simultaneously with Mond and Quincke, so that its existence is placed beyond all doubt. Probably a similar combination of iron with carbon monoxide occurs in blast furnaces. In the meantime the nickel compound bids fair to assume technical importance, as at the recent meeting of the British Association specimens of nickel plated articles were exhibited which had been prepared by the deposition of nickel from the volatile compound. The compounds of carbon monoxide and chlorine with platinum, discovered by Schutzenberger in 1868, have also been subjected to re-investigation by Pullinger (*Berichte*, xxiv., 2291), whilst Mylius and Foerster (*Berichte*, xxiv., 2424) make the observation that the platinum chloride carbon monoxide combines with hydrochloric acid and soluble chlorides to double salts of the general formula $COPtCl_2,RHCl$. The compounds with the chlorides of sodium, potassium, zinc and others are yellow and crystallizable, but so readily soluble in and decomposed by water as to render their isolation very difficult. With the hydrochloric acid salts of organic bases a series of well-defined bodies have, however, been obtained, as with amylamine, aniline, pyridine and quinoline. Corresponding bromine, iodine and cyanogen derivatives of platinum carbon monoxide have also been prepared, but all efforts to isolate the platinum carbon monoxide itself have as yet proved unsuccessful. The known existence of a platinum carbon bisulphide ($PtCS_2$) and the determination of the precipitate caused in platinum chloride carbon monoxide solutions by sulphuretted hydrogen to be a sulphur compound COPtS, according to the equation $COPtCl_2 + H_2S = COPtS + 2HCl$, argues for the existence of a platinum carbon monoxide of the formula $(PtCO)x$. Owing to the analogous behaviour of palladous and cuprous chlorides towards carbon monoxide, Mylius and Foerster also consider the occurrence of analogous palladium and copper salts to be probable.

Chemical Action at a Distance.

Under the paradoxical title of "Chemical Action at a Distance," Professor Ostwald communicates to the *Philosophical Magazine* (Aug., p. 145) an abstract of a paper recently read by himself before the Royal Saxon Society of Science at Leipsic. It is well known that a piece of pure zinc or amalgamated zinc is not attacked by dilute acids, but if a platinum wire be wound about it, solution in the acid takes place at once with evolution of hydrogen. Zinc, armed with platinum,

cannot be dissolved in solutions of neutral salts, such as potassium sulphate, but if a few drops of acid be added to the liquid, solution at once ensues. In the latter case it appears self-evident that the acid attacks the zinc, since the latter is dissolved; but Professor Ostwald finds that if the zinc and platinum be bent into a curve, with its arms some slight distance apart, and these be so placed in a potassium sulphate solution that the portions of the liquid surrounding each arm are separated by a wall of porous material, then the zinc only dissolves when the solution about the platinum arm is acidified, hydrogen being simultaneouly evolved from the platinum surface. In a solution of common salt zinc behaves in exactly the same way, and cadmium and tin also show the same behaviour. Metals which are dissolved, not with evolution of hydrogen, but only with the accompanying action of an oxidizing agent, may be brought into solution according to the same fundamental principle; even the more resistent metals, when connected with platinum upon which their specific solvent is allowed to act, are dissolved in liquids which otherwise never attack them. Ostwald found considerable amounts of silver to dissolve in dilute sulphuric acid, when the metal had been connected with a platinum wire near which a few drops of chromic acid solution had been added to the sulphuric acid. Similarly gold may be dissolved in a solution of common salt, when the platinum is brought in contact with chlorine. These phenomena are termed chemical action at a distance, because the appearance in every case is as if the specific solvent of the metals, when applied to the platinum, exercises its action at a distance upon the metal in question, but there can plainly be no doubt that electrolytic relations play here the decisive *rôle*. Professor Ostwald thinks that these actions can be most satisfactorily explained by Arrhenius's theory of free ions, according to which it is assumed that zinc, in contact with the solution of an electrolyte, as potassium sulphate, may only go into solution by its atoms becoming loosened from the metal in the form of ions with their corresponding charges of electricity. As positive ions leave the originally neutral zinc, the latter becomes charged negatively and the solution positively, until a certain definite difference of potential has been established between the metal and the solution, when equilibrium occurs. On account of the very great quantities of electricity carried by the ions the necessary quantities of metal are extremely slight, in general too slight to be shown by analytical tests, and further solution is hindered by the excess of positive ions that exist in the liquid, but would be renewed if these ions could be removed. If another metal, such as platinum, be connected with the zinc this assumes the same negative charge as the zinc, and when dipped into the liquid would act electrostatically upon the excess of ions and collect them around it. Further, if the positive ions did not hold their electricity very firmly, under the influence of the difference of potential caused by the presence of the zinc they might be forced to yield up their electricity to the electrode platinum. Such a condition obtains when the potassium sulphate at the platinum wire is replaced by sulphuric acid, and consequently the hydrogen ions part with their electrical charges, escaping in the form of ordinary hydrogen. By the combination of this positive electricity with the negative of the metal the latter is partially neutralized, the zinc becomes able to send out more positive ions, and the action continues as long as metallic zinc or hydrogen ions remain at disposal. Since the publication of the electro chemical theory of Berzelius, the idea has been held that the aggregation of atoms into molecules is conditioned by the opposed electrical charges of the former, but this representation is here applied to the case of the combination of the same atoms, which Berzelius looked upon as impossible. The study of the question appears to form a starting-point towards the understanding of the phenomena connected with the dissolving of metals in general, and such confidence has Ostwald in Arrhenius's theory that he mentions that the description of some of the experiments was completely worked out at his writing table, before he had seen any of the phenomena described. After making the experiments on the following day it was found that nothing in the description required alteration.

London and Paris Telephone.

One of the most interesting papers brought under the notice of the British Association at Bath was that by Mr. W. H. Preece on the London and Paris Telephone. Notwithstanding the difficulties attending this enterprise, Mr. Preece was able to claim that there is no telephone circuit, in or out of London, on which the transmission of speech is more perfect than it is between London and Paris. Speech has also been transmitted from London through Paris to Brussels, and also—though with some difficulty—through Paris to Marseilles, a distance of 900 miles. The average number of calls daily, excluding Sundays, has been 86, and the maximum 108. Three minutes' complete use of the wire is allowed, and the average of calls during the busy part of the day has been 13 per hour, though as many as 19 have been accommodated during a single hour. As an instance of what is possible by means of the telephone it was mentioned that during a three minutes' call 450 words have been dictated in Paris and transcribed in London in shorthand, at the cost of about five words for a penny. Among the attendant phenomena Mr. Preece referred to the fact that a metallic telephone circuit may have a static charge induced upon it by a thunder cloud, the electric strain being released when the charged cloud flashes into earth or into a neighbouring cloud. If there be electro-magnetic force already present in the circuit the current will surge backwards and forwards in consequence of the inertia until it dies out, but if there be no electro-magnetic force present neutrality will be attained at once. Telephone circuits indicate this operation by peculiar and characteristic sounds, which in the case of a copper wire circuit, like the Paris to London telephone, is a short, sharp report, comparable to the crack of a pistol. This is sometimes quite startling, and although there is no danger or liability to shock, the resulting start has more than once thrown the listener off his stool and led to the belief that he has been knocked down by the electric current. Mr. Preece is of opinion that the future of telephone working, especially in large cities, will be one of underground wires, the difficulties being overcome by metallic circuits, twisted wires, low resistance and low capacity.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, AUGUST 29, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE BRITISH ASSOCIATION AT CARDIFF.

By the time when these pages appear in print the meeting of the British Association in Cardiff will have become an event of the past; the last paper will have been read, the final excursion will be over, and of the visitors only a few stragglers will be left to tempt further the pluvial capabilities of the metropolis of South Wales. As might have been expected from the outlying position of the place of meeting the attendance has not been relatively large, the tickets sold numbering less than thirteen hundred, or about five hundred less than last year. Neither have the papers been very numerous or striking, and although the physical aspects of science have perhaps been most in evidence, there has been no such sensational publication of new facts or promulgation of new theories as has made the proceedings at some previous meetings notable. Contrary to expectation, which looked for a late meeting next year, it has been fixed at an unusually early date, it having been resolved that the gathering in Edinburgh in 1892 shall commence on Wednesday, August 3.

But although the meeting at Cardiff may in point of attendance and some other respects have been somewhat below the average, and although the papers read before the sections have not been epoch-making, it must be admitted that the presidential addresses, without exception, have been of a very high order of merit. The address of the PRESIDENT of the Association, Dr. HUGGINS, had for its theme advances in astronomical knowledge during the last thirty years. These were described as being due chiefly to the introduction into the observatory of the spectroscope and the modern photographic plate. The spectroscope has made revelations as to the probable composition and condition of matter in space, from the nebulous cloud to the brightest star, and has disclosed the movements of "dark suns" of which the existence was hitherto unsuspected. With its aid, too, it has proved possible to measure with marvellous precision previously unrecognizable movements of stars to and fro along the line of vision, and to differentiate between the light waves from binary stars not known before to have a separate existence. With the camera and gelatine plate almost infinitely minute indications of light energy, reaching this planet centuries after emission from an invisible source, have been stored up until they have become perceptible and been permanently recorded on the sensitive film. By the same means also light waves belonging to the portion of the spectrum outside the powers of human sight have been rendered visible. But the glimpses into starry space afforded by these two instruments have revealed a "background formed of an enlacement of streams and convoluted windings and intertwined spirals of fainter stars," far more bewildering in the apparent complexity of the order of their distribution and movements than any problem that puzzled the pre-Copernican astronomer. As Dr. HUGGINS eloquently puts it, "We who form part of the emblazonry can only see the design distorted and confused; here crowded, there scattered, at another place superposed. The apparent groupings due to our position are mixed up with those which are real." It is the deciphering of this wonderfully intricate constitution of the heavens to which Dr. HUGGINS looks forward as one of the chief astronomical works of the coming century.

In the opening passages of the address by Professor LODGE to the Mathematical and Physical Section, after alluding to similar topics, reference was made to the practical discovery of a physical method for colour photography after the failure of chemical means, and it was pointed out that the first suggestion in this direction was made by Lord RAYLEIGH in 1887. But one of the chief subjects of the address was the desirability of establishing a permanent and publicly supported physical laboratory on a large scale, in which work requiring great exactitude or spreading over long periods of time might be carried out. Professor LODGE then took the "risk of introducing a rather ill-favoured and disreputable-looking stranger," in the belief that he was "not all scamp, and that his present condition is as much due to long-continued neglect as to inherent incapacity for improvement." The individual turned out to be almost as intangible as he was ill-favoured, but as "an instance" of what was meant, the question was mooted whether it has or has not been established by direct experiment that a method of communication exists between mind and mind, or "thought transference," irrespective of the ordinary channels of consciousness and the known organs of sense, and if so, what is the process? The opinion was expressed that it could hardly be through some unknown sense-organ, but that it might be by some direct physical influence upon the ether, or in some still more subtle manner. Further investigation is what is wanted, and yet,

said Professor LODGE, whether it be a truth or a fiction probably not one of the recognized scientific societies would receive a paper on the subject. The field, the exploration of which is regarded as being so dangerous, was described as being the border-land of physics and psychology; it might be called the connection between life and energy or between mind and matter. It is an intermediate region, bounded on the north by psychology, on the south by physics, on the east by physiology, and on the west by pathology and medicine. An occasional psychologist has groped down into it and become a metaphysician. An occasional physicist has wandered up into it and lost his base. Biologists look at it askance or deny its existence, while a few medical practitioners, after long maintenance of a similar attitude, have begun to annex its western frontier. The whole region seems to be inhabited mainly by savages, many of whom are given up to gross superstition. So far as explorations of this region have been carried out by metaphysicians and others it has been by methods unsatisfactory to physicists, and the hope was expressed that the work might now be properly taken up. Professor LODGE thinks that a vulnerable point from the physical side is to be found in the connection between life and energy. The relation of life to energy is not yet understood, and as a contribution towards the elucidation of the mystery the Professor said, rather paradoxically, "Life is not energy, and the death of an animal affects the amount of energy no whit; yet a live animal exerts a control over energy that a dead one cannot."

In the Chemical Section, Professor ROBERTS-AUSTEN appropriately chose the problems of metallurgy for the subject of his address. The first part was devoted to the explanation of facts connected with oxidation and reduction, upon which depend operations of special importance to the metallurgist. With the earlier discoveries as to oxidation the speaker associated the name of ROBERT BOYLE, the bicentenary of whose death is completed this year. In the second part of his address the Professor discussed the influence in metallurgical practice of certain reactions which are either limited or reversible. In modern metallurgy, he said, the whole range of the field of study is changing. It is no longer possible for the metallurgist to devise a series of operations on the evidence of a set of equations that indicate only the completion of an operation. It is necessary for him to consider the complicated problems which have been introduced into chemistry from the sciences of physics and mechanics; in fact, he has no longer to deal only with atoms and molecules, but with the influence of mass. As OSTWALD has pointed out many reactions are reciprocating, so that the original substance may be re-obtained from the products of the reaction. Illustrations of this were given from the metallurgy of iron, copper, aluminium and silver, and the speaker then proceeded to discuss the means by which progress in the metallurgic art may be effected, emphasizing the need for studying the molecular constitution of metals and alloys. In some remarks upon the conditions under which such researches are usually carried out in this country a contrast was drawn between the laboratories in British works, which are too often mere sheds placed behind the boiler house, with the laboratories upon which a German chemical firm has recently spent £19,000. As an illustration of the mighty interests involved it was stated that in a single operation conducted in the establishment of Messrs. JOHNSON, MATTHEY and Co., a mass of palladium valued at £30,000 was extracted from gold platinum ore valued at more than a million sterling.

The address of Professor RUPERT JONES to the Geological Section had for its principal subject the coal-field of South Wales. In the Biological Section Mr. FRANCIS DARWIN discussed the causes of growth curvature in plants in a lengthy address, from which we hope to have an opportunity of publishing some passages on a future occasion. Cartography was the subject of the address by Mr. RAVENSTEIN to the Geographical Section, whilst Professor CUNNINGHAM took for his text in the Economic Science and Statistics Section, "Nationalism and Cosmopolitanism in Economics." Next came the Mechanical Science Section, in which Mr. T. FORSTER BROWN dealt specially with the modern applications of mechanical engineering in mining operations. Lastly the address of Professor MAX MÜLLER to the Anthropological Section was an argument as to the importance of philological studies as an aid in working out the problems of anthropology.

It is announced that the question of allowing the employment of women in pharmacies has recently been under the consideration of the Ministry of Public Instruction in Russia, and that a resolution has been arrived at to permit their entry into the business in that country as apprentices. Before being allowed to practise, however, they will have to pass an examination in Latin equal to the standard of the fourth class in the gymnasium.

* * *

A striking illustration of the unequal weather prevailing recently is furnished by Mr. Reynolds in eight records of rainfall that occurred last month within an area of about four miles in each direction during a violent thunderstorm in the neighbourhood of Leeds. The maximum fall amounted to ·60 inches in 40 minutes, during part of which time the fall was at the rate of 1·5 inch per hour.

British Pharmaceutical Conference.

MEETING OF THE EXECUTIVE COMMITTEE.

A meeting of the Executive Committee was held at the Town Hall, Cardiff, on Monday, Aug. 17, at 10 p.m.

Present—Mr. Martindale, President, in the chair; Professor Green, Messrs. Anthony, Atkins, Coleman, Dott, Gerrard, Munday and Schacht; Alderman Yorath, Mr. Davies, Treasurer, Messrs. Naylor and Ransom, Hon. Gen. Secs., and Mr. Johnson, Assistant Secretary.

The minutes of the previous meeting were read and confirmed.

A draft report for presentation at the annual meeting was submitted by the Hon. General Secretaries and agreed to.

The Treasurer's financial statement for the year 1890–91 was read and approved.

A proposed list of officers for the ensuing year was adopted for recommendation to the general meeting for election.

The question of the advisability of continuing to hold the Conference at the same place and about the same time as the British Association was again brought forward. As, however, the invitation to members at the last meeting of the Conference to ventilate the subject during the year had not resulted in any decided expression of opinion, it was thought best to postpone the discussion of the question in general meeting until next year.

There being no Chemists' Association in the town, it was decided, at the suggestion of the Local Committee, that the books purchased with the Bell and Hills Fund should be placed in the Cardiff Free Library, where the chemists of the district should have free access to them.

The programme for the proceedings of the sittings of the Conference was considered and agreed to.

Several gentlemen were duly nominated and elected to membership.

MEETING AT CARDIFF.

FIRST DAY'S PROCEEDINGS.

Tuesday, August 18.

(*Continued from page* 159.)

Reading of Papers.

The reading of papers was then proceeded with, the first being a—

Report upon Ipecacuanha.

PART I.—GENERAL PROXIMATE ANALYSIS.

BY R. A. CRIPPS, F.I.C., AND A. WHITBY.

The conflicting statements of various observers as to the percentage of emetine in ipecacuanha root, and the comparatively unknown characters of the other constituents, evidence the need which exists for a thorough chemical examination of the drug.

We have therefore undertaken such a research, this communication forming a report upon the first part; the second part is now in progress, but from various causes is not sufficiently advanced to publish at present.

One hundred grams of the root in No. 80 powder were packed in a percolator and exhausted successively by means of petroleum ether, absolute ether, and alcohol of 65 o.p., the powder being exposed to the air to remove adherent solvent between each extraction. The marc was then macerated with cold distilled water, the watery liquid decanted, the treatment with water repeated, and finally the residual root was exhausted with solution of sodic hydrate 0·2 per cent.

By these means five separate solutions were obtained, and examined as follows:—

I. Petroleum Ether Solution.—The solvent was distilled off and the residual fatty extract dried upon the water-bath. It weighed 0·2835 gram = 0·28 per cent. This residue consisted of a fatty oil, which slowly assumed a crystalline appearance, from the presence of numerous nearly white crystals imbedded in a dark yellow thick oil. The residue was treated with cold absolute alcohol, which dissolved the oily portion, leaving a greyish-white insoluble matter, which did not wholly redissolve in cold petroleum ether, but left a minute brownish residue, soluble in chloroform. The portion dissolved in absolute alcohol weighed 0·2670 gram, the solution being acid to phenol phthalein, and requiring 5·8 c.c. of decinormal soda solution for neutralization; this is equivalent to 0·1635 gram of free oleic acid, the remaining 0·1035 gram consisted mainly of neutral fat.

That which was insoluble in cold absolute alcohol weighed only 0·0165 gram, and was of a waxy nature.

A portion of the petroleum ether solution was evaporated by aspiration and the residue weighed from time to time; by this means evidence was obtained of the presence of a mere trace of volatile oil.

The petroleum ether, which had been distilled from the extract, was rendered very faintly acid with hydrochloric acid and re-distilled; no residue was left, indicating absence of any volatile alkaloid soluble in petroleum ether.

We may here state that this distillation with a trace of acid was repeated with the distillates from the ethereal and spirituous extracts, in each case with a negative result.

The petroleum ether extract therefore contains—

Volatile oil	mere trace.
Free fatty acid, equivalent to oleic acid	0·163 per cent.
Neutral fat	0·104 ,,
Insoluble in alcohol (wax?) .	0·016 ,,
	0·28 ,,

II. Ethereal Solution.—After distilling the solvent the residue was dried and weighed: 0·2795 gram = 0·28 per cent. This dried extract was treated successively with cold distilled water, cold alcohol, and boiling alcohol, whereby it was separated into four portions—

(*a*)	Soluble in water	0·026 gram.
(*b*)	,, in cold alcohol . .	0·220 ,,
(*c*)	,, in hot alcohol . .	0·0175 ,,
(*d*)	Insoluble in hot alcohol . .	0·0105 ,,

(*a*) The solution in water was neutral; gave indications of the presence of a mere trace of alkaloid by Mayer's solution and iodine in iodide of potassium; it contained no sugar, but assumed a green coloration with ferric chloride; its quantity did not admit of further examination; in all probability it is allied to catechin or quercitrin.

(*b*) The alcoholic solution left upon evaporation a soft brown residue, which also contained a trace of alkaloid, but consisted mainly of a substance possessing all the properties of an acid resin. It contained no chrysophanic acid or tannin. It was soluble in chloroform. The following reactions were observed—

Dilute KHO—Freely soluble, re-precipitated on addition of HCl.

HNO_3—Slight action, with yellow coloration.

$HNO_3 + H_2SO_4$—Slight action, with yellow coloration.

H_2SO_4—Brownish, becoming purplish brown and finally red-brown when gently warmed on water-bath.

H_2SO_4 and sugar—Dark brown.

Fe_2Cl_6—No alteration.

(*c*) This was not further examined; it was probably wax.

(*d*) This was found to be insoluble in dilute solution of potassic hydrate; it gave a brown coloration

with sulphuric acid. It is probably an indifferent resin.

The ethereal solution therefore contains—

Alkaloid	Trace
Substance soluble in water (allied to quercitrin or catechin)	0·026 per cent.
Acid resin	0·220 „ „
Wax (?)	0·017 „ „
Indifferent resin	0·011 „ „
Loss	0·006 „ „
	0·280

III. Alcoholic Solution.—Total volume 730 c.c.; 10 c.c. evaporated yielded 0·142 gram of dry residue = 10·37 per cent.

One-half of the total spirituous solution was distilled, and the residue evaporated at a low temperature till all spirit was dissipated, then treated with cold distilled water, the solution filtered, the filter washed with water, and the filtrate made up to 100 c.c. In this way were obtained (*a*) a dark brown solution, and (*b*) an insoluble brown residue.

(*a.*) Aqueous solution.

(1) *Estimation of Total Solids in Solution.*—5 c.c. on evaporation left a dry residue weighing 0·23 gram = 9·2 per cent.

(2) *Estimation of Tannin.*—25 c.c. were treated with slight excess of plumbic acetate, the precipitate filtered off, rapidly washed, dried and weighed = 0·2135 gram. Upon incineration this yielded 0·1035 gram of oxide of lead, leaving 0·11 gram organic acids, precipitated by lead acetate = 0·88 per cent. tannin, etc.

Twenty-five c.c. similarly treated with cupric acetate yielded no precipitate.

(3) *Estimation of Sugars.*—Sugar was estimated volumetrically by means of Fehling's solution in a portion of the filtrate from the above lead precipitate, both before and after inversion with hydrochloric acid. The results were as follows:—

	Per cent.
Before inversion, calculated as dextrose	1·76
After inversion, calculated as saccharose (additional)	2·12
Total	3·88

(4) *Estimation of Alkaloids, etc.*—25 c.c. were introduced into a separator, rendered slightly acid with H_2SO_4, and agitated successively with petroleum ether, ether, and chloroform; washed once with petroleum ether, then rendered alkaline by ammonic hydrate and again agitated with ether and then with chloroform.

One-half of the filtrate from II. was treated in the same manner after removing lead by sulphuretted hydrogen; the separations in this case were far more rapid and the residues purer. In this way four residues were obtained from the evaporated solvents, petroleum ether extracting nothing. The quantities obtained were so small that the remaining portion of the original alcoholic extract (355 c.c. = 48·6 grams) was distilled, the extract diluted with water, precipitated by plumbic acetate, and filtered, the filtrate treated with sulphuretted hydrogen, again filtered and agitated with solvents as above.

a[1]. *Extracted by Ether from Acid Solution.*—Upon evaporation this yielded 0·012 gram of dry extract = 0·0246 per cent.

This extract was of a yellowish colour, almost insoluble in water, but soluble in alcohol, chloroform, or dilute alkaline liquids; from the latter it is re-precipitated upon addition of acids. When boiled with dilute hydrochloric acid it yields no glucose. Water or dilute acids extract from it traces of an alkaloid as indicated by iodine or Mayer's solution. The acid ethereal extract therefore consists of an acid resin with traces of an alkaloid.

b[1]. *Extracted by Chloroform from Acid Solution.*—This extract was of a brown colour, and when dry weighed 0·0485 = 0·10 per cent. By treatment with warm water it was resolved into two parts, soluble and insoluble, weighing respectively 0·037 gram and 0·0115 gram = 0·076 and 0·023 per cent.

The solution in warm water became opalescent on cooling, it possessed a somewhat bitter and nauseous taste; it gave no indication of glucose with Fehling's solution, but after digesting upon the water-bath with weak hydrochloric acid for an hour glucose was produced, indicating the presence of a glucoside. With alkaloidal reagents the following reactions were observed:—

Mayer's solution	Yellowish white precipitate.
Iodine in iodide of potassium	Orange-brown precipitate.
Potassio-bismuth iodide	Orange precipitate.
Phospho-tungstic acid	Pale yellow precipitate.
Platinic chloride	Yellow precipitate, insoluble when warmed, but soluble in alcohol.
Auric chloride	Yellow, not dissolved upon warming, sparingly soluble in alcohol.
Potassic hydrate	Slightly darkens solution, rendering it quite clear.
Ferric chloride	Greenish coloration.
Acetic acid and calcium hypochlorite	Coloration more orange, indicating trace of emetine (?).
Baric hydrate	No precipitate.

The dried residue from aqueous solution reacted as follows:—

Sulphuric acid	Pale dull brown, gradually darkening.
Sulphuric acid with sugar	Pale dull brown, gradually darkening.
Sulphuric acid and molybdate	Orange-brown, becoming greenish-brown.
Sulphuric acid followed by HCl	Evanescent indigo coloration.
Nitric acid	Orange.

That portion insoluble in warm water was readily soluble in spirit, and partially soluble in water acidulated with sulphuric acid. The weak acid solution gave evidence of the presence of an alkaloid the reactions of which were the same as those given above. It was also soluble in dilute aqueous alkalies, from which acids precipitated a small quantity of resinous substance. It is evidently a mixture of an alkaloid with an acid resin. The reactions of these substances indicate an alkaloid which if not emetine is nearly allied to it, with an acid resin, and a glucoside slightly soluble in water. The absence of a precipitate with baric hydrate shows that the glucoside is not saponin, although this aqueous solution froths considerably when agitated.

c[1]. *Extracted by Ether from Alkaline Solution.*—After eight separations it was found that ether still removed *traces* of alkaloid, the quantity removed by the last two not appreciably differing, although the first three separations removed abundance of alkaloid. This is in accordance with our observations when working upon ipecacuanha for assay purposes. The eight washings were washed with water, allowed to evaporate spontaneously, and the residue finally dried over sulphuric acid. It weighed 0·9275 gram = 1·91 per cent. This alkaloidal residue was of a very pale yellow-brown colour, and presented a semi-crystalline appearance in the thinner films. It was rapidly and completely soluble in weak hydrochloric acid, rectified spirit, alcohol, or ether; in the latter solution petroleum ether produced a perfectly white precipitate.

The dry alkaloid gave the following reactions—

Sulphuric acid	Very pale yellow, becoming very pale brown when warmed upon water-bath.
Sulphuric acid and sugar	Faint pinkish brown, becoming salmon pink.
Nitric acid	Pale orange brown, becoming bright orange-red.
Hydrochloric acid.	No coloration.
Fröhde's reagent	Pale yellowish pink, becoming greenish.
Fröhde's reagent and HCl	Greenish blue, becoming rose with green at edges.

The dilute HCl solution reacted as follows—

Potassic hydrate	Abundant white precipitate, insoluble in excess.
Ammonic hydrate.	Abundant white precipitate, insoluble in excess.
Chlorinated lime	Orange solution, then yellow precipitate.
Auric chloride	Yellow precipitate, soluble on warming.
Platinic chloride	Pale yellow precipitate, soluble in spirit.
Mayer's solution	White precipitate.
Sonnenschein's solution	Yellow precipitate.
Potass. bismuthic iodide	Brilliant orange-red precipitate.
Potass. cadmic iodide	White precipitate.
Iodine in potassic iodide	Bright brown precipitate.
Phospho-tungstic acid	White precipitate.

These are the general reactions ascribed to emetine, but the almost complete absence of colour with sulphuric acid and Fröhde's reagent, with the clearer and more distinct colours with sulphuric acid and sugar and nitric acid, would suggest a greater degree of purity than is usual.

Further experiments upon this alkaloid are reserved for the second part of this report.

d[1]. *Extracted by Chloroform from Alkaline Solution.*—After separation of the ether the aqueous liquid was agitated with four successive quantities of chloroform; the last washing was found to contain only a mere trace of alkaloid. These chloroformic solutions were washed with water, and being still highly coloured, the alkaloid was extracted therefrom by two agitations with dilute sulphuric acid. The acid removed all the colour, which was, however, again transferred to chloroform when agitated with that liquid after addition of excess of ammonic hydrate. It was thus seen to be impossible to further purify this alkaloid by agitation, and therefore the chloroform solution was evaporated and dried at a low temperature. It weighed 0·1175 gram = 0·242 per cent.

This residue presented distinct indications of crystalline character; it was of a dark brown colour, and in solution was slightly fluorescent. The dry alkaloidal residue was tested with the usual reagents, giving the same results as the alkaloid extracted by ether, with these exceptions.

Sulphuric acid	No coloration.
Fröhde's reagent	No coloration, pale bluish on addition of HCl.
Sulphuric acid and sugar	Gradually yellow, then brown.
Nitric acid	Gradually yellow, then fading.
Auric chloride	Dirty yellow, soluble on warming.
Phospho-tungstic acid	Dirty white.
Potass. cadmic iodide	Dirty white.
Potass. or ammonic hydrate	Scarcely any precipitate.
Chlorinated lime	Pale orange yellow.

These reactions indicate a certain admixture with the last described alkaloid, but accompanied by some other substance, most probably also alkaloidal.

e[1]. The aqueous liquid from which the above-named solvents had been removed was rendered faintly acid by means of sulphuric acid, then an excess of magnesia added, and the whole evaporated to dryness in the water-bath, and the dry residue powdered. The powder was boiled successively with ether, chloroform and alcohol. Each of these solvents extracted a small quantity of solid matter. The amount from ether and chloroform was very small, and appeared to consist mainly of resinous substances; alcohol extracted 5·01 per cent.; this would include the sugars, therefore the substance other than sugar would amount to 1·13 per cent. It consisted of coloring matter and probably other indefinite substances.

(*b.*) *Insoluble brown residue.*—This was treated with dilute ammonic hydrate, whereby a large proportion was dissolved; this solution upon treatment with slight excess of acetic acid, evaporation to small bulk, and filtration, yielded a precipitate which, when washed and dried, weighed 0·169 gram = 0·338 per cent. phlobaphane. The residue insoluble in ammonia was digested with rectified spirit which dissolved 0·11 gram = 0·22 per cent. This portion was insoluble in aqueous potassic hydrate, and may be regarded as an indifferent resin. That which was insoluble in rectified spirit was not further examined.

The alcoholic solution was therefore found to contain:—

Tannin and allied bodies	0·88 per cent.
Saccharose	2·12 ,,
Dextrose	1·76 ,,
Resin removed by ether from acid solution	0·025 ,,
Resin and alkaloid removed by chloroform from acid solution	0·100 ,,
Alkaloid removed by ether from alkaline solution	1·910 ,,
Alkaloid removed by chloroform from alkaline solution	0·24 ,,
Resinous body not removed by agitation	0·07 ,,
Colouring matter, etc., soluble in water	1·13 ,,
Phlobaphane	0·34 ,,
Indifferent resin	0·22 ,,
Colouring matter, etc., insoluble in water	0·61 ,,
Loss	0·965 ,,
Total extract	10·370 ,,

IV. The Aqueous Solution. Made up to 1 litre.

(1) *Estimation of Total Extract.*—25 c.c. yielded 0·3815 gram of residue dried at 100° C. = 15·26 per cent.

(2) *Estimation of Mineral Matter.*—The above residue left upon incineration 0·032 gram of ash = 1·3 per cent.

(3) *Estimation of Mucilage.*—25 c.c. treated with 50 c.c. absolute alcohol in closed flask, allowed to stand twenty-four hours, collected on a tared filter, washed with 66 per cent. alcohol, dried and weighed = 0·1690 gram; when ignited this precipitate yielded 0·004 gram of ash. The mucilage so obtained contained much albumen. Mucilage + albumen = 6·61 per cent.

100 c.c. treated for albumen as described further on yielded 0·28 gram = 2·8 per cent. 6·61 − 2·8 = 3·81 per cent. mucilage.

(4) *Estimation of Dextrine.*—The filtrate from mucilage was evaporated to a low bulk and mixed with four volumes of absolute alcohol and rapidly filtered off. After washing and drying it weighed 0·052 gram = 2·08 per cent.

(5) *Estimation of Sugar.*—The filtrate from dextrine was assayed for sugar by Fehling's solution, and yielded 2·30 per cent.

(6) *Estimation of Organic Acids.*—After removing mucilage from 25 c.c. and evaporating off the alcohol plumbic acetate was added in slight excess, allowed to stand two days, filtered, and the precipitate washed, dried and weighed =0·123 gram. Upon ignition it yielded 0·084 gram, the difference 0·037 gram being organic acids and allied substances=1·48 per cent.

(7) *Estimation of Albumens.*—For the more accurate estimation of albumen, 10 grams of root were treated with cold water (100 c.c.) and filtered.

To 25 c.c. of the filtrate 5 c.c. of a saturated solution of salt were added, together with a few drops of acetic acid, and the whole raised to the boiling point. The precipitate which formed was collected upon an asbestos filter, washed with hot water, then with 40 per cent. spirit, dried and weighed; the asbestos and albumen were then ignited and again weighed, the difference 0·0775 gram represents albumen precipitated by boiling = 3·10 per cent.

To another 25 c.c. of this solution, mixed with half its volume of a saturated solution of salt, a solution of tannin and acetic acid in dilute spirit was added, rapidly filtered under pressure, washed with water and dried. The precipitate was boiled with alcohol to remove tannin and the insoluble residue weighed =0·0884 gram = total albumen 3·34 per cent.

The addition of hydrochloric acid to the aqueous solution in the cold produced only a faint cloudiness upon standing, indicating absence of more than a mere trace of legumin and allied substances.

(8) *Estimation of Alkaloid.*—100 c.c. of the aqueous extract were rendered alkaline by ammonia and agitated with chloroform. The separation was troublesome, and the chloroform residue weighed 0·0056 gram=0·056 per cent. Another portion was treated with Mayer's solution, the precipitate dissolved by ether, the ethereal solution mixed with alcohol and water and decomposed by sulphuretted hydrogen, filtered from mercuric sulphide, treated with ammonia in excess and again agitated with ether. By this means a dark coloured alkaloid was obtained, representing 0·166 per cent. of the root.

The following reactions were observed with this alkaloid:—

Sulphuric acid	Reddish-brown, not changed on water-bath.
Nitric acid, 1·42	Brick-red.
Nitric and sulph. acids	Brownish-red.
Fröhde's reagent	Brownish-purple, becoming browner.
Fröhde's reagent and hydrochloric acid	No blue coloration.
Hydrochloric acid	Reddish-brown.
Chlor. lime and acid	Faint emetine reaction.
Platinic chloride	Yellow precip., soluble in spirit.
Auric chloride	Yellow precipitate, insoluble on warming.
Mayer's solution	Yellow precipitate.
Sonnenschein's reagent	Dirty yellow precipitate.

The aqueous solution was therefore found to contain:—

	Per cent.
Mineral matter	1·30
Mucilage	3·81
Dextrine	2·08
Sugar	2·30
Organic acids and allied bodies	1·48
Albumen precipitated by boiling	3·10
Albumen not precipitated by boiling	0·24
Alkaloid	0·166
Colouring matter and loss	0·784
Total solids	15·260

V. Alkaline Solution.—2 litres. 50 c.c. were acidified by the addition of acetic acid, mixed with 3 vols. of alcohol of 90 per cent., and allowed to stand twenty-four hours. The precipitate was collected on a tared filter, washed with 75 per cent. alcohol, dried, weighed, and ash deducted. This corresponds to pectin and albuminoids 0·0835 gram = 3·34 per cent.

The filtrate and washings from pectin, etc., were evaporated to dryness, and the amount of sodic acetate deducted. The residue weighed 0·078 gram = 3·12 per cent.

This solution yielded a larger amount of ash than would be accounted for by the acetate of sodium present, the difference representing 0·80 per cent. of the root.

The alkaline solution contains:—

	Per cent.
Pectin, albumen, etc., precipitated by alcohol	3·34
Albuminoids, etc., not precipitated by alcohol	3·12
Ash	0·80
	7·26

VI. Estimation of Starch, etc.—The residue of the 10 grams used to estimate albumen was introduced into a flask together with 100 c.c. of 1 per cent. hydrochloric acid, the whole boiled for four hours, using a return condenser. The liquid was then filtered and the insoluble portion thoroughly washed, the filtrate being made up to 1 litre with distilled water, after being neutralized with sodic bicarbonate. The sugar in the solution was then estimated as usual, 10 c.c. of Fehling's solution requiring 10·125 c.c. of the liquid (mean of several estimations) = starch 44·44 per cent.

VII. Cellulose, Fibre, etc.—The residue from 6 was dried and weighed 1·13 gram = 11·30 per cent.

VIII. Moisture, Ash, etc.—4·774 gram of original powder when dried at 100° C. lost 0·518 gram = 10·85 per cent. moisture. Upon ignition 0·116 gram of ash was obtained = 2·43 per cent. This ash was treated first with distilled water, then with hydrochloric acid, whereby were obtained the following:—

	Per cent.
Soluble in water	0·524
Soluble in hydrochloric acid	1·696
Insoluble in hydrochloric acid	0·210

The portion soluble in water consisted mainly of potassic sulphate, with a trace of sodic chloride.

That soluble in hydrochloric acid contained calcic and magnesic phosphates, calcic carbonate and ferric oxide.

The insoluble portion consisted of silica.

IX. Summary.—The following table expresses the results of this examination of a sample of ipecacuanha root.

	Per cent.
Moisture	10·85
Volatile oil	Trace
Free fatty acid	0·16
Neutral fat	0·11
Wax (?)	0·03
Acid resins soluble in ether	0·25
Indifferent resins	0·23
Substance allied to quercitrin	0·03
Tannin (total)	1·13
Phlobaphane	0·34
Saccharose	2·12
Dextrose (total)	4·06
Dextrine	2·08
Mucilage	3·81
Albumen precipitated by boiling	3·10
Albumen not precipitated by boiling	0·23
Albumen, pectin, etc., insoluble in OH_2	3·34
Albumen not precipitated by alcohol	3·12
Organic acids and allied bodies	1·48

Alkaloid removed by ether from alcoholic extract	1·91
Alkaloid removed by chloroform	0·24
Alkaloid, etc., removed by chloroform from acid solution	0·10
Alkaloid from aqueous extract	0·17
Colouring matter and decomposition products	2·52
Resinous (?) matter not removed by agitation with ether, etc.	0·07
Starch	44·44
Cellulose, lignin, etc.	11·30
Ash, soluble in OH_2	0·53
Ash, soluble in HCl	1·69
Ash, insoluble in HCl	0·21
	99·65

In conclusion, I wish to state that this examination has been carried on in the laboratory of Messrs. Southall Bros. and Barclay, to whom my thanks are due; also to thank the Committee of this Conference for a grant from the Research Fund towards the expenses.

The discussion on this paper was taken with that on a paper entitled—

Preparations of Ipecacuanha.

BY W. H. SYMONS.

Observing that a paper is to be read at this year's meeting of the Conference on the subject of ipecacuanha, I think it may be interesting to place before you certain samples of preparations which, with the view of ascertaining how they kept their virtue, I made some five years ago.

Concerning the ipecacuanha used I have the following notes. It lost 12·8 per cent. of its weight on drying in a water oven. Treated as described in the Pharmacopœia, 3 ozs. yielded 265 grains of dry acetic extract, or nearly 90 grains per ounce: this extract with certain precautions could be powdered, but it was very hydroscopic.

Made into a paste with lime, ammonia and water, and allowed to stand twenty-four hours, then dried at a low temperature and percolated with boiling chloroform to exhaustion, 45 grains of this acetic extract yielded 1·98 grains of a substance which had the characters of impure emetine.

Some of the above-mentioned acetic extract was made into the official wine by dissolving in Gilbey's Castle G sherry. Another portion was similarly treated with sherry which had been mixed with gelatine and subsequently filtered. From the same ipecacuanha I made vinum ipecacuanhæ B.P. 1867, acetum ipecacuanhæ Y.B. 1872, a tincture with proof spirit and another with weak spirit containing about 10 per cent. alcohol, also an ammoniated tincture by moistening 1 ounce of ipecacuanha with 1 drachm of solution of ammonia (10 per cent.) and then slowly percolating to 20 ounces with weak spirit (10 per cent.).

None of the samples have been filtered since they were first made, they have been taken as fairly as possible from the bulk, the bottles being well shaken just before sampling. At no time has any precipitate been discernible in the ammoniated preparation, and it is to this preparation that I wish particularly to draw your attention, for it is the only one which has stood the test of time, it still contains a large proportion of emetine.

As far as my experiments have gone it would appear that a menstruum containing about 1 grain of free ammonia per ounce furnishes the best preparation of ipecacuanha. I hope in the course of a few weeks to be able to estimate the alkaloidal value of the preparations I now show, and to try how far an ammoniated wine will fulfil the conditions necessary to make the preparations of this important remedy more reliable than they have hitherto been.

The President said the samples sent by Mr. Symons quite verified the statements made by him that ammoniated wine was perfectly clear, while the others had become somewhat muddy. The paper by Messrs. Cripps and Whitby was only a first instalment, the alkaloids not having been analysed, though two had been observed, one soluble in ether and the other soluble in ether but insoluble in chloroform.

Mr. Naylor was glad to see that the authors had noticed the presence of free fatty acid in ipecacuanha root. As far as he knew this fact was not mentioned in any text-book, though it was no doubt known to many. If these gentlemen were inclined to investigate the constitution of this fatty acid further he could furnish them with a quantity of the crude material. It was also interesting to note the percentage of emetine obtained from the root. Some years ago very large percentages were reported, but more recently it had been suggested by Flückiger and others that those percentages were exaggerated. The present figures seemed to approach very nearly to 2 per cent., instead of the 1¼ per cent. at which they stood five or six years ago.

Mr. Dott said he had been struck by the very high proportion of starch, which was probably due to the method of estimation employed, under which other carbohydrates would be included as starch. With regard to the second paper he thought it unadvisable to advertise particular wines. He did not think an ammoniacal preparation could be held to correspond with the present ipecacuanha wine, however desirable it might be in other respects.

Mr. Ransom asked what was the percentage of emetine found by the authors.

The President said the amount of alkaloid soluble in ether was given as 1·91.

Mr. Ransom added that over an experience of some years he had found an average of from 1½ to 2 per cent. of so-called emetine, which was, however, probably a mixture of alkaloids, and he was glad to find that this had been confirmed. Much higher percentages had been found, whilst Flückger on the other hand said ipecacuanha rarely contained more than 1 per cent. He was interested in the suggestion for introducing an ammoniacal wine. No doubt the alkaloid was easily extracted by the addition of a little ammonia to the menstruum, and probably ammoniated ipecacuanha wine would be found a valuable preparation.

The President remarked that the authors had reserved the thorough examination of the alkaloids for the present; they did not assert that it was all emetine. The amount of starch appeared somewhat large, but it was well known that some samples of root were much more starchy than others.

Mr. Collier said ipecacuanha was largely used at Guy's Hospital in the treatment of anthrax. There were a number of tanneries in the neighbourhood, and cases were often brought in in which infection had taken place from skins, and ipecacuanha had been found very useful, both administered internally and as an outward application after the removal of the pustule. A number of experiments were conducted by Dr. Washbourne in the biological laboratory, and he found that ipecacuanha undoubtedly had the power of checking the growth of the anthrax bacillus; but a solution of emetine was found perfectly ineffective for this purpose. He (Mr. Collier) had suggested that it might be due to the aromatic oils, but the analysis now given showed such a small percentage of these matters that it could hardly be so. It had been shown before that the emetine was of no value in dysentery, but, on the contrary, ipecacuanha deprived of its emetine was more valuable on account of not producing sickness,

ST BARTHOLOMEW'S

whilst it was equally powerful in checking dysentery. What the active principle against anthrax was he did not know at all, and hoped the authors would have thrown some light upon it. The subject was very interesting and important, and was dealt with at some length in the Guy's Hospital Reports for the present year.

Mr. J. C. UMNEY was surprised that no reference was made in the abstract given of the paper to the volatile alkaloid, which had been stated by Arndt to exist to the extent of about 0·3 per cent. He should like to know if the statement had been confirmed or refuted.

Mr. LEIGHTON suggested that if the ammoniated preparation of ipecacuanha were as nasty as ammoniated tincture of quinine it would be objectionable, especially for children.

The PRESIDENT said ipecacuanha was often administered in combination with ammonia, especially in bronchitis, and the combination would probably often be found serviceable. Whether it should be a wine or tincture might, however, be a question.

Mr. WILLIAMS said the combination mentioned in the paper was an ammoniated tincture; it was a tincture of 10 per cent. strength in alcohol, with only 3 minims liquor ammoniæ to the ounce, or about 1 grain real ammonia, a quantity so small as to be scarcely perceptible, and to him its preservative effect was very remarkable.

Mr. GERRARD said there were many drugs, both in the Pharmacopœia and outside it, the active principles of which could be readily extracted by the addition of a small quantity of alkali. This was the case to some extent with ergot, and he had found it to hold good when extracting alkaloids. Many of them were united with tannin-like acids which were very insoluble, but ammonia acted on the tannin and rendered the bases soluble in water, spirit, or almost any solvent. The suggestion made, therefore, was both practical and useful. In the majority of prescriptions containing ipecacuanha which came into his hands it was combined with ammonia, though occasionally with an acid, such as oxymel of squill. He hoped the author would go on and prepare a formula for the ammoniated preparation.

Mr. Moss said he had noted one or two points in the paper which had been already commented on by other speakers. One particularly was the large percentage of starch, which had never been recognized in such quantity before. To estimate a body like starch by the process described was sure to give results very much above the actual proportions present in the root. Such bodies as glucosides would yield the same product, sugar, and would therefore be reckoned as starch. He had also been struck by the small amount of pectic acid obtained. Anyone who worked with this root, especially in making the official extract, would notice the tremendous separation of pectic acid soon after the first percolate was heated; so much so that one was inclined to think that the figures for pectic acid and starch might be transposed. Of course, pectic acid took up a large amount of water, so that the quantity might be correct; but one would think that pectin must be present in larger quantity than had been mentioned. The paper represented a vast amount of work, and reflected great credit on the industry and painstaking of the authors.

Mr. STROTHERS suggested that the Conference might find the means to supply investigators with similar samples of the root, so that the work might be identical. Samples of ipecacuanha differed so enormously that frequently a difference of a few grains would be observed in two experiments, when if the same sample had been worked upon the result would have been identical. It was remarkable that some persons were extremely susceptible to ipecacuanha. He had heard of a gentleman who could not remain in a place where ipecacuanha had been powdered twenty-four hours previously.

The PRESIDENT, in proposing a vote of thanks to the authors, said there was no doubt the presence of a volatile alkaloid increased the difficulty of the investigation. Some people were extremely susceptible to it, but they were rare cases.

(*To be continued.*)

The British Association for the Advancement of Science.

SIXTIETH ANNUAL MEETING.

THE PRESIDENT'S ADDRESS.

(*Continued from page* 163.)

Stas in a recent paper gives the final results of eleven years of research on the chemical elements in a state of purity, and on the possibility of decomposing them by the physical and chemical forces at our disposal. His experiments on calcium, strontium, lithium, magnesium, silver, sodium, and thallium, show that these substances retain their individuality under all conditions, and are unalterable by any forces that we can bring to bear upon them.

Professor Rowland looks to the solar lines which are unaccounted for as a means of enabling him to discover such new terrestrial elements as still lurk in rare minerals and earths, by confronting their spectra directly with that of the sun. He has already resolved yttrium spectroscopically into three components, and actually into two. The comparison of the results of this independent analytical method with the remarkable but different conclusions to which M. Lecoq de Boisbaudran and Mr. Crookes have been led respectively, from spectroscopic observation of these bodies when glowing under molecular bombardment in a vacuum tube, will be awaited with much interest. It is worthy of remark that as our knowledge of the spectrum of hydrogen in its complete form came to us from the stars, it is now from the sun that chemistry is probably about to be enriched by the discovery of new elements.

In a discussion in the Bakerian lecture for 1885 of what we knew up to that time of the sun's corona, I was led to the conclusion that the corona is essentially a phenomenon similar in the cause of its formation to the tails of comets, namely, that it consists for the most part probably of matter going from the sun under the action of a force, possibly electrical, which varies as the surface, and can therefore in the case of highly attenuated matter easily master the force of gravity even near the sun. Though many of the coronal particles may return to the sun, those which form the long rays or streamers do not return; they separate and soon become too diffused to be any longer visible, and may well go to furnish the matter of the zodiacal light, which otherwise has not received a satisfactory explanation. And further, if such a force exist at the sun, the changes of terrestrial magnetism may be due to direct electric action, as the earth moves through lines of inductive force.

These conclusions appear to be in accordance broadly with the lines along which thought has been directed by the results of subsequent eclipses. Professor Schuster takes an essentially similar view, and suggests that there may be a direct electric connection between the sun and the planets. He asks further whether the sun may not act like a magnet in consequence of its revolution about its axis. Professor Bigelow has recently treated the coronal forms by the theory of spherical harmonics, on the supposition that we see phenomena similar to those of free electricity, the

rays being lines of force, and the coronal matter discharged from the sun, or at least arranged or controlled by these forces. At the extremities of the streams for some reasons the repulsive power may be lost, and gravitation set in, bringing the matter back to the sun. The matter which does leave the sun is persistently transported to the equatorial plane of the corona; in fact, the zodiacal light may be the accumulation at great distances from the sun along this equator of such like material. Photographs on a larger scale will be desirable for the full development of the conclusions which may follow from this study of the curved forms of the coronal structure. Professor Schaeberle, however, considers that the coronal phenomena may be satisfactorily accounted for on the supposition that the corona is formed of streams of matter ejected mainly from the spot zones with great initial velocities, but smaller than 382 miles a second. Further that the different types of the corona are due to the effects of perspective on the streams from the earth's place at the time relatively to the plane of the solar equator.

Of the physical and the chemical nature of the coronal matter we know very little. Schuster concludes, from an examination of the eclipses of 1882, 1883, and 1886, that the continuous spectrum of the corona has the maximum of actinic intensity displaced considerably towards the red when compared with the spectrum of the sun, which shows that it can only be due in small part to solar light scattered by small particles. The lines of calcium and of hydrogen do not appear to form part of the normal spectrum of the corona. The green coronal line has no known representative in terrestrial substances, nor has Schuster been able to recognize any of our elements in the other lines of the corona.

The spectra of the stars are almost infinitely diversified, yet they can be arranged with some exceptions in a series in which the adjacent spectra, especially in the photographic region, are scarcely distinguishable, passing from the bluish-white stars like Sirius, through stars more or less solar in character, to stars with banded spectra, which divide themselves into two apparently independent groups, according as the stronger edge of the bands is towards the red or the blue. In such an arrangement the sun's place is towards the middle of the series.

At present a difference of opinion exists as to the direction in the series in which evolution is proceeding, whether by further condensation white stars pass into the orange and red stages, or whether these more coloured stars are younger and will become white by increasing age. The latter view was suggested by Johnstone Stoney in 1867.

About ten years ago Ritter, in a series of papers, discussed the behaviour of gaseous masses during condensation, and the probable resulting constitution of the heavenly bodies. According to him, a star passes through the orange and red stages twice, first during a comparatively short period of increasing temperature which culminates in the white stage, and a second time during a more prolonged stage of gradual cooling. He suggested that the two groups of banded stars may correspond to these different periods: the young stars being those in which the stronger edge of the dark band is towards the blue, the other banded stars, which are relatively less luminous and few in number, being those which are approaching extinction through age.

Recently a similar evolutional order has been suggested, which is based upon the hypothesis that the nebulæ and stars consist of colliding meteoric stones in different stages of condensation.

More recently the view has been put forward that the diversified spectra of the stars do not represent the stages of an evolutional progress, but are due for the most part to differences of original constitution.

The few minutes which can be given to this part of the address are insufficient for a discussion of these different views. I purpose, therefore, to state briefly, and with reserve as the subject is obscure, some of the considerations from the characters of their spectra which appeared to me to be in favour of the evolutional order in which I arranged the stars from their photographic spectra in 1879. This order is essentially the same as Vogel had previously proposed in his classification of the stars in 1874, in which the white stars, which are most numerous, represent the early adult and most persistent stage of stellar life, the solar condition that of full maturity and of commencing age; while in the orange and red stars with banded spectra we see the setting in and advance of old age. But this statement must be taken broadly, and not as asserting that all stars, however different in mass and possibly to some small extent in original constitution, exhibit one invariable succession of spectra.

In the spectra of the white stars the dark metallic lines are relatively inconspicuous, and occasionally absent, at the same time that the dark lines of hydrogen are usually strong, and more or less broad, upon a continuous spectrum, which is remarkable for its brilliancy at the blue end. In some of these stars the hydrogen and some other lines are bright, and sometimes variable.

As the greater or less prominence of the hydrogen lines, dark or bright, is characteristic of the white stars as a class, and diminishes gradually with the incoming and increase in strength of the other lines, we are probably justified in regarding it as due to some conditions which occur naturally during the progress of stellar life, and not to a peculiarity of original constitution.

To produce a strong absorption-spectrum a substance must be at the particular temperature at which it is notably absorptive; and, further, this temperature must be sufficiently below that of the region behind from which the light comes for the gas to appear, so far as its special rays are concerned, as darkness upon it. Considering the high temperature to which hydrogen must be raised before it can show its characteristic emission and absorption, we shall probably be right in attributing the relative feebleness or absence of the other lines, not to the paucity of the metallic vapours, but rather to their being so hot relatively to the substances behind them as to show feebly, if at all, by reversion. Such a state of things would more probably be found, it seems to me, in conditions anterior to the solar stage. A considerable cooling of the sun would probably give rise to banded spectra due to compounds, or to more complex molecules, which might form near the condensing points of the vapours.

The sun and stars are generally regarded as consisting of glowing vapours surrounded by a photosphere where condensation is taking place, the temperature of the photospheric layer from which the greater part of the radiation comes being constantly renewed from the hotter matter within.

At the surface the convection currents would be strong, producing a considerable commotion, by which the different gases would be mixed and not allowed to retain the inequality of proportions at different levels due to their vapour densities.

Now the conditions of the radiating photosphere and those of the gases above it, on which the character of the spectrum of a star depends, will be determined, not alone by temperature, but also by the force of gravity in these regions; this force will be fixed by the star's mass and its stage of condensation, and will become greater as the star continues to condense.

In the case of the sun the force of gravity has already become so great at the surface that the de-

crease of the density of the gases must be extremely rapid passing in the space of a few miles, from atmospheric pressure to a density infinitesimally small; consequently the temperature-gradient at the surface, if determined solely by expansion, must be extremely rapid. The gases here, however, are exposed to the fierce radiation of the sun, and unless wholly transparent would take up heat, especially if any solid or liquid particles were present from condensation or convection currents.

From these causes, within a very small extent of space at the surface of the sun, all bodies with which we are acquainted should fall to a condition in which the extremely tenuous gas could no longer give a visible spectrum. The insignificance of the angle subtended by this space as seen from the earth should cause the boundary of the solar atmosphere to appear defined. If the boundary which we see be that of the sun proper, the matter above it will have to be regarded as in an essentially dynamical condition—an assemblage, so to speak, of gaseous projectiles for the most part falling back upon the sun after a greater or less range of flight. But in any case it is within a space of relatively small extent in the sun and probably in the other solar stars, that the reversion which is manifested by dark lines is to be regarded as taking place.

Passing backward in the star's life, we should find a gradual weakening of gravity at the surface, a reduction of the temperature-gradient so far as it was determined by expansion, and convection currents of less violence producing less interference with the proportional quantities of gases due to their vapour densities, while the effects of eruptions would be more extensive.

At last we might come to a state of things in which, if the star were hot enough, only hydrogen might be sufficiently cool relatively to the radiation behind to produce a strong absorption. The lower vapours would be protected, and might continue to be relatively too hot for their lines to appear very dark upon the continuous spectrum; besides, their lines might be possibly to some extent effaced by the coming in under such conditions in the vapours themselves of a continuous spectrum.

In such a star the light radiated towards the upper part of the atmosphere may have come from portions lower down of the atmosphere itself, or at least from parts not greatly hotter. There may be no such great difference of temperature of the low and less low portions of the star's atmosphere as to make the darkening effect of absorption of the protected metallic vapours to prevail over the illuminating effect of their emission.

It is only by a vibratory motion corresponding to a very high temperature that the bright lines of the first spectrum of hydrogen can be brought out, and by the equivalence of absorbing and emitting power that the corresponding spectrum of absorption should be produced; yet for a strong absorption to show itself, the hydrogen must be cool relatively to the source of radiation behind it, whether this be condensed particles or gas. Such conditions, it seems to me, should occur in the earlier rather than in the more advanced stages of condensation.

The subject is obscure, and we may go wrong in our mode of conceiving of the probable progress of events, but there can be no doubt that in one remarkable instance the white-star spectrum is associated with an early stage of condensation.

Sirius is one of the most conspicuous examples of one type of this class of stars. Photometric observations combined with its ascertained parallax show that this star emits from forty to sixty times the light of our sun, even to the eye, which is insensible to ultra-violet light, in which Sirius is very rich, while we learn from the motion of its companion that its mass is not much more than double that of our sun. It follows that unless we attribute to this star an improbably great emissive power, it must be of immense size, and in a much more diffuse and therefore an earlier condition than our sun; though probably at a later stage than those white stars in which the hydrogen lines are bright.

A direct determination of the relative temperature of the photospheres of the stars might possibly be obtained in some cases from the relative position of maximum radiation of their continuous spectra. Langley has shown that through the whole range of temperature on which we can experiment, and presumably at temperatures beyond, the maximum of radiation-power in solid bodies gradually shifts upwards in the spectrum from the infra-red through the red and orange, and that in the sun it has reached the blue.

The defined character as a rule of the stellar lines of absorption suggests that the vapours producing them do not at the same time exert any strong power of general absorption. Consequently we should probably not go far wrong, when the photosphere consists of liquid or solid particles, if we could compare select parts of the continuous spectrum between the stronger lines or where they are fewest. It is obvious that if extended portions of different stellar spectra were compared, their true relation would be obscured by the line-absorption.

The increase of temperature, as shown by the rise in the spectrum of the maximum of radiation, may not always be accompanied by a corresponding greater brightness of a star as estimated by the eye, which is an extremely imperfect photometric instrument. Not only is the eye blind to large regions of radiation, but even for the small range of light that we can see the visual effect varies enormously with its colour. According to Professor Langley, the same amount of energy which just enables us to perceive light in the crimson at A would in the green produce a visual effect 100,000 times greater. In the violet the proportional effect would be 1,600, in the blue 62,000, in the yellow 28,000, in the orange 14,000, and in the red 1,200. Captain Abney's recent experiments make the sensitiveness of the eye for the green near F to be 750 times greater than for red about C. It is for this reason, at least in part, that I suggested in 1864, and have since shown by direct observation, that the spectrum of the nebula in Andromeda, and presumably of similar nebulæ, is in appearance only wanting in the red.

The stage at which the maximum radiation is in the green, corresponding to the eye's greatest sensitiveness, would be that in which it could be most favourably measured by eye-photometry. As the maximum rose into the violet and beyond, the star would increase in visual brightness, but not in proportion to the increase of energy radiated by it.

The brightness of a star would be affected by the nature of the substance by which the light was chiefly emitted. In the laboratory solid carbon exhibits the highest emissive power. A stellar stage in which radiation comes, to a large extent, from a photosphere of the solid particles of this substance, would be favourable for great brilliancy. Though the stars are built up of matter essentially similar to that of the sun, it does not follow that the proportion of the different elements is everywhere the same. It may be that the substances condensed in the photospheres of different stars may differ in their emissive powers, but probably not to a great extent.

All the heavenly bodies are seen by us through the tinted medium of our atmosphere. According to Langley, the solar stage of stars is not really yellow, but, even as gauged by our imperfect eyes, would

appear bluish-white if we could free ourselves from the deceptive influences of our surroundings.

From these considerations it follows that we can scarcely infer the evolutional stages of the stars from a simple comparison of their eye-magnitudes. We should expect the white stars to be, as a class, less dense than the stars in the solar stage. As great mass might bring in the solar type of spectrum at a relatively earlier time, some of the brightest of these stars may be very massive and brighter than the sun—for example, the brilliant star Arcturus. For these reasons the solar stars should not only be denser than the white stars, but perhaps, as a class, surpass them in mass and eye-brightness.

It has been shown by Lane that, so long as a condensing gaseous mass remains subject to the laws of a purely gaseous body, its temperature will continue to rise.

The greater or less breadth of the lines of absorption of hydrogen in the white stars may be due to variations of the depth of the hydrogen in the line of sight, arising from the causes which have been discussed. At the sides of the lines the absorption and emission are feebler than in the middle, and would come out more strongly with a greater thickness of gas.

The diversities among the white stars are nearly as numerous as the individuals of the class. Time does not permit me to do more than to record that in addition to the three sub-classes into which they have been divided by Vogel, Scheiner has recently investigated minor differences as suggested by the character of the third line of hydrogen near G. He has pointed out too that so far as his observations go the white stars in the constellation of Orion stand alone, with the exception of Algol, in possessing a dark line in the blue which has apparently the same position as a bright line in the great nebula of the same constellation; and Pickering finds in his photographs of the spectra of these stars dark lines corresponding to the principal lines of the bright-line stars, and the planetary nebulæ with the exception of the chief nebular line. The association of white stars with nebular matter in Orion, in the Pleiades, in the region of the Milky Way, and in other parts of the heavens, may be regarded as falling in with the view that I have taken.

In the stars possibly further removed from the white class than our sun, belonging to the first division of Vogel's third class, which are distinguished by absorption bands with their stronger edge towards the blue, the hydrogen lines are narrower than in the solar spectrum. In these stars the density-gradient is probably still more rapid, the depth of hydrogen may be less, and possibly the hydrogen molecules may be affected by a larger number of encounters with dissimilar molecules. In some red stars with dark hydrocarbon bands the hydrogen lines have not been certainly observed; if they are really absent, it may be because the temperature has fallen below the point at which hydrogen can exert its characteristic absorption; besides, some hydrogen will have united with the carbon. The coming in of the hydrocarbon bands may indicate a later evolutional stage, but the temperature may still be high, as acetylene can exist in the electric arc.

A number of small stars more or less similar to those which are known by the names of their discoverers, Wolf and Rayet, have been found by Pickering in his photographs. These are remarkable for several brilliant groups of bright lines, including frequently the hydrogen lines and the line D_3, upon a continuous spectrum strong in blue and violet rays, in which are also dark lines of absorption. As some of the bright groups appear in his photographs to agree in position with corresponding bright lines in the planetary nebulæ, Pickering suggests that these stars should be placed in one class with them, but the brighest nebular line is absent from these stars. The simplest conception of their nature would be that each star is surrounded by a nebula, the bright groups being due to the gaseous matter outside the star. Mr. Roberts, however, has not been able to bring out any indication of nebulosity by prolonged exposure. The remarkable star η Argus may belong to this class of the heavenly bodies.

In the nebulæ, the elder Herschel saw portions of the fiery mist or "shining fluid" out of which the heavens and the earth had been slowly fashioned. For a time this view of the nebulæ gave place to that which regarded them as external galaxies, cosmical "sandheaps," too remote to be resolved into separate stars; though indeed in 1858 Mr. Herbert Spencer showed that the observations of nebulæ up to that time were really in favour of an evolutional progress.

In 1864 I brought the spectroscope to bear upon them; the bright lines which flashed upon the eye showed the source of the light to be glowing gas, and so restored these bodies to what is probably their true place, as an early stage of sidereal life.

At that early time our knowledge of stellar spectra was small. For this reason partly, and probably also under the undue influence of theological opinions then widely prevalent, I unwisely wrote in my original paper in 1864, "that in these objects we no longer have to do with a special modification of our own type of sun, but find ourselves in presence of objects possessing a distinct and peculiar plan of structure." Two years later, however, in a lecture before this Association, I took a truer position. "Our views of the universe," I said, "are undergoing important changes; let us wait for more facts with minds unfettered by any dogmatic theory, and therefore free to receive the teaching, whatever it may be, of new observations."

Let us turn aside for a moment from the nebulæ in the sky to the conclusions to which philosophers had been irresistibly led by a consideration of the features of the solar system. We have before us in the sun and planets obviously not a haphazard aggregation of bodies, but a system resting upon a multitude of relations pointing to a common physical cause. From these considerations Kant and Laplace formulated the nebular hypothesis, resting it on gravitation alone, for at that time the science of the conservation of energy was practically unknown. These philosophers showed how, on the supposition that the space now occupied by the solar system was once filled by a vaporous mass, the formation of the sun and planets could be reasonably accounted for.

By a totally different method of reasoning, modern science traces the solar system backward step by step to a similar state of things at the beginning. According to Helmholtz the sun's heat is maintained by the contraction of his mass at the rate of about 220 feet a year. Whether at the present time the sun is getting hotter or colder we do not certainly know. We can reason back to the time when the sun was sufficiently expanded to fill the whole space occupied by the solar system, and was reduced to a great glowing nebula. Though man's life, the life of the race perhaps, is too short to give us direct evidence of any distinct stages of so august a process, still the probability is great that the nebular hypothesis, especially in the more precise form given to it by Roche, does represent broadly, notwithstanding some difficulties, the succession of events through which the sun and planets have passed.

The nebular hypothesis of Laplace requires a rotating mass of fluid which at successive epochs became unstable from excess of motion, and left behind rings, or more probably perhaps lumps, of matter from the equatorial regions.

(*To be continued.*)

Proceedings of Societies in London.

INTERNATIONAL CONGRESS OF HYGIENE AND DEMOGRAPHY.

(*Continued from page* 141.)

SECTION OF CHEMISTRY AND PHYSICS IN RELATION TO HYGIENE.

Sir Henry Roscoe took the chair on Thursday morning, when the first paper read was on "*The Hygienic Importance of Copper*," by Professor Lehmann (Würzburg), of which the following is an abstract :—

In spite of many investigations, great difference of opinion still exists with regard to the hygienic importance of copper ; those affirming and those denying the deleterious action of copper have often gone too far in the matter. This paper only dealt with the importance of such copper salts as enter the organism through artificial greening of vegetables, through addition of sulphate of copper to bread, and through careless use of copper vessels. The author said it had not been proved by a single well-observed case that copper salts, up to, say, a quantity of 150–200 mg. of copper, entering the organism of a healthy adult at one time and in a certain dilution in the course of eating and drinking, could cause a disturbance in health worthy of any remark. Such doses only caused quickly passing gastro-intestinal symptoms. Not a single copper salt, combined with an acid not in itself poisonous, had been proved to have any specific poisonous properties. During copious meals about 200 mg. of copper might enter the body with preserves and bread without being noticed to any extent by the senses. The most unclean and unsuitable use of copper and brass ware would seldom cause such a quantity suspended in bouillon, meat, fat, vegetables, flour stuffs, etc., to enter the body. If very acid food were cooked in copper vessels and allowed to cool in them, larger quantities of the metal might pass into solution, but if not the food merely remained in the copper vessel. Acute copper-poisoning by means of preserves and bread had never been recorded, but, on the other hand, it frequently happened through the use of vessels containing verdigris. In no case recorded of severe copper-poisoning through copper vessels had it been shown that anything like the amount of copper necessary to injure the organism had been taken. Cases had been attributed to copper merely because no other poisons were found. Ptomaines and toxalbumins were certainly often the true cause of the trouble. In other cases it had been shown that no reason existed for regarding the small quantities, often merely traces of copper, which were found, as the cause of death. Chronic copper-poisoning through the entrance of small quantities of copper salts (20, 30, or even 50 mg. of copper daily) did not occur in man or animals, although copper was absorbed in considerable quantities, stored in the liver, and excreted by means of the bile, the intestines, and the kidneys. But in spite of the fact that the organism accustomed itself rapidly to copper, too large quantities might cause harm through chronic gastro-intestinal disturbance. The phenomena in human beings, attributed to chronic copper-poisoning, were to be partly referred to the action of other poisons (arsenic, lead, carbon monoxide, etc.), partly to acute copper-poisoning through carelessness. It followed that a direct injury of acute or chronic character was not to be feared from such quantities of copper as find entrance into the body through moderate technical "greening," preparation of bread with copper, or somewhat careless use of copper utensils in the household. On the other hand, by means of very carelessly prepared preserves, bread contaminated with copper, or kitchen-ware treated in an absolutely reckless manner, it was very likely that acute vomiting and purging might occur, but hardly anything more serious. Nevertheless, the author was of opinion that it is in the interest of hygiene to forbid entirely the useless addition of copper to vegetables, on account of possibility of injury to human health when quantities of copper of real consequence have been used. The addition of copper to bread should be absolutely forbidden, because there is a danger of careless addition in large quantities ; it also makes it possible to bake with spoiled and, under some circumstances, injurious flour ; and it is possible to add a larger quantity of water (6 to 7 per cent.).

The Chairman (Sir Henry Roscoe) expressed his satisfaction at finding that Professor Lehmann discountenanced the use of copper in the preparation of food, although he had shown that it was not so deleterious as was generally supposed. He had never heard of copper being used in bread-making in this country, though it appeared to be employed in Holland.

Mr. J. Goodfellow said he had examined about three hundred specimens of bread during the last three years, obtained from all parts of England, and had not discovered any trace of copper sulphate in any. He did not think it would pay an English baker to add the small amount of copper sulphate which would alone be possible for the sake of additional water it would take up, which he did not think would be above 5 per cent. On a recent visit to Holland he had examined seven samples of bread qualitatively, and in three of them found copper.

Mr. Charles E. Cassal said there was no doubt that this adulterant was fairly common in Holland and Belgium, but in England he knew of no recorded case within the last ten or fifteen years since the Adulteration Act was passed.

Dr. Harold G. Colman asked if Professor Lehmann's experiments had extended to tin, as there were several cases of alleged poisoning from food preserved in tin.

Professor Lehmann said that the salts of tin were probably more deleterious than those of copper, but he believed in most of the cases referred to the toxic effect was due to ptomaines.

A paper was then read on "*The Action of Water on Lead*," by J. H. Garrett, M.D., of which the following is an abstract:—The action of water upon the lead is a process of oxidation, the main result being the production of a white, crystalline, insoluble oxyhydrate of lead. The formation of this insoluble lead-salt is well seen in all waters which act markedly on lead and are not of acid reaction, such as stale distilled water. All natural waters that have a decidedly acid reaction act on lead, the acid in the water dissolving the oxide as it is formed, and the first result is a clear solution of lead-salt. The quantity of lead thus got into solution is dependent upon the quantity of acid originally contained in the water. Much of the lead salt formed and dissolved by an acid water is, under certain circumstances, ultimately deposited. Waters which are decidedly alkaline by reason of containing considerable quantities of carbonate, *e.g.*, carbonate of lime, are prevented from acting on lead by the formation upon the surface of the metal of a closely fitting insoluble coat, which is presumably a carbonate of lead. It is possible that unusual waters exist in which this last-named rule does not hold. Certain neutral salts other than carbonate being contained in the water help or hinder the action, and affect the solution of the oxyhydrate of lead after its formation. The rate of action of water on lead is increased by increase of temperature, at least up to a certain degree. What is the cause of the oxidation of lead in waters that act on this metal, *i.e.*, whence and how is the oxygen derived? *a.* Is it derived simply from the oxygen of the air which is dissolved in the water? *b.*

Is it derived by decomposition of water, either by the lead itself displacing hydrogen, or by an electrolysis due to the galvanic action which may result from the lead being invariably alloyed with small quantities of other metals? *c.* Is it derived by reduction of the nitrates and nitrites of alkaline bases, or of the other forms of oxidized nitrogenous matter which occur in most waters to a greater or lesser extent?

The author concluded by saying it is a rare thing to meet with a water that is absolutely nitrate free; and as lead produces nitrate at common temperature when contained in solution in a water, however minute a proportion be present, we have here an undeniable source of oxygen. Every nearly neutral water that acts on lead with production of crystals of oxhydrate, and every naturally acid water that acts on lead with solution of the oxide gives evidence of containing nitrite after the action has taken place. As the water did not contain nitrite in the first place, or if it contained nitrite the quantity is now increased, we are right in assuming that it has been produced by reduction of nitrate by the lead. In the hundreds of experiments that I have made upon the action of water on lead, in no case where the ordinary action has occurred have I failed to obtain ample proof of the presence of nitrite after the action. But although lead reduces nitrate to nitrite (and when air is excluded probably to hyponitrite) it never reduces it entirely to ammonia at common temperature. This reduction apparently does not take place with sufficient rapidity for this to happen. When there is free admission of air the nitrite is re-oxidized by the oxygen of the air as fast as it is reduced by the lead. The main action of water on lead is therefore due to the presence in the water of a nitrate (or some partially oxidized organic nitrogenous compound which admits of being reduced by the lead and re-oxidized by the air giving the reaction of nitrite when reduced). The continuation of action observed to take place in a nearly neutral water, where oxyhydrate of lead is produced for weeks together, is due to nitrite acting as an oxygen carrier between the air and the lead. The rate of action is increased when copper, silver, and other metals are in contact with the lead beneath the water. The rate is diminished when zinc, tin, and other metals are similarly in contact with it, these metals suffering oxidation in preference to the lead.

The Chairman said this paper pointed to an entirely new explanation of the action of lead upon water, viz., that it was due to the presence of nitrates, and that the very smallest trace of nitrate in the water had an influence in bringing the lead into solution. A great deal had been heard lately about the amount of lead contained in certain waters supplied to large towns in the north of England, where many cases of lead poisoning had occurred. He should like to know if Dr. Garrett had any suggestions to offer with a view of preventing this action.

Dr. Garrett said he had made some experiments, but from the very nature of the causes of the action it was always present. Distilled water could not be obtained which did not contain a minute proportion of nitrate, which was easily detected after it had acted on the lead and been reduced to nitrite. He feared, therefore, it was impossible to prevent this action taking place, the only method was to coat the lead in some way; with naturally hard waters the lead became coated, and probably the best thing for the purpose was carbonate of lime. Experiments lately carried on in Sheffield had led to the conclusion that the addition of carbonate of lime in the form either of chalk or limestone was effective; so small a quantity of carbonate in solution as 2 grains to the gallon was found sufficient.

Dr. Rideal suggested that as it had been found that a mixture of two metals reduced the nitrate it might be possible with a copper and zinc couple to reduce it to ammonia.

Dr. Garrett pointed out that where the lead was not affected in the presence of another metal that other metal was, and the solution of the salt of tin in water would be just as injurious as that of lead. When there was an electrical action no doubt the water was decomposed, and if there were an evolution of hydrogen it would very likely lead to the nitrite being reduced to ammonia.

Dr. Maguire (Dublin) said in his city there was a very pure water supply, and fifteen years ago it was found to attack lead so seriously that an order was passed by the corporation that no lead pipes should be used unless alloyed with 3 per cent. of tin. That plan had been adopted for the last fifteen years, and since then no cases of lead poisoning had occurred. He should be glad to know whether this alloy of tin and lead was really a protection.

Dr. Garrett said 3 per cent. of tin was a very small proportion, but the experience gained in Dublin seemed to be the best answer to the question.

Dr. Maguire said that even that small percentage of tin made the lead very difficult to work.

Dr. Garrett suggested that it might be well to do away with lead altogether, and use iron.

Dr. Maguire said the iron pipes would be closed up completely in a year.

Dr. Russell mentioned a case in which a very pure water from Dartmoor had been found to act very powerfully, not on lead pipes, but on an iron pipe galvanized; so much so that when the water was boiled there was an actual deposit of basic salt of zinc, and the kettle was completely furred inside.

Dr. Percy Frankland said he had paid some attention to this subject, which was one of the darkest problems which had been presented to chemists. He was sorry he had not been present when the paper was read, and did not know whether any reference had been made to the remarkable effect of carbonate of sodium in preventing the action of water on lead. The waters which most frequently acted on lead were those which were almost destitute of bicarbonates in solution, and such waters were in some cases acid. His experience did not agree with the statement at the close of the paper that the main action of water on lead was due to the presence of nitrates or some partially oxidized organic nitrogenous compound, although the latter was a very wide saving clause, because they did not know in what condition these organic compounds were. There was no doubt, however, that water which did not contain a trace of nitrates had a powerful action on lead. Some years ago he had a case of this kind in one of the Lancashire towns which was supplied from the upland surface water nearly free from bicarbonate. It acted with such intense violence on lead that numerous cases of poisoning took place, and it was perfectly dangerous in this case, because the activity went on increasing as the lead gave way, new pipes not being nearly so much acted on as old ones. He found that this action was entirely destroyed by the addition of a suitable quantity of carbonate of sodium, and when this was applied the cases of poisoning absolutely disappeared. He believed the same method had been used with equal success elsewhere, and it was easily carried out, and not expensive, and need only be applied when the water was in such a state as to be likely to act on lead. This could generally be gauged by the amount of organic matter present. It was necessary, however, where the water showed a slight acidity, not only to neutralize it, but to have a considerable excess of sodium. It was introduced into the water as it entered the reservoir. He believed the quantity used was 5 or 10 parts to the 1000 of carbonate of sodium, which on a supply of 1,000,000

gallons per day worked out about £1 sterling as the cost, which was not excessive.

Dr. Garrett asked why Dr. Frankland preferred carbonate of soda to carbonate of lime. He should like to know where a water was obtainable absolutely free from nitrites which would act on lead, because in the hundred experiments he had made he had never got an action like that where the supernatant water did not give a reaction of nitrite.

Professor Lehmann corroborated the statement that the addition of carbonate of lime prevented the action of water on lead.

Dr. Percy Frankland said the action of carbonate of soda differed entirely from that of carbonate of lime. In carbonate of lime it could not be introduced in any excess unless there was a large quantity of carbonic acid present, but carbonate of soda could be added in any quantity. He might also say that the effect of lime was not nearly so pronounced as that of soda. It was the excess of carbonate of soda which caused the action to be arrested. There was also another reason, the neutralizing power of carbonate of soda was much more rapid than that of carbonate of lime; a weak organic would act with carbonate of lime very slowly, when it would act so very rapidly with carbonate of soda.

Sir Charles Cameron said the Dublin water was extremely soft, having only two degrees of hardness, and there was no carbonate of calcium in it at all. It contained 2 grains of fixed inorganic materials consisting almost entirely of potassium chloride. He first experimented with ordinary soft lead pipes, and the first thing that struck him was that some small carp contained in a tank made of this ordinary soft lead in a very short space of time became afflicted with hemiplegia, so that when little worms were put into the water they darted at them, but went round in a circle, and nearly the whole of them assumed a crescentic form. The alloy he suggested was 97 of lead to 3 of tin, and he found that in a small tank constructed of that material the carp remained a considerable time without showing any of the effects of lead poisoning. Besides, he made the usual chemical experiments, and found the amount of lead taken up was excessively minute. In fact, there had been no cases of lead poisoning from the use of Dublin water since.

The next paper was entitled, "*What is the Importance of Magnesia in Drinking Water?*" by Percy F. Frankland, Ph.D., B.Sc., F.R.S., etc. The author called attention to the difference of opinion existing at the present day with regard to the hygienic importance of magnesia in drinking water. Some authorities on water viewed the presence of magnesia as of no more consequence than hardness in general, whilst others considered that the presence of even a few grains per gallon renders the water of doubtful quality for continuous use. It was highly desirable that the possibility of mischief resulting from the use of magnesian waters should be fully discussed and a conclusion arrived at, as it not unfrequently happened that waters which were otherwise of most excellent quality were objected to in consequence of their containing a somewhat larger proportion of magnesia than was usual in this country. Moreover, as the views concerning the importance of magnesia in water were in a vague and unsettled state, comparatively few analysts put themselves to the trouble of determining this base at all, with the result that a large number of waters were in use in which the presence of any exceptionally large proportion of magnesia was quite unsuspected. The geological formation—the magnesian limestone—richest, in this base, was only represented to a very limited extent in this country, but comparatively large proportions of magnesia were also found in waters from other strata, more especially in those from the New Red Sandstone. The author, after referring to a number of magnesian waters which had come under his notice, invited a discussion of the question, especially with a view to eliciting the opinion of foreign authorities who had experience of the waters in the extensive dolomitic districts of the continent.

Sir Charles Cameron said he had been greatly interested in this paper on the presence of magnesia, because he might venture to say there was more magnesia in the waters of Ireland than in those of either England or Scotland. All about Dublin water contained a great quantity of magnesium carbonate, chloride and sulphate. He found nearly 15 grains per gallon of magnesium salts in the water of the city and county of Dublin. This came from a rock technically called calc, being limestone mixed with considerable quantities of aluminum silicate of ferrous composition, with a good deal of uncombined silica, and often considerable quantities of iron pyrites. The water from that rock always contained large quantities of sulphate of calcium, due, he thought, to the pyrites becoming oxidized into ferrous sulphate and free sulphuric acid, which acted on the lime and magnesia, and accounted for the occurrence of a quantity of magnesium and calcium sulphates in the water. He had experience of water from all parts of Ireland, being the public analyst for twenty-four counties, and he found there was a very general distribution of magnesium salts, though in Wexford none at all was found. In the whole of the central part of Ireland, however, the quantity was considerable and was never altogether absent, sometimes reaching larger quantities than any Dr. Frankland had mentioned. Considering that magnesia was required for the human frame he should hardly think any injurious influences would be exercised by the presence of small quantities, and he had never been able to connect in any way diseases with the presence of a moderate amount of such salts. Where there was a large amount, especially in the form of chloride and sulphite, it might be sufficient to act as an aperient, which would not be desirable.

Dr. Rideal asked if there were any nitrates in the Dublin water.

Sir Charles Cameron said his experience at Blackburn had been just the same as that at Dublin. They had a soft peaty water of about 4 grains of solid to the gallon, which acted on lead pipes very injuriously. They had all the pipes lined with tin, and since then no cases of poisoning had occurred; whereas with similar pipes at Darwen they constantly had cases.

Dr. Maguire said he had been brought in contact with a water supply in the county of Wicklow, and had a copy of the analysis in his hand. The water was very pure, but contained strong traces of magnesia, and the effect was that after about ten years cast-iron 3-inch pipes became choked solid. Lead cisterns and water pipes were attacked very strongly, and the difficulty was to know what to do. Copper pipes tinned inside were resorted to for the large houses, and larger iron pipes had to be used outside, but he should be glad of any suggestion for material for pipes to contain such water.

Dr. Rideal suggested iron pipes lined with glass.

Dr. Maguire feared that the expansion and contraction of the iron with changes of temperature would prevent these pipes lasting.

Sir Charles Cameron suggested that possibly Dr. Angus Smith's preparation for iron pipes would be found successful. He knew that iron pipes soon corroded with soft water, because in large laundries where iron pipes were used the water was delivered very red, and they had to be removed, and either copper or lead substituted.

Dr. Frankland suggested that the iron pipes might be coated with pitch.

Dr. Maguire said that had been tried, but still the corrosion went on.

Mr. Goodfellow said he presumed Dr. Frankland's remarks as to the harmlessness of a small quantity of magnesia only applied to persons in health. He should think that where there was any tendency to rheumatism, or in cases of cancer, the presence of magnesia would be injurious.

Dr. Frankland said he had carefully abstained from making any remark on the presence of magnesia beyond saying that he did not think a small proportion, as it was evidently present in the water used by the great majority of the people, could possibly have much effect. He did not commit himself, however, to any statement as to its injurious effects or otherwise.

Mr. Drowned said the Massachusetts State Board of Health had for six years conducted an elaborate series of investigations on water, and also on the purification of sewage by intermittent filtration, the latter being entirely disconnected with any idea of making a profit. The water question was a very simple one with them. They had no hard waters, they were all soft, averaging not more than two or three parts per hundred thousand of fixed solids. They were, therefore, not troubled with the question of lime or magnesia. They had established the idea of normal chlorine with the idea of determining thereby the amount of pollution of surface and ground waters. Massachusetts was on the Atlantic seaboard and extended westward about 250 miles, and they found by investigating the natural waters near their source, which an absolute inspection showed received no human waste whatever, that the chlorine diminished as they receded from the seaboard westward, and that this occurred in a definite ratio. Ultimately they proved conclusively that the salt in water came from the sea, being borne in by the easterly winds. After a few days heavy north-easterly storm, perhaps twenty miles from the coast, the rainfall had the same chlorine contents as the normal ground waters of that vicinity. They used the term normal to mean unpolluted, and by plotting these results on a map of the State and drawing lines through those points where the quantity was the same they obtained a series of lines which they termed isochlors. If on an examination of the water in any particular locality they found this normal figure exceeded it was taken as an evidence of pollution. At Boston, for instance, the water supply came from about thirty miles to the westward, where the normal chlorine figure was 24, but the actual figure varied from 35 to 40, and the difference represented approximately the amount of pollution.

The Chairman said he believed no one had ever seen such a complete system of analyses of water in a given area as those to be found in the volume compiled by the State of Massachusetts. It was a perfect example of what ought to be done.

Mr. Drowned said there were 10,000 to 12,000 complete analyses of water and sewage effluents, and many also had been taken bacteriologically.

Sir Charles Cameron said he had examined the remarkable series of analyses to which the President had referred with great pleasure and amazement, and one thing struck him as very remarkable compared with his experience in Ireland. There he had long come to the conclusion that there was no relevancy whatever between the amount of chlorine and the amount of pollution in waters where the amount of solid matter exceeded 30 or 40 parts per hundred thousand. He found constantly that a water which contained so little as ·001 of organic ammonia and ·0005 saline ammonia in a hundred thousand would contain 10 to 20 grains of chlorine. He invariably found that hard water contained immense quantities of chlorine, largely magnesium chloride, less frequently sodium chloride and potassium chloride; on the other hand, he had found in the case of waters which came from primary crystalline rocks, that there was a relevancy between the chlorine and pollution.

Dr. Percy Frankland said everyone acquainted with the reports of the State Board of Health of Massachusetts must be astounded at the amount of work of this kind which was accomplished. The question had occurred to him whether the whole area of the State was of the same geological formation, and whether there would not be variations in the amount of chlorine accordingly. This, of course, would apply to water coming from different depths. For instance, in this country directly you got to the chalk beneath the London clay you got a very different amount of chlorine from that observed in ordinary chalk water.

Mr. Drowned said they thought at first there would be a difference in the ground waters and surface waters, but as far as the experiments went they were the same. In the western part of the State there was some limestone and the water was a little harder, but they had not discovered any ground waters that had a higher chlorine than the surface water in the same vicinity; of course, that would not have been expected *à priori*, but it was found to be the case.

The next paper read was "*On the Effects of the Respiration of Carbonic Acid on Man*," by W. Marcet, M.D., F.R.S.—In this paper the subject was dealt with under three headings:—(1) The source of the presence and accumulation of carbonic acid in the air breathed; (2) The action of re-breathed air on the human body; (3) The action of carbonic acid gas breathed in volumes which either produce insensibility or prove fatal. Under the first heading it was pointed out that the presence and accumulation of carbonic acid in the air is derived principally from the decomposition of organic matter in the earth, and also in some measure from the consumption of coal. The amount of coal consumed in the metropolis and fifteen miles around was about 9,400,000 tons per annum, which would give out 28,866,867 tons of carbonic acid, equal to 3·53 cubic miles of carbonic acid. A source of carbonic acid, perhaps least thought of, was derived from the process of fermentation, as in the manufacture of beer; this gas was usually lost, but it is now, in some instances, collected from the vats, condensed into the liquid form, and used mostly for refrigerating purposes. The amount obtained from Messrs. Guinness and Co. was said to reach the enormous figure of 32 tons per diem. Again, the inhabitants of large towns must contaminate the air with their breath. The occurrence of any great excess of carbonic acid in the atmosphere was prevented, however, by the extreme diffusibility of this gas, so much so, that under a comparatively clear sky in the streets of a large town like London, there was barely more than four parts in 10,000 of air, while in the country the proportion would be 3·5 or 3·8 parts. Some experiments had been made by the author and another to find out if the proportion of atmospheric carbonic acid varied between such different levels as the town of Geneva and the highest point of the Jura mountains, called the Dole, the difference in altitude being 4,193 feet. The experiments were undertaken simultaneously at both stations, and the state of the weather was carefully recorded at the time. The results showed distinctly that in fine, clear weather there was no difference between the proportions of CO_2 in the air of the two stations; therefore, in clear weather, the carbonic acid diffuses equally through the atmosphere. Three experiments made on the mountain while the observer was in a fog or cloud, the corresponding experiments near Geneva being carried out in fine weather, gave 3·24 parts of CO_2 for the high station and 3·88 for the low station, and in clear weather, on another occasion, one experiment on the mountain while in the clouds gave 2·94 of CO_2, while

three quarters of an hour afterwards, the fog having temporarily disappeared, the sun came out brightly and the CO_2 rose to 3·91 parts, falling again when the cloud formed afresh round the observer. It followed, therefore, that on the top of a mountain there is less CO_2 in a cloud or fog than in fine, clear weather. From other experiments there could be no doubt that the very reverse takes place in large towns in foggy weather; when the streets of London are obscured by a dense autumnal fog the atmosphere CO_2 is greatly increased. This was clearly due to the carbonic acid generated in towns being absorbed by fogs, while the diffusion of the gas was much less rapid through fog than through the atmosphere when clear. But on the top of a mountain the CO_2 formed on the spot was small, and when, after diffusing through a cloud, it reached the outside, the tension of the gas was rapidly increased by the sun's action, and it escaped. This same tension would prevent the cloud from absorbing CO_2 from below, and so the cloud lost its atmospheric CO_2. In respect to the action of re-breathed air on the human body, the conclusions come to were (1) on re-breathing air in a closed vessel less carbonic acid is expired in a given time than in ordinary breathing; (2) the persons who emit most carbonic acid in re-breathed air are those who expire most carbonic acid and air in the same time in ordinary breathing; (3) on re-breathing 35 litres of air in a closed vessel for a period of five minutes, the volume of this air undergoes a slight reduction; (4) when fresh air is taken into the lungs, immediately after re-breathing air in a closed vessel, the volumes of air re-breathed and weights of CO_2 expired are greater than in ordinary breathing; (5) the effects produced on the chemical phenomena of respiration by re-breathing 35 litres of air in a closed vessel during five minutes have passed away in less than six minutes after the breathing of fresh air has been resumed. Lastly, as to the action of carbonic acid gas breathed in volumes which either produce insensibility or prove fatal, the experiments showed that (1) when air containing an excess of CO_2 is breathed, the gas accumulates rapidly in the blood, and under such a condition the phenomenon of nutrition is more or less interfered with, and also that people working in ill-ventilated rooms and buildings should, towards the preservation of their health, sleep in as pure an atmosphere as possible, where they will rid their blood of the carbonic acid absorbed in the day time; (2) the effects produced by inhalation of carbonic acid gas depend greatly on the rapidity of the exposure. The sudden inhalation of air containing a large proportion of the gas may produce rapid insensibility and death, while this same air might have been breathed for some time with a certain degree of impunity, had the carbonic acid present been increased gradually; (3) that when life is threatened by the inhalation of carbonic acid, there is no reason to despair of artificial respiration so long as the heart is beating; the gas will diffuse rapidly from the blood into the air with which the lungs are inflated, and thus be carried out of the body.

Sir Charles Cameron said credit must be given to Dr. Hammond, of the United States, for being the first to point out that the air contaminated by carbonic acid and organic matter thrown out by the bodies of animals was not purified in the slightest degree by the removal of carbonic acid. He had been very much astonished in reading papers by other investigators not to find any reference to these remarkable discoveries which were made ten or eleven years ago. Dr. Hammond made his experiments in a very scientific way. He kept the animals for a certain space of time in a closed vessel, and then having removed them the carbonic acid gas was altogether removed by chemical means. Other animals were then introduced, and also into the same kind of air, from which the carbonic acid had not been removed, and they died just as rapidly in the one case as in the other, showing that the really toxic element present was not the carbonic acid, but organic matter. Indeed a very much larger amount of carbonic acid than was usually found was not by itself really injurious. No class of workmen were more healthy than those employed in the mineral water manufacture, and he amused himself some years ago in determining the amount of carbonic acid present in such places. He found it often amounted to nearly 1·5 per cent. in the immediate neighbourhood of the man bottling, and he had no doubt on many occasions it reached nearly 2 per cent. He thought many recorded results were vitiated by the experiments being carried on in such limited quantities of air. The experiment should be so arranged that an abundant supply of air when being tested should be supplied to the animal. But when only a limited quantity was provided, and the animal put into it, there were so many disturbing factors that one could not place much reliance on the result.

Dr. Odling remarked that experiments were at one time made on the use of carbonic acid gas as an anæsthetic, and it was administered in large quantities. It was not found manageable, but he believed no toxic effect was produced.

Sir Charles Cameron said there was no doubt it acted as a narcotic.

(*To be continued.*)

Provincial Transactions.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

On Wednesday evening, the 19th inst., the members of this Association visited Park and Pleasance Breweries (Messrs. Ballingall and Son). The party were met by Mr. William Stuart, manager, who conducted them over the extensive establishment. The whole process of brewing was shown, from the preparation of the malt to the finished products, and the various appliances were explained in an interesting manner. A new and exceedingly efficient installation of ice-making machinery was examined with much interest, and lucidly described. Through the courtesy of Mr. Wm. Ballingall, M.A., the visitors were shown the new laboratory, which has just been equipped with suitable chemical and microscopical apparatus. The visit proved very instructive, and before leaving votes of thanks, proposed by Mr. W. Mair, Secretary, were heartily accorded to Mr. Stuart for the trouble he had taken in connection with the visit, and to ex-Provost Ballingall for the privilege accorded.

Parliamentary and Law Proceedings.

Poisoning by Strychnine.

Last week an inquest was held at Moss Side, Manchester, by Mr. F. Price, district coroner, as to the cause of death of Lavinia Turner, a child aged three years. It appeared that the child had been ailing from a skin affection, and the mother took it to a "hospital for skin diseases" in Hyde Road, where Mr. Bernstein prescribed a bottle of medicine, a lotion and a box of ointment. A teaspoonful dose of the medicine was given to the child, who complained of its bitterness and died with symptoms of strychnine poisoning shortly afterwards.

Dr. W. Whitefield, 117, Boston Street, Hulme, said the deceased was brought to his surgery in strong convulsions. The mother said the child had taken some medicine, but witness said nothing but strychnine could produce the appearances he saw. The bottle produced was brought to him. Witness tasted the

contents, and was at once sure, from the taste, and looking also at the condition of the child, that it contained strychnine. The child was too strongly convulsed to permit the stomach pump to be applied, and it was also unable to swallow anything, and witness therefore injected something under the skin in order to make her sick, but it was of no avail. She died in about twenty minutes or half an hour after she was brought to his house. Witness retained possession of the bottle, but sent a portion of the contents to Mr. C. Swinn, chemist, for the purposes of analysis. He saw Mr. Swinn make the test, and it produced the reaction of strychnine. Witness subsequently made a *post-mortem* examination of the body. All the internal organs of the chest and abdomen were healthy. He found about a tablespoonful of liquid in the stomach, which he had not preserved.

P. S. George Smith said he received from Mrs. Turner the bottle of lotion produced. It bore a large red label, on which was printed in heavy black letters the words, "The Lotion—Poison." He then went to Dr. Whitefield's surgery and received from him another bottle, also produced. Witness went to the Skin Hospital in Hyde Road on Sunday morning and there saw Dr. Mayer Joseph Bernstein. He told him what had happened. Dr. Bernstein then said, "I cannot understand how that is; I certainly put the medicine up with my own hands. It is certainly very serious. I do not know how strychnine could be in it. I gave her a solution of soda." He then showed witness his book, and added, "I never intended to give her strychnine. If there is strychnine in the medicine it is a mistake." Witness asked Dr. Bernstein to let him look into the laboratory where he dispensed his medicines, and he accompanied witness there, He showed witness a bottle labelled "Potass. Bi-carb.," and said, "This is the soda," and also showed him the bottle "Liqu. Strych.," and underneath a red label containing the word "Poison." The bottles were about a yard apart. The bottle containing the soda was standing on a table under the window, and the bottle containing strychnine was on the window bottom. Dr. Bernstein said, "I cannot understand how I could make the mistake, as I always keep the bottles as they stand now." Witness said, "Supposing that you have made a mistake and put strychnine in the medicine instead of soda, how much strychnine would there be in the bottle of medicine?" He said, "an ounce." Witness asked, "Would a teaspoonful in a table-spoonful of water be sufficient to cause the death of the child?" and Dr. Bernstein replied, "Oh dear yes; I should never think of giving a child like that strychnine. It would be madness to do so." Witness then left. On the Sunday evening witness went to him again and received the two bottles produced. Dr. Bernstein accompanied witness to the police-station and asked to be allowed to test the medicine. He was permitted to do so, and having applied the cork to his tongue, shook his head, and said it was very like strychnine. He added that he had been in practice twelve years and never made a mistake before.

Dr. Bernstein: Was not the bottle marked "strychnine" standing at the extreme end of the window, together with another bottle labelled "arsenic?"

Witness: It was. You told me the other bottle contained arsenic.

Dr. Bernstein: I said they had always occupied that position.

Witness: Yes.

Dr. Bernstein, having been cautioned, was sworn, and said his name was Mayer Joseph Bernstein. He was a bachelor of medicine and surgeon, and also held a degree in hygiene. He practised at 35, Hyde Road, and at St. Anne's Square. I recollect (he continued) the patient being brought to me on Saturday last. The disease for which I was treating her seemed to be progressing very well, and I repeated the mixture which she had had before, which was simply a solution of bicarbonate of soda, with burnt sugar to give it a colouring. I have no recollection of giving anything else. The evidence of the police sergeant is correct. I do not believe that the bicarbonate of potash contains any strychnine. It is labelled "potass," but it is bicarbonate of soda really. The bottles have been in the position in which they were seen by the officer since I have been there and before I went there.

By a Juryman: The bottles containing poison were kept apart from the other bottles purposely.

Another Juryman: On the morning this medicine was mixed, would it be likely that you had used strychnine?

Witness: I only saw two or three patients before twelve o'clock. I do not believe I gave strychnine that day, but I cannot say. The entries in my book are not consecutive, because some of the patients were old patients.

The Coroner: Looking at the consequences that have happened, have you any doubt that you have by mistake put strychnine into this bottle instead of bicarbonate of soda.

Witness: I cannot believe it has been put there by anyone else. There is no reason to think so.

By another juryman: The lotion contained no strychnine. It was a very simple lotion, and would have caused no serious damage. I dispensed a considerable quantity of bicarbonate of soda. I am not often in the habit of giving strychnine or arsenic.

The Coroner: How do you account for the bottle getting into your hands?

Witness: I cannot say, except it had been put there accidentally. I do not recollect such a thing happening.

The jury returned a verdict of death by misadventure, by the administration of strychnine, and desired the Coroner to censure Dr. Bernstein.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Sale of Poisons.

Sir,—I was glad to see Mr. Carteighe was present and made himself heard in the discussion on the paper dealing with "The Sale of Poisons," read by Dr. G. Danford Thomas before the Section of State Hygiene at the recent Congress. The views expressed by the author were most favourable to the craft, and the paper is one that should be read by every pharmacist with interest. The suggestion that "the retail sale of proprietary medicines should be restricted to chemists and druggists," coming from one holding an official position like the coroner for London and Middlesex, is encouraging indeed.

In accord with the resolution that was passed by the Section (which, I trust, will be represented in the proper quarter), why should not the Pharmaceutical Society and the whole of the chemists and druggists for once combine and unanimously petition Government to consider at an early date the question of restricting the sale of all proprietary medicines containing poison to registered chemists. I am sure they would be backed up by the medical profession, and there will probably never be a better chance than the present.

C. J. S. Thompson.

Erratum.—On p. 151, col. i., line 27 from bottom, *for* "Liquor Strychninæ Hydrochloratis" *read* "Liquor Arsenici Hydrochloricus."

"*Shaw.*"—As you send no information as to the composition or "specific property" of the ointment we are unable to advise you as to the best means of changing its colour.

Communications, Letters, etc., have been received from Messrs. Maben, Johnston, Shepheard, Massie, Hornsby, Apprentice, Purdon.

A POINT IN PHARMACEUTICAL ETHICS.

BY THOMAS MABEN.

Some readers may wonder why I qualify the word "ethics" by the term "pharmaceutical," for they may rightly say that if any given action is in itself immoral, the fact that it is pharmaceutical can in no sense make it moral. Agreed, but there are some actions which one man will hold to be moral, and another, if not immoral, at least doubtful, actions which may be classed under the head of "indifferent morality," and while examples of these may be found in every trade and profession, I am at present referring to a class which frequently occurs in pharmacy, and for the sake of convenience I use the term "pharmaceutical ethics."

The point which I wish to consider is this:—When a pharmacist is asked for any given preparation which goes under the same name in the British Pharmacopœia, and is there officially described as to its strength, characters, etc., ought he to supply that preparation of B.P. strength, or is he right in supplying what may be termed "commercial" qualities of the preparation in question? I am not referring to sweet spirit of nitre, milk of sulphur and such like, for these synonyms are not yet officially recognized, however much most of us may wish them to be so, but to definite preparations, of which the name by which they are known to the public is the same as the official B.P. name. In order to illustrate my meaning I shall select three of the preparations containing acetic acid, viz., acetic acid, glacial acetic acid and vinegar. These are articles which have definite official strengths, acetic acid containing 33 per cent., glacial acid 99 per cent., and vinegar 5·41 per cent. of real acetic acid. They are moreover in constant request by the public for medicinal or dietetic purposes, and are regularly asked for under their proper names; yet I venture to assert that when acetic acid is asked for, B.P. acid is not supplied in one case out of six, and very probably a similar remark will also be true of one at least of the other two.

It is now many years since I first ascertained that commercial acetic acid was not B.P. acid, and from a correspondence I then had with one of the leading firms who manufacture the acid, I learned that it was rarely indeed that B.P. acetic acid was specially ordered. The majority of pharmacists probably never think anything about it, and take it for granted, as I used to do myself, that "acid. acet. fort." is synonymous with "acid. acet. B.P." Although it was pointed out many years ago by Dr. Thresh that this acid varies greatly in strength, I do not think this is generally known, and we do not, I believe, as a body, recognize that when we purchase "acid. acet. fort." we do not usually receive 33 per cent. acid. I do not blame the wholesale trade for this, because if B.P. acid is specially ordered, it will, of course, be supplied, but I do think the custom which has grown up is not one that should be continued.

In order that there may be no doubt as to the facts, I here give a few examples of what is being sold as "acetic acid" and "strong acetic acid," and that not in small country shops only, but in high-class pharmacies. There are twelve samples of acid, most of them of recent date, but a few were taken from time to time, since 1884, from acid supplied to myself, when by inadvertence B.P. had not been specially indicated in the order. Of these twelve samples only one was of full strength, surely a sadly low proportion. I have contented myself with four samples each of glacial acid and vinegar, all of which, however, were obtained from first-class establishments. The percentage of acid was obtained by volumetric estimation with normal soda solution, the specific gravity also being taken in each case.

The results were as follows, the figures representing the percentage of real acid:—Acetic acid—33, 32, 30·8, 30·8, 29·6, 29·3, 29, 28·8, 28·6, 27·4, 27·4, 23·9. Glacial acetic acid—99·0, 99·0, 95·6, 93·3. Vinegar—5·69, 4·84, 4·10, 3·25.

I have no doubt whatever that pharmacists generally will be extremely surprised to see these figures, and I also think that most of them will agree in the opinion that they disclose a rather discreditable condition of affairs. At the same time I do not doubt that if a public analyst were to "drop" on us for any of these, we should be able to produce evidence *ad nauseam* to prove that 30 per cent. acetic acid is, and from time immemorial has been, known as "acetic acid;" that 93·3 acid is glacial acid because it becomes solid at a certain temperature; and that vinegar is supplied of all qualities, according as may be wanted, these being known as No. 24, 22, 20, 18, and so on. We have been successful in beating off the attacks on "sweet spirit of nitre" and "milk of sulphur," but in these cases we had the advantage of the protection afforded by the fact that these synonyms have no legal recognition. I hardly think we would be equally successful with cases which could be brought forward, and with other substances than those I have mentioned, where the name is not a synonym but the actual B.P. name. But assuming that we would be successful, I put this question to my fellow pharmacists, Is this a creditable position to take up? Is this what the Pharmaceutical Society exists for? Is this the *raison d'être* of the British Pharmaceutical Conference? Is it the object of the higher education of pharmacists to train up a set of men whose knowledge enables them to "sail close to the wind" and save themselves in this way? For my own part I take it that one of the primary objects of our education is to enable us to know how to test our drugs and keep them at the proper standard, and not to help us to fight a public analyst when he finds us out.

I am well aware that commercial acetic acid, sp. gr. 1040, containing 30 per cent. or thereby of real acid, is a regularly recognized preparation by makers and is supplied as acetic acid, but I do not know of any reason why 1044 acid should not take its place. If there are any industries in which the weaker acid is necessary, the reduction of the stronger acid by the addition of an eighth part of water would be a very simple operation, and would surely meet every possible need.

Take the case of vinegar. I may be told that it is not fair to generalize on such slender particulars, and the remark may not be unjust. I will not therefore assume that there is no B.P. vinegar to be found anywhere, but I will say it is a remarkable fact that not one of these samples is of the proper strength. Two of them are evidently simply diluted acetic acid, and even at that they are both too weak. If in a simple, inexpensive article

like vinegar we cannot take the pains to see that it is what it professes to be, I wonder what will be the condition of many more important drugs.

I can hardly think that pharmacists are aware that this state of things exists with reference to these three preparations (and necessarily with those others of which these are the basis), but we cannot, we ought not to take refuge in ignorance, more especially when we profess to be on so much higher a level than these poor publicans and sinners, the oilmen and the grocers. On the other hand, if we are not ignorant, then I am driven to the conclusion that very much of our zeal for supplying the public with exactly what they want, as in the case of milk of sulphur and sweet spirit of nitre, is a zeal that finds its origin in our pocket, and is neither more nor less than cant. If spt. æth. nit. B.P. were fourpence per lb. lower in price than ·850 sweet spirit of nitre, and if sulphur præcip. B.P. were twopence per lb. cheaper than calcareous milk of sulphur, instead of the other way about, I wonder if we would ever have heard of a prosecution, and if there were no pecuniary advantage in selling 23 per cent. acid in place of 33 per cent., would we not all be very moral so far as it is concerned? I hope my brethren will pardon any seemingly harsh expression, but I repeat that this state of things is not creditable to us as a body, and it is high time the reproach was removed.

I had intended submitting a paper on the above lines to the recent Conference, but a friend whom I consulted thought it might be too controversial, so I did not send it in. But the issue of Professor Attfield's report, and the receipt of a letter from him asking my opinion on the question therein discussed, has inclined me to think that this other point which I have been urging, and which seems to me to be of even greater importance than that of synonyms, should not be lost sight of. The position that I take up is that when we are asked for articles under the names by which they are known in the Pharmacopœia, we ought to supply all such of official strength. And I go further and say that when customers employ synonyms which are usually understood to refer to B.P. preparations, it is distinctly wrong to substitute preparations of a different strength or character.

Some may ask if I mean to apply this principle all round, and thus exclude from pharmacy everything but B.P. qualities. I reply "yes" and "no." Certainly we must apply the principle all round for everything that is to be used as a *drug*, but that does not prevent us from keeping and selling "commercial" qualities. When these are used in the arts, as, for example, the mineral acids, or in veterinary practice, as, for example, blue or green vitriol, we are at perfect liberty to supply them in the usual commercial condition; but where "drugs" are concerned the rule must be absolute and inexorable. Then some say that the British Pharmacopœia is intended only to be authoritative in so far as regards the dispensing of the prescriptions of medical men, and not necessarily as a guide for the usual retail trade of the pharmacist. This argument appears to me to savour of jesuitry, and I sincerely hope that it is not one that will find much support from conscientious pharmacists.

Mr. Martindale, whose able address everyone must have read with great pleasure, appears to think that if we are compelled to keep to B.P. standards, we ought to have a monopoly of the sale of B.P. drugs. But that does not follow. He might as well say that because a grocer may not sell sanded sugar therefore the sale of sugar will be confined to grocers. This is a *non sequitur* that we cannot logically allow for the grocer, and we may take it that the grocer will not be any less logically minded than we are. The true position to take up is, that whoever sells a B.P. preparation must sell it of proper strength and quality, and if that principle were recognized, and the Food and Drugs Act impartially carried out all round, a good few unqualified dealers in drugs would soon find it to their advantage to let drugs severely alone. But my good brother pharmacists, how can you and I make any demand for a monopoly if our own hands are not clean? Let us first take the beam out of our own eye, and then we shall see clearly whether our brother's mote is of such a character as to interfere with his right to make a living even by poaching on our preserves.

Apart from the question of monopoly, I entirely approve, in the interests of the public, of Professor Attfield's attempt to add a list of synonyms to the Pharmacopœia. With one or two exceptions I would be delighted to see the synonyms mentioned in his report, and many more besides, officially recognized. There are very few to which conscientious pharmacists could object, and still fewer where it has been the practice to supply other than those preparations named as synonyms by Professor Attfield. One of the latter is lin. saponis co., which has in some quarters—not "a few" only, but a good many—been regarded as synonymous with lin. opii, though this has never been my own opinion and practice, and the diversity thus caused having led to many complaints, it is most desirable that the point should be settled one way or another. Then I should imagine that few pharmacists would be so far lost to what is due to themselves and the public as to supply nitrate of soda for saltpetre, but there is room for the suspicion that this practice is not entirely confined to oilmen and hucksters. Mr. Martindale appears to assume that the idea of including saltpetre is to get rid of impurities in nitrate of potash. But I give it a much wider scope than that, for many oilmen do not even think it necessary to procure commercial nitrate of potash; commercial nitrate of soda is good enough for them.

The editorial comments in the *Pharmaceutical Journal* on the question of synonyms are such as all may agree with; but I do not see why at this time of day any objection need be urged on the ground of interference with trade. Why, all our recent legislation in connection with food and with drugs has been a direct interference with trade. What else is the entire Pharmacy Act, or the Food and Drugs Act? The very essence of these Acts is that they "interfere with trade," and surely it is all in favour of Professor Attfield's recommendations that they aim simply at the extension of the principle of the Food and Drugs Act, a principle which is admitted to be absolutely necessary to the welfare of the community, even though it interferes with trade on every hand.

On every ground, therefore, but mainly on the ground of the public interest, I agree that the principle of officially sanctioning the use of synonyms in our national Pharmacopœia is one that should receive encouragement.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, SEPTEMBER 5, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

SELF-HELP.

AMONG the numerous suggestions that have been made from time to time with the view of effecting improvement in the position of chemists and druggists, attention has chiefly been directed to Parliamentary measures and the enforcement of legal restrictions. The far more effective means of self-help has met with less consideration, though it is one of which chemists might in many instances avail themselves with advantage, since the nature of their business offers opportunities for doing so that do not exist in the case of other trades to anything like the same extent. We are especially glad therefore to be enabled to refer to the paper by Mr. MABEN, which appears in this number of the Journal, as setting forth very plainly not only the duty that devolves upon the chemist in his dealings with the public, but also the practical advantages to be derived by himself from the maintenance of a high ethical principle in all his business transactions. Mr. MABEN rightly deals with the subject from the point of view of the pharmacist, and the gist of his argument is that the validity of the pharmacist's claim to be held in higher regard than persons engaged in other trades rests upon his observance of other rules and principles than those followed in ordinary trade. The illustration he takes of three articles known by names which are common in trade and are also used in the British Pharmacopœia is a convenient one for the consideration of the view he takes. According to trade usage the names "vinegar," "acetic acid," and "glacial acetic acid" are applied to articles which differ in degree from those which the Pharmacopœia intends to be understood by the respective names, and the principle contended for by Mr. MABEN is that the pharmacist in supplying articles under those names is bound to adhere to the standards of the Pharmacopœia. This argument involves the assumption that articles supplied by pharmacists are intended to be used in some way for medicinal purposes. So far as that assumption is applicable there can be little doubt that pharmacists should conform to the definitions of the Pharmacopœia if they desire to command public confidence as the recognized sources of supply of medicinal articles. Regard for their own interests ought therefore to induce them to uphold the authorized standards, and to inspire the public with the idea that their personal guarantee of this condition is the only ground for confidence.

But we feel sure that many who read Mr. MABEN'S paper will have presented to their minds the question which he has anticipated. Are we to exclude from pharmacy everything but British Pharmacopœia qualities? Unquestionably yes, so far as pharmacy is concerned, is the only answer that can be given to that question, and general acquiescence in that view of the matter is the only basis upon which there is any chance of improvement in the position of British pharmacists. Happily we have left behind the time when everyone who called himself chemist and druggist made his preparations by private formulæ or obtained them from wholesale houses without regard to the Pharmacopœia. Still it must not be forgotten that though the practice of pharmacy in this country has greatly improved it is yet in many instances associated with other descriptions of trade in which competition and the principle of *caveat emptor* are more regarded than the maintenance of high standards of quality. There are many chemists and druggists throughout the country who will say that if they had to live by pure pharmacy their lot would be a sorry one. Undoubtedly that is true, and it is a great misfortune that the practice of pharmacy is thus mixed up with trades of a totally different character. But it is not any the less an obligation imposed upon everyone who claims to call himself a chemist and druggist, and to carry on to any extent, however small, the business of a pharmacist, that he should maintain the credit of that calling so far as he exercises it. If the chief means of existence is another trade, as in many instances is the case with chemists and druggists, any pharmaceutical business they do should be carried out with the same strict regard for authorized medicinal standards as would be observed in first-class dispensing houses. As a general trader a man may sell any one of the four or more qualities of vinegar that may suit his customers, but as a pharmacist the vinegar he supplies should be of the nature and quality defined by the Pharmacopœia, and in all other cases the same rule should be observed. In the case of vinegar the legal difficulty of deciding whether there had been a breach of the Sale of Food and Drugs Act would be even greater than in the case of an article sold under a name that is not adopted as a synonym of a similar Pharmacopœia preparation. The name "vinegar" belongs to the grocer's article as well as to that of the Pharmacopœia,

and it might be on that ground possible to justify the sale of another quality than that defined by the Pharmacopœia. But that is a position which the pharmacist should studiously shun. If he desires to supply the grocer's article he should take pains to let it be known that he does so as a grocer would and without incurring the risk of discredit being cast upon the craft of pharmacy. In all these matters pharmacists should be in advance of public analysts rather than apprehensive of interference from them, and we trust that Mr. MABEN's paper may have the effect of contributing to the establishment of such a condition of affairs.

ELECTRICAL STANDARDS.

ALTHOUGH the commerce in electrical energy has not in this country developed so quickly as was at one time expected, it has now attained dimensions that render very desirable the authoritative establishment of standards of measurement of the current supplied to consumers by those engaged in its production. In view of the probability of this contingency arising, powers were conferred upon the Board of Trade by the Weights and Measures Act of 1889 to cause to be made and verified new denominations of standards for the measurement of electricity, which after approval by her Majesty in Council will become the only legal standards for the purpose. The first step in exercise of these powers was taken by the Board of Trade in December last in appointing a Committee to consider and report whether any, and if so, what action should be taken. The Committee was a remarkably strong one, including, besides Mr. COURTENAY BOYLE and Major P. CARDEW as representatives of the Board of Trade, Mr. GRAVES and Mr. W. H. PREECE, representing the Post Office, Sir W. THOMSON and Lord RAYLEIGH, representing the Royal Society, Professor G. CAREY FOSTER and Mr. GLAZEBROOK, representing the British Association, and Dr. JOHN HOPKINSON and Professor AYRTON, representing the Institution of Electrical Engineers. The meetings of the Committee were also attended by Mr. H. J. CHANEY, Superintendent of the Weights and Measures Standards Department, and the witnesses examined were Mr. CROMPTON, Dr. FLEMING, Dr. MUIRHEAD, Mr. PARKER, Mr. HARRISON, and Professor SILVANUS THOMPSON, the last-named being deputed by the London County Council.

The members of the Committee and the witnesses being practically unanimous as to the desirability of making legal provision for the measurement of electricity, the principal business before the Committee was the consideration of the magnitudes and definitions of standards of resistance and current, and the conclusions arrived at have been formulated in a report that has been issued within the last few days. In this report the system of electrical units originally defined by the British Association is adopted, and it is proposed that the magnitudes of the standards recommended should be determined on the electro-magnetic system of measurement with reference to the centimetre as unit of length, the gramme as unit of mass and the second as unit of time. The term "standard" is, however, used somewhat loosely in the report, being sometimes applied to the unit of measurement and sometimes to the measuring instrument.

The standard of resistance is dealt with first, and this, it is proposed, should be denominated the "ohm," and have the value of 1,000,000,000 in terms of the centimetre and second. The equivalent of one ohm suggested is the resistance offered to an unvarying electric current by a column of mercury of a constant cross-sectional area of one square millimetre and of a length of 106·3 centimetres at the temperature of melting ice. The relation between this and what is known as the British Association unit is stated to be that the latter may be taken as 0·9866 of the legal ohm. But although the Paris International Congress on Electrical Units is followed so far as to adopt a column of mercury as a fundamental measure of resistance, considerations of practical importance have induced the Committee to recommend the preparation of a material standard from a coil of solid metal, verified by comparison with the British Association unit.

For the legal standard of electrical current it is recommended that the term "ampere" should be adopted, and that it should have the value of 0·1 in terms of centimetre, gramme and second. The definition given of one ampere of unvarying current is the current which, when passed through a solution of silver nitrate containing about 15 parts by weight of the nitrate to 85 parts of water, deposits silver at the rate of 0·001118 gramme per second. An alternating current of one ampere would mean a current such that the square root of the time average of the square of its strength at each instant in amperes is unity. For the measurement of these currents it is suggested that instruments should be used constructed on the principle of the balance, in which by the proper disposition of the conductors forces of attraction and repulsion are produced, dependent upon the amount of current passing and balanced by known weights.

The legal standard of electrical pressure, for which the denomination "volt" is appropriated, formed the subject of a lively discussion in the Committee. It is defined as the pressure which if steadily applied to a conductor whose resistance is one ohm will produce a current of one ampere, and it was eventually decided that the electrical pressure at a temperature of 62° F. between the poles or electrodes of the voltaic cell known as CLARK'S cell may be taken as not differing from a

pressure of 1·433 volts by more than an amount to be determined by a committee appointed to investigate the question. An alternating pressure of one volt will mean a pressure such that the square root of the time average of the square of its value at each instant in volts is unity. For the measurement of electrical pressure, whether unvarying or alternating, it is recommended that instruments be used constructed on the principle of Sir W. THOMSON'S quadrant electrometer used idiostatically, and for high pressure instruments on the principle of the balance, electrostatic forces being balanced against a known weight.

In the draft "Order in Council" submitted by the Committee for adoption, the issue of which would complete the legalization of the above described standards under the terms of the Weights and Measures Act, it is stated that in their use the limits of accuracy attainable are for the ohm within one hundredth of one per cent., for the ampere within one tenth of one per cent., and for the volt within one quarter of one per cent.

We observe with much regret in the *Times* of last Tuesday a notification of the death of Mrs. Bottle, the wife of the Vice-President of the Pharmaceutical Society.

* * *

In addition to the reasons which have hitherto led to the announcement of the meetings of the German Apotheker-Verein there is now the additional one that several English pharmacists were made members of that body on the occasion of the late Jubilee of the Pharmaceutical Society. The meeting this year will take place at Magdeburg on the 14th of this month and continue until the 17th. As usual the sittings on Tuesday and Wednesday will be devoted to the discussion of pharmaceutical affairs and the business of the Association. On the evening of Monday the visitors attending the meeting will be received by the officials. On Tuesday the Magdeburg pharmacists have arranged for an evening entertainment in the Wilhelma Gardens, and on Wednesday there will be a banquet in the Freundschaft saloon, with a concert and ball afterwards. Thursday and Friday are to be devoted to excursions in the neighbourhood of Magdeburg and also to the Harz Mountains if a sufficient number of guests signify their intention to join in the trip. Provision is also made for the entertainment of ladies during the business sittings on Tuesday and Wednesday.

* * *

An injunction has been issued against the United Drug Association of Cincinnati restraining the members from placing the name of a local firm on a periodically published "black list" or "cut-off list," or otherwise interfering with the business of the firm in the way of a boycot. This decision will have an important bearing upon the attempts that are being made in the United States to counteract "cutters" by shutting them off from the sources of supply.

British Pharmaceutical Conference.

MEETING AT CARDIFF.

FIRST DAY'S PROCEEDINGS.

Tuesday, August 18.

(*Continued from page* 175.)

A paper was then read entitled a—

NOTE ON EXTRACTUM EUONYMI SICCUM.

BY MICHAEL CONROY, F.C.S.

By the instructions contained in the addendum to the British Pharmacopœia we are directed to make this article by exhausting the root bark of *Euonymus atropurpureus* with a menstruum composed of equal parts of rectified spirit (sp. gr. 838) and water. The spirit is then distilled off and so much sugar of milk added to the still fluid extract—the actual amount having been ascertained experimentally—that the final product shall contain 80 per cent. of dry extractive. The mixture is then evaporated over a water-bath until it becomes brittle. "The mass may then be powdered and kept in a well corked bottle."

The last sentence is copied verbatim from the directions, and it is in reference to it that this note is concerned. Whatever success may be obtained experimentally in making this article in a small way I am unable to say, but it is certain that the process is not suitable for making it in quantity. The method is right enough until we come to the powdering of the dried extract, but this is a serious matter indeed to the unfortunate individual who has it to perform. The extract is so extremely hygroscopic that the operation has to be performed in a warm, dry room, and even then it is with the greatest difficulty that it can be obtained in a pulvurent form. But success in this is not of much value, as the powder soon coheres and forms quite a mass again, even in well-stoppered bottles.

I have tried in two ways to remedy this defect, each of which is an improvement. In the first one the extract was dried on the water-bath without the sugar of milk, which was added, in the right proportion, during the operation of powdering instead. This was a great improvement, inasmuch as the extract dried better and powdered much more easily. The gradual addition of the sugar of milk during the operation of powdering prevented adhesion of the extract against the mortar, and gave greater freedom to the pestle. The resulting powder was paler in colour and kept very well in stoppered bottles.

The other plan consisted in adding calcined magnesia instead of sugar of milk to the *soft* extract, and in other respects following the official process. This plan in every way proved a success. The extract dried rapidly, and practically lost all its troublesome hygroscopic properties. The operation of powdering was performed easily under ordinary atmospheric conditions without any special precautions, and the pulverized extract remained a perfectly mobile powder.

Light calcined magnesia was used in the operation, but probably the heavy kind would also answer. The light kind was chosen on account of its greater bulk. As the improvement in the preparation is a mechanical one, due to the fact that the particles of magnesia envelope the powdered extract, and thus protect it from atmospheric influences, it appeared to me that the light kind would go farther in this respect.

Samples of the official kind and the two others referred to in this note are on the table for inspection.

Mr. DOTT said he had had the same experience as the author, having found the tendency in the powder to adhere a great inconvenience. The only objection he had to such a substance as magnesia was that it

would represent a considerable proportion of insoluble matter. If a preparation could be produced which would remain in a dry and powdered form without that addition of insoluble matter it would be preferable.

Mr. Moss said his experience was somewhat different from Mr. Conroy's, for what he had made corresponded exactly with the Pharmacopœia characters. It was true it was hygroscopic and required to be kept in a very well-corked bottle, and if any of it got left round the neck of the bottle it became resinous, melted, and formed a sort of varnish; but the bulk of the contents remained perfectly separate, even when kept for some months. Mr. Conroy did not say how soon the powder acquired this coherent condition. One would expect that powders like magnesia, or phosphate of lime, would act as he had said, but the question was whether such additions were not travelling somewhat in the direction of those makers of euonymin who had been rebuked by English pharmacists. It had been said that sulphate of barium had been found in some American preparations, and this was regarded as an adulteration; but it seemed to him that there were not many steps between magnesia or phosphate of lime and sulphate of barium.

Mr. J. C. Umney said he had made two or three quantities of this preparation on a fairly large scale, using 100 lbs. each time. On two occasions he had found no difficulty in powdering the extract according to the Pharmacopœial directions, but on the third occasion there was a difficulty, and though it was reduced to powder, after a time it became so agglomerated that the bottles had to be broken to take it out.

Mr. Grose said he was not a maker of this preparation, but a user of it, and he must admit that its condition sometimes called forth a good many adjectives which were not to be found in Johnson.

The President said his experience, which was only in a small way, agreed with what had been stated by Mr. Moss and Mr. Umney, that the preparation could be made according to the Pharmacopœia directions. It was quite probable, however, that some samples of the root bark would not yield a preparation which would with only 20 per cent. of sugar of milk produce a powder that would keep well. The matter was a good deal discussed in the committee, and sugar of milk was selected as being the most inert and therefore least objectionable excipient which could be used. The powdered root bark itself was suggested, but that was discarded in favour of sugar of milk, which was deemed the most acceptable excipient. He might add that the wording of the directions was very carefully guarded. It said, "The mass may then be powdered and kept in a well-corked bottle;" it was foreseen that, especially if sent to warm climates, there would be this tendency to agglomerate into a hard mass.

Mr. Naylor said there seemed to be an impression on the part of those who had spoken that the hygroscopic principle was the oil present in the extractum euonymi siccum, but he did not think that was the case. The chief hygroscopic principle was the extractive matter, which was soluble in alcohol, water and other solvents. So far as he knew, having tried the preparation on himself, and taken the extractive matter, it was practically of no advantage unless it produced a tonic effect. He must confess to a certain degree of regret in respect of the process introduced into the Pharmacopœia for making euonymin, and still considered the selective method by far the best, since from the article made in that way the best results had been obtained. Indeed, but for those results it might be questioned whether they would have had this particular preparation in the Pharmacopœia. It had come to be recognized in this country because euonymins made by the selective method were found to have a distinct action on the liver. Now the pharmaceutical preparation had but a mild action on the liver. It might be that a mild action was required, and in time the Pharmacopœia preparation might come into use, but at present all those who had to do with the manufacture of euonymin on a large scale would agree with him that the sale of it was comparatively small. He regretted that a method was not selected which had for its object the extraction of the cholagogic principles and the elimination of those substances from the product which they knew to be of very little, if of any, medicinal value.

Mr. Dott doubted whether it was known with certainty what preparations were used by Professor Rutherford in his experiments.

Mr. Naylor said at any rate they must have been preparations which were then in the market, and there were none then, so far as he knew, which in any way corresponded to this particular preparation of the Pharmacopœia. If those were tested they would be found to contain principally the resins, which if taken alone would be found to produce most powerful effects. He had tried them on his own system for some time, and when undiluted they produced pronouncedly griping and purgative effects. They could readily be reduced to powder with sugar of milk. Mr. Moss had alluded to the fact that the Americans made use of other diluents, but notwithstanding that the preparation was extremely active.

The President said there was intense bitterness in the aqueous extract, quite distinct from the resinous principle.

Mr. Naylor said there was no bitterness in the resin.

Mr. Conroy, in reply, said the main objection was that raised by Mr. Moss, who suggested that because American makers had used carbonate of barium in this article, which was most objectionable, we should be approaching that practice by using magnesia. He (Mr. Conroy) considered there was a wide gulf between using a poisonous substance like carbonate of barium and a perfectly harmless one like calcined magnesia. Mr. Moss said the powder did not aggregate when kept in well closed bottles. That was so, but if the bottle was opened from time to time for use it would soon aggregate. The only real objection was the one pointed out by Mr. Dott, namely, the addition of an insoluble substance to the extract. But then the presence of 10 per cent. of a harmless substance like magnesia could not be very objectionable when it gave them an article that could be handled with ease and comfort, and one that would keep well.

The President then moved a vote of thanks to Mr. Conroy, which was unanimously agreed to.

The next paper read was on—

Indian Gums for Pharmacy Work.

BY DR. S. RIDEAL AND W. E. YOULE.

The gums which find their way into the English market from India may be divided roughly into two classes, those which are entirely soluble in water and exude from species of acacia, of which amrad is the most important, and those which are not exudations from acaciæ and do not entirely dissolve in water, known under the generic name of ghatti. These latter gums have recently received considerable attention from pharmacists, owing to the scarcity and high price of genuine gum arabic. The following papers have been published during the last few years:—1887, *Journ. de Pharm.* [5], xv., p. 411, "Gummo-Phosphate of Lime," by Dr. Sambuc; 1888, *Pharm. Journ.* [3], xviii., p. 876, "Ghatti and other Indian Substitutes for Gum Arabic," by A. Mander; *Pharm. Journ.* [3], xix.,

p. 1, "Notes on East Indian Gum," by J. G. Prebble; *Pharm. Journ.* [3], xix., pp. 339 and 360, "On Gum Arabic and its Substitutes," by T. A. Ellwood; 1889, *Journ. de Pharm.* [5], xix., p. 441, "First Notice of Ghatti Gum"; *Journ. de Pharm.* [5], xix., p. 557, "On Gums capable of Replacing Gum Arabic" (edit.); *Journ. de Pharm.* [5], xx., p. 121, "Australian Gum," by M. Nauden; *Pharm. Journ.* [3], xx., p. 781, "On Gum Ghatti," by C. F. Henry; 1890, *Pharm. Journ.* [3], xx., p. 717, "Notes on some Gum Samples," by T. Maben; *Pharm. Journ.* [3], xx., pp. 869, 980, "Chemistry and Commercial Possibilities of Wattle Gum," by J. Maiden; *Journ. Soc. Chem. Ind.*, July, 1891, p. 624, "Gum Arabic and its Modern Substitutes," by S. Rideal and W. E. Youle.

Mr. Mander's paper gives a description of the chief varieties of the East Indian gum, both amrad and ghatti, together with oomra wattle. An account of the behaviour of each gum examined with various typical re-agents, ferric chloride, borax, lead acetate, ammonium oxalate, etc., is also given, together with the relative viscosities of the various amrad samples as compared with the B.P. mucilage. It is to be regretted that the viscosity of the ghatti sample was not also given; probably its high strength, which Mr. Mander clearly recognized, was the cause of this not being done. The author found that ghatti mucilage emulsified twice as much oil (olive) as gum acacia, with the production of a much better looking preparation. He also suggested its use for medicinal lozenges. Mr. Henry, in his paper of a later date than the above, agrees generally with Mr. Mander's statements regarding ghatti. He found, as a rule, that only 25 per cent. of the gum was soluble in water, the residue being insoluble in hot water even after prolonged boiling. The mucilage is of greater density than the B.P. mucilage. The ash of the gum averages 1·7 per cent. and contains much more carbonates, and is whiter than the ash of gum arabic. He concludes by recommending ghatti strongly as an adhesive agent.

The general appearance of ghatti gum is probably by this time well known to pharmacists. It occurs in somewhat dullish looking tears of a light brown colour, associated with a number of fragments which are white in colour and vermiform in shape. These latter consist generally entirely of metarabin. The amount of matter totally insoluble in water varies very much, ranging from 5 to 25 per cent. with different samples. "The amount of water in the natural gum is somewhat less than that contained in gum arabic, being about 8 per cent., while the latter average 13 per cent. to 15 per cent." The ash is fairly constant in quantity, being generally about 2·6 per cent., or somewhat lower than that of a genuine gum arabic. We have not observed any very great disproportion in the relative amounts of carbonic acid in gum acacia and ghatti ashes as remarked by Mr. Henry, who finds much more CO_2 in the latter. On the contrary, we find the total amount of CO_2 obtained from ghattis is somewhat less than from genuine gum arabics. Thus the following numbers were obtained from two representative gum arabics and two ghattis on analysing the ash (*loc. cit.*):—

Sample.	$CaCo_3$.	$MgCo_3$	K_2CO_3.	Total Co_2.
1. Gum arabic .	53·90	29·48	17·2	44·62 per cent.
2. ,, .	44·70	34·30	18·01	43·38 ,,
3. Ghatti .	53·50	8·40	7·8	30·79 ,,
4. ,, .	50·90	10·33	9·29	30·72 ,,

The mucilage given by any ghatti is decidedly more viscid than that from the ordinary gum arabics now obtainable. We have obtained, dealing with a large number of samples, the following, among other results, expressed in absolute measure, which show the marked superiority of these Indian gums in this respect:—

Sample.	Per cent. solution.	Absolute Viscosities.	Water = 100
1. Gum arabic . .	10	·1850	1233
2. ,, . .	,,	·1555	1029
3. ,, . .	,,	·0480	317
4. ,, . .	,,	·0430	285
5. ,, . .	,,	·0639	417
6. Ghatti . .	,,	·2880	2322
7. ,, . .	5	·1350	1089
8. ,, . .	,,	·1760	1420
9. ,, . .	,,	·1485	1198
10. ,, . .	10	·3621	2920(*l.c.*)

The above absolute numbers representing viscosity were obtained by the use of a special instrument which we found preferable to a burette for these determinations. It consists of a bulb of about 70 c.c. capacity, upon which, at top and bottom, are blown two smaller bulbs of about 10 c.c. capacity. The small upper or "safety" bulb terminates in a short, wide tube; on to the lower bulb is fused a piece of fine capillary tubing, 10 c.m. long. The gum solution can be sucked up into the bulb and the time occupied by it in again running out into a bottle placed beneath noted in seconds, when the absolute viscosity can be calculated by a simple formula if the dimensions of the instrument be known. If the solution of the gum, which may be conveniently made to contain 10 per cent. of gum arabics or 5 per cent. of gum ghattis, takes too long to flow out under these conditions, the operation may be accelerated by performing it under diminished pressure. The upper part of the viscosity apparatus is then connected with a partially exhausted bottle, and the gum is sucked up from a bottle, the time taken to fill the bulb thus being noted. The bulb is then emptied under the same diminished pressure (as registered by a mercurial gauge) by connecting the exhausted bottle with the bottle and thus sucking the gum out of the bulb. This second time is also noted; from the mean of the two determinations the absolute viscosity is obtained. This number, which for 10 per cent. solutions is always a fraction, can be returned in a more convenient form by dividing it by the absolute viscosity of water and multiplying by 100. We have described this apparatus at some length in the paper already referred to.

The mucilage is yellowish or light brown in colour when properly made, and is much more permanent and retains its viscosity unimpaired for a longer time than the inferior gum arabics from Senegal and Barbary now in the market. There is, for example, none of the separating into two layers of different colour and widely divided viscosities which is typical of the latter class of gums on standing.

It follows, therefore, from the above average viscosity of ghatti solutions as compared with good gum arabics, that for making up ordinary mucilage according to the Pharmacopœia (1 part gum in $2\frac{1}{2}$ parts water), one must not take less than 8 parts of water to 1 part of ghatti. The mucilage obtained must, of course, be freed from the insoluble lumps of metarabin and is then found to possess the above-mentioned properties. The reactions of ghatti mucilage as compared with that of ordinary gum acacia in weak solutions are summarized in the table on p. 192.

From this it would seem that the best re-agents to use for the detection of ghatti are ammonium oxalate, ferric chloride, alcohol, and mercuric chloride.

As stated above, ghatti gum solutions do not yield nearly such a copious precipitate with alcohol as does gum acacia. We have tried a series of experiments with these precipitates, especially as regards their optical properties when compared with the original gums. These experiments were carried out as follows: 5 grams of the gum were dissolved in 20 c.c. of water, filtering off the insoluble residue in the case of ghattis. To the cold solution 90 c.c. of 95 per cent. alcohol was

	Reagent.	With Ghatti.	With Gum Arabic.
1	Ammonium oxalate.	Slight turbidity	Copious white ppt.
2	Lead basic acetate.	Slight ppt.	Copious gelatinous ppt.
3	Ferric chloride	Slight darkening gelatinous ppt.	No darkening,no gelatinous ppt.
4	Borax.	Gelatinizes	Does not gelatinize.
5	Stannous chloride.	Bleaches, no gelatinizing	Bleaches.
6	Alcohol (equal bulk.	Slight precipitate	Copious precipitate.
7	Mercuric chloride.	White stringy ppt.	No reaction.

added and the precipitate which formed was thrown on to a tared filter and washed with 30 c.c. more alcohol. Finally, it was dried and weighed, then re-dissolved in water and its rotatory power determined by the polariscope. The rotatory power of the filtrate was also obtained. With two gum arabics and two ghattis the following average results were obtained:—

Sample.	Weight gum taken.	Wt. alcohol precipitate.	Wt. gum in filtrate.	(a)j Original gum.	(a)j Alcohol ppte.	(a)j Filtrate.
	grms.					
Arabic 1 . .	5·000	3·1872	1·4162	+66·2°	+57·9°	+55·1°
,, 2 . .	5·000	2·3312	2·4108	−38·2°	−20·1°	−64·9°
Ghatti 1 . .	3·245	·4065	2·8385	−140 8°	−106·0°	−72·4°
,, 2 . .	2·255	·2900	1·8078	−147·06°	−106·04°	−69·0° (*loc. cit.*)

The ghattis are generally lævorotatory, and the alcohol precipitate is apparently of a different kind to that yielded by gum acacias; that is, the precipitate is more lævorotatory than the filtrate, while the opposite is the case with gum arabics, whether they are lævo or dextro rotatory. Both classes of gums, however, it would appear from these experiments, consist of at least two kinds of gum, one of which is more soluble in alcohol than the other and differs in its action on polarized light. Similar work done by O'Sullivan with pure arabin points to the same conclusion.

These results are interesting from a pharmaceutical point of view, as it may be found possible to obtain from ghatti gum, by fractional precipitation with alcohol, a gum which will be identical with ordinary gum arabic. We are still working in this direction.

A few remarks on the subject of making up ghatti mucilage may here be of interest. As is well known, commercial samples of this gum are generally dirty and admixed with bark, in fact the tears frequently contain thin scales of bark on their flat surface. As the bark of the *Anogeissus latifolia*, from which ghatti is an exudation, is astringent, the commercial gum contains more or less tannin. The presence of tannin in the mucilage causes a darkening with ferric salts and also spoils the colour of the original mucilage. The tannin can be almost entirely prevented from getting into solution and a bright light-coloured mucilage obtained by observing the following precautions.

The gum should be ground to powder in porcelain or stoneware mortars, not *iron*. The weighed quantity of powdered gum is then placed in a copper or earthenware basin and about half the quantity of cold water required for the finished mucilage is then added and the whole well stirred until the metarabin has swollen up and separated from the soluble gum. The mucilage is then strained through muslin and the swollen pieces of insoluble gum are picked out of the cloth and returned to the basin. The second quantity of water is now added to the insoluble and the undissolved gum and after stirring left in contact, until only white jelly-like lumps of metarabin are left undissolved. The second batch of mucilage thus obtained is also strained through muslin and united with the first. By this double treatment with cold water not only is a better mucilage obtained, but most of the bark is caught on the muslin at the first filtration when only a trace of it has dissolved, and thus the finished solution contains only a minute quantity of tannic acid and gives no appreciable darkening with iron salts. The whole operation also should be conducted as rapidly as is consistent with getting a strong mucilage, as the solubility of tannin from the bark is not marked in cold water until it has been well soaked. If the mucilage be made with hot water, a considerable darkening of the gum takes place.

Ghatti gum which has been ground in iron vessels and thereby become contaminated with a trace of ferric oxide, even when treated only with cold water, forms an exceedingly dark-coloured solution on standing some time. The appearance of the three kinds of ghatti mucilage referred to, viz., cold, hot, and mucilage contaminated with iron by grinding in an iron mortar, is very marked, and it is easy to identify them.

Mucilage made up in accordance with the foregoing directions from ghatti gum is in our opinion quite capable of replacing gum acacia for pharmaceutical work. We have demonstrated experimentally that the solution is capable of the same suspensory power, *e.g.*, for making *Mistura cretæ*, and is equally as good in adhesive value for making the officinal lozenges. When freed from tannin it gives no darkening with iron salts, and it possesses an advantage over gum acaciæ in that it can be compounded with a small quantity of alcohol. In this respect it forms a mucilage intermediate between mucilago acaciæ and mucilago tragacanthæ. It emulsifies more oil than gum acacia, producing a snow-white emulsion.

The keeping qualities of ghatti mucilage, as already mentioned, are equal to those of best gum acacia and are decidedly superior to that of the solution prepared from the inferior gums from the Cape, etc., now in the market. Another point in which ghatti can claim a distinct advantage is its price, which is decidedly lower than that asked for senegals, Cape and other gums of a quality suitable for pharmaceutical work. Really good ghatti can be purchased at an average price of 40*s.* to 45*s.* per cwt., while the higher grades of the gums mentioned which yield a light-coloured mucilage cannot be purchased under 65*s.* to 80*s.* per cwt.

The other gums which come from India under the generic name of Indian amrad are not of much importance from a pharmaceutical point of view. They form a class which in physical properties, etc., resemble second-rate gum arabics. Only the best grades give a light-coloured mucilage, although they possess the advantage over ghatti of being entirely soluble in water.

At the conclusion of the paper,—

The PRESIDENT said gum arabic had been very scarce of late, but he hoped when the Nile was opened up they might receive some of the supplies which must be hoarded up in the interior. In the meantime they had been placed in great difficulty, and ghatti gum was no doubt of great service for many purposes, especially for use in the arts.

Mr. STROTHERS said he had used ghatti gum for making mucilage, and believed it to be very good in some cases; but after a practice of twenty-five years he had not yet succeeded in making good lozenges with it.

Mr. BOA had had considerable experience with ghatti gum, both for pharmaceutical and industrial purposes. In making mucilage for pharmaceutical purposes he had found that a proportion of one to six or seven corresponded with the official mucilage made from genuine gum acacia. It seemed to him, however, that until this gum was officially recognized it ought not to be used in place of gum acacia, though it might for certain special preparations not official. In working with it experimentally for official preparations he found it produced different colours in certain cases. He had been less successful with the powdered variety commercially supplied than with the gum bought in the rough state. In making mucilage he found it better to reject the vermiform pieces and select only the more globular clean pieces, from which a nice mucilage might be obtained by the usual means, which was very useful for emulsifying and suspending purposes. In some instances it had a taste readily distinguishable from that of acacia mucilage. For industrial purposes it was often used ground up in the form of a paste; mosaic workers used it in this manner, and found it gave better results than gum acacia at double the price.

Mr. GERRARD said he had to prepare considerable quantities of emulsions from time to time, and on one occasion was tempted to use powdered ghatti gum, but was not very well satisfied with it. It did not give a clean emulsion, because in grinding particles of bark and other matters got ground up with it. To separate these by picking was tedious and troublesome, and even then the cleaning was not complete, and a good deal of impurity was ground up with the gum. The consequence was that after the emulsion had stood for a few days a considerable quantity of gritty and unsightly matter settled at the bottom, and the use of such a gum did not seem proper for the manufacture of official or medicinal preparations. He observed that in one place viscosity was spoken of as if it were a convertible term with adhesiveness, which was not the case. Another point was that ferric chloride and ferric nitrate gave a precipitate from mucilage made from ghatti gum, but not from gum acacia; but he had never met with a solution of gum acacia which did not give a precipitate with ferric chloride.

Mr. BIRD said he had had considerable experience with this gum, having on the appearance of Mr. Mander's paper made a number of experiments to ascertain its capacities, and he could endorse all that had been said as to its emulsifying and keeping qualities. The difficulties found by some previous speakers had no doubt been caused chiefly by their using an unpicked sample. It was not at all difficult to find a sample which had been picked over, and all the white and best gums selected, and such samples gave very excellent results. In preparing mucilage his practice was to place the gum in water for about half a day, stirring it frequently. It was then strained, and if it were a good sample very little residue remained. To his mind the chief objection to this gum was the peculiar odour which he always observed in it.

Mr. DOTT asked what advantage the apparatus described for ascertaining the viscosity possessed over an ordinary large pipette.

The PRESIDENT said it was undoubted that strong solutions of gum arabic gave a precipitate with ferric chloride and also with borax, but it was much more marked with the ghatti gum. He had not found much difficulty in making a mucilage, especially in the method described; but he had heard that such mucilage was apt to become fungoid if made of a strength of 1 to 8, unless some antiseptic were added. He understood that this took place more rapidly than with gum arabic. He concluded by proposing a vote of thanks to the authors of the paper.

The vote of thanks was carried unanimously.

Dr. RIDEAL, in reply, said lozenges would have to be made with this gum by a formula totally different from that employed with gum arabic. It would not be possible to add the powdered gum in making the lozenges, but he had been informed that lozenges had been made on a large scale with this gum, making a very strong mucilage in the first instance. Mr. Boa had suggested a strength of 1 to 6 or 7 instead of 1 to 8, as more nearly corresponding to the Pharmacopœial preparation. The fact was that these gums varied considerably in the proportion of insoluble matter, and therefore the amount of soluble matter would vary inversely; probably from 1 to 6 to 1 to 8 would be the proportion. The vermiform gum was insoluble, and it was well therefore to avoid it for making mucilage. The dark colour which Mr. Gerrard had found might perhaps be due to the use of an iron mortar. It was quite obvious that this gum was not equal in value to gum acacia; an article sold at 40*s.* a cwt. could not be expected to equal one which fetched 80*s.* By all means he would say use pure gum acacia if you could get it, but if you could not, this ghatti gum was worth a trial. He did not think it was correct to say that it was peculiarly liable to a fungoid growth; he had specially studied this point and knew that it kept very well. With regard to the reaction with ferric chloride, he meant to convey that in the case of the ghatti gum it was much more marked than with gum acacia.

The next paper read was a—

NOTE ON THE ESTIMATION OF VOLATILE OIL IN COPAIBA.

BY R. A. CRIPPS, F.I.C.

For the estimation of volatile oil in copaiba it is customary to heat a small quantity (1 to 1·5 grams) until the resin becomes of a full brown colour, and vapours of volatile oil no longer arise. The operation is usually performed in a dish, either by employing a long-continued temperature of 100° C., or by a shorter application of a heat of about 150° to 160° C. In the former case the experiment is tedious owing to the retarding influence of the resin upon the volatilization of the last portions of volatile oil; this is to a certain extent, but by no means satisfactorily, avoided by the use of the higher temperature; in this latter case, especially, the darkening of the resin would indicate some change in the resin itself.

I have sought to expedite the estimation and retain the resin in an unaltered condition by the use of steam, whereby the volatile oil is very rapidly removed with a minimum of heat and consequently a minimum of change.

The apparatus consists of a flask, fitted with a safety-tube, and a tube bent twice at right angles. This tube passes through the cork (not india-rubber bung) of a second small weighed flask, and reaches very nearly to the bottom. The small flask also carries a bent tube, having a bulb blown in it and joined by a rubber collar to another tube passing into a test-tube, the latter being partially cooled by immersion in water.

Into the small weighed flask introduce about 0·5 gram of copaiba, accurately weighed, with about 5 c.c. of distilled water, and about two-thirds fill the larger flask with water. Insert the corks and boil the water in the larger flask; a jet of steam will now be driven into the smaller flask, the force of which must be moderated by attention to the source of heat; it must not be so rapid as to splash the copaiba on to the cork. To avoid this I have also found it advantageous to bend up the lower end of the tube passing into the smaller flask, directing the opening towards the nearest side of the flask, which thus breaks the force of the jet. As soon as the smaller flask becomes about one-fourth filled with condensed water, a gentle heat is

applied by means of a spirit lamp. The volatile oil passes over with the steam into the connected test-tube. The object of the bulb in the tube passing from the smaller flask is to retain any minute portions of resin which might accidentally be carried over during the distillation.

After the steam has been continuously passing for half-an-hour the sources of heat are removed, the lower end of the tube passing into the smaller flask, and the bulb in the exit tube washed into the flask with a little spirit to remove any adherent resin, the flask placed upon its side on the water-bath till all visible moisture is removed, and finally dried for half-an-hour in the air-oven at 100° C. The weight of resin obtained gives, by difference, the quantity of volatile oil. The resin so obtained is of a pale colour, and quite brittle.

I have estimated the resin in this way, varying the length of time from 15 minutes to 3 hours, with results which indicate that the removal of the volatile oil is practically complete after half-an-hour; indeed, the resin obtained after only 15 minutes is quite brittle, the difference between this and half-an-hour being under 1 per cent.

I have found this method of distillation to be admirably adapted for the detection of turpentine in copaiba, for at the very first appearance of steam in the tube between the smaller flask and the test-tube the odour of turpentine is readily distinguished at the mouth of the test-tube. It is for this purpose only that the test-tube is introduced into the apparatus.

According to my experience, however, turpentine is now but seldom employed to adulterate copaiba.

For the after-examination of the resin it is perhaps more convenient to transfer the contents of the small flask to an evaporating basin for the final drying, taking care to thoroughly rinse out all resin with spirit and with ether.

The following amounts of volatile oil have been found in commercial specimens by this method:—40·95, 45·0, 45·3, 46·4, 47·8, 48·2, 49·6, 50·4, 50·8, 53·3 and 59·6 per cent.

The estimation of volatile oil enables one to determine the amount of potassic hydrate required to saponify the resin, as the volatile oil itself is not acted upon. I have found this to vary from 12·1 to 19·3 per cent. as extremes, but to be usually between 16·0 and 17·0 per cent.

This apparatus will doubtless prove useful in the estimation of volatile oils, etc., in other substances, *e.g.*, balsam of Peru, Canada balsam, colophony, etc.

My thanks are due to Messrs. Southall Bros. and Barclay for permitting these experiments to be carried on in their laboratory.

The PRESIDENT said Mr. Cripps had devised a very useful apparatus to prevent the burning of the resin. He thought the proportions he mentioned were about the same as had been given by previous writers.

Mr. R. H. DAVIES said he did not quite understand whether the percentage of potassic hydrate required to saponify the resin was stated in terms of the original copaiba or of the resin. It was stated that from 12 to 17 per cent. of potash was required, which would be a matter of some interest, as they were told that the potash had no action on the oil. The apparatus was an ingenious one, though the passage of steam through substances containing essential oils for the purpose of extracting the oils was not novel; but he did not know that it had been applied before to oleoresins, and the apparatus seemed likely to serve the purpose very efficiently.

Mr. MOSS thought the apparatus might be admirably adapted for the estimation of essential oils, and not only so, but for the actual production of the oils themselves on the commercial scale. He had used this process for the preparation of oil of copaiba for some time past. Anyone who attempted to distil copaiba oleoresin with water and tried to get the oil knew the operation was a very lengthy one; but if live steam were passed through it under pressure it carried away the oil with it, and thus an operation which would otherwise take some days was very much shortened. He had not used anything like the bulb in Mr. Cripps' apparatus, but it struck him that it would be an improvement.

The PRESIDENT remarked that if turpentine were used as an adulterant it would come over first in the distillation and be easily recognized.

Mr. MOSS said turpentine was not often found now, the adulterant being generally something of the nature of gurjun balsam. The copaiba which came from Hamburg was sometimes open to the suspicion of an admixture of that kind.

Mr. NAYLOR said he thought Mr. Davies' question would be answered by one sentence in the paper, which he would again read. He took it the author meant the percentage of the resin.

On the motion of the President a vote of thanks was passed to Mr. Cripps.

The next paper read was on—

LIQUID PERSIAN GALBANUM.

BY E. M. HOLMES, F.L.S.

On several occasions during the last twenty years there has been imported into the London market a reddish-brown liquid galbanum of the consistence of Venice turpentine. It differs so much in appearance and in odour from ordinary solid galbanum that it has never met with a ready sale. Having recently had occasion to examine some of this product I found in it two or three fruits, which might possibly, but not necessarily, belong to the plant yielding it, and therefore seemed worthy of a careful examination.

An examination of the fruits might at first sight appear unnecessary, inasmuch as text-books on materia medica give two or three plants as the sources of galbanum, and it might therefore be supposed that the botanical sources of the drug were definitely set at rest. But a very little investigation leads one to the opposite conclusion. Thus the authors of 'Pharmacographia' remark:—"The uncertainty that exists as to the plants which furnish assafœtida hangs over those which produce the nearly allied drug galbanum. Judging from the character of the latter it can scarcely be doubted that it is yielded by umbelliferous plants of at least two species, which are probably the following, viz.:—1. *Ferula galbaniflua*, Boiss. et Buhse.; 2. *Ferula rubricaulis*, Boiss. et Buhse.

On turning to the still more recent 'Pharmacographia Indica' (May, 1890, p. 152), it is evident that the authors have been greatly misled by the statments of previous writers, for they give *Ferula rubricaulis* and the plant called *F. galbaniflua* by Dr. Aitchison as sources of the gum resin. A brief review of the present state of our knowledge concerning the drug is therefore necessary to a clear understanding of the position which liquid Persian galbanum holds with respect to the other commercial varieties, and of its relation to the plants said to yield them.

Commercial galbanum has been described by most writers on materia medica as being of two kinds, viz., Levant and Persian, each of which exist in two or more varieties. So far as the specimens in the Museum of the Pharmaceutical Society are concerned these are *Levant galbanum* in three distinct forms:—

1. In the tear.—These consist of distinct nodules, either opaque or translucent.

2. In small lumps, consisting of opaque small yellow translucent tears, mixed with portions of the stalks and sometimes fruits.

3. In masses consisting of translucent yellowish small fragments, and larger bluish or greenish soft portions, the whole mixed into a sticky mass and containing sections of the root.

The first two are rarely seen in commerce, the third is the article imported during the last ten years. All three have a decided musky odour.

II. *Persian galbanum.*—This exists in the Pharmaceutical Society's Museum under two forms—

1. A mass of small sticky tears with a varnished appearance, and mixed with fragments of stems and fruit stalks, etc.

2. A brownish or reddish-brown liquid of the consistence of Venice turpentine, which is the subject of this article.

Persian galbanum differs in the possession of a turpentiny odour in addition to that of galbanum. Hirschsohn* has pointed out that the Persian and Levant kinds may be distinguished also by chemical tests as follows:—Levant galbanum, either crude or in the form of a petroleum extract, gives with 1 part of sulphuric acid and 3 of alcohol a reddish-violet or blue-violet colour, the former being the case with the variety containing translucent tears and portions of stalk, and the latter with the variety containing bluish tears and portions of root.

Hydrochloric acid gives also a bluish-violet or a reddish-violet (and with one sample no colour at all). A mixture of chloral and chloral hydrate gives a rose-coloured solution, passing through blue to green, with the Levant variety containing stalks; and a yellowish-red solution passing into a dirty green, but faintly rose-coloured at the edges, with Levant galbanum containing sections of the root.

Persian galbanum gives with sulphuric acid and alcohol a yellowish-brown solution, and with chloral and chloral hydrate an intensely green solution. Hydrochloric acid gives a reddish-yellow colour.

It will be easily understood that it is scarcely likely that these products are all derived from one species, but that they are probably derived from at least three different plants.

The geographical and botanical sources of these varieties of galbanum are involved in some obscurity. "Levant," a word meaning The East, is loosely applied to the Eastern countries of the Mediterranean basin.

The term "Levant" applied to galbanum might therefore mean only that the drug was imported from some Turkish or Egyptian port, or even from Trebizonde or Trieste, and no clue is thus afforded as to its geographical source. It appears, however, from 'Pharmacographia,' that in the second century A.D. galbanum was among the drugs on which duty was levied at Alexandria, and that in A.D. 1503 it reached England by way of Venice. In 'Pharmacographia Indica' it is stated that "In India galbanum is little used, the bulk of what is imported into Bombay being sent to Egypt and Turkey under the name of Jawáshir," and further that it reaches Bombay from Persia. I have also seen in the Kew Museum a specimen of modern Levant galbanum from Kurrachee in the Persian Gulf.

We thus arrive at the conclusion that the so-called Levant galbanum is really of Persian origin.

With respect to the galbanum distinguished in commerce as Persian, it is stated in 'Pharmacographia' that considerable quantities of galbanum reach Russia by way of Astrachan and Orenburg. Hirschsohn (*Pharm. Journ.*, [3], vii., p. 371) confirms this statement. Moreover, specimens in the Daniel Hanbury collection of materia medica from Astrachan are undoubtedly of the kind known in commerce as "Persian."

It is obvious, therefore, that all the varieties of galbanum of commerce come from or through Persia.

The evidence respecting the botanical source of galbanum is by no means as satisfactory as could be desired.

This arises from the fact that travellers and botanists are, as a rule, not familiar with drugs, and as the same native name is applied in different districts to different products, much confusion has of necessity arisen. It is necessary, therefore, to sift as far as possible the information at our disposal.

It appears that Buhse collected in Northern Persia a plant which he stated to be the source of galbanum, to which the name *Ferula galbaniflua* was given by Boissier. This is the plant which is usually given as one of the sources of galbanum, but there is no evidence to show which variety of the drug it yields.

A second plant, *Ferula rubricaulis*, Boiss., is given in 'Pharmacographia,' in Bentley and Trimen's 'Medicinal Plants,' and still later in 'Pharmacographia Indica,' as a source of galbanum.*

This, as I have shown in 1888 (*Pharm. Journ.*, [3], xx., p. 365), is an error, the plant having a distinctly alliaceous taste and odour, which is never present in true galbanum. The history of the error is as follows: Boissier described a plant, or rather a mixture of two plants, under the name of *Ferula erubescens* (*Ann. Sc. Nat.*, 1844, p. 316). The two plants confounded under this name he subsequently separated as *Ferula rubricaulis* and *Ferula gummosa* (Boiss. 'Diagn.,' sec. ii., 2, p. 92), and finally sunk the latter under *Ferula galbaniflua*, as var. *β-Aucheri* (Boiss., 'Fl. Orient.,' vol. ii., p. 989).

It would thus appear that galbanum is afforded by two plants growing in Northern Persia, and which are *Ferula galbaniflua*, Boiss., and *F. galbaniflua*, var. *β-Aucheri*, Boiss., but that it is not the produce of *F. rubricaulis*.

But a third plant† is stated by Borszczow to afford galbanum. This is *Ferula Schair*, Borszcz., a plant growing on the confines of Siberia and Turkestan. He observed a milky juice to exude from the cut stem which had completely the odour of galbanum, and the scent was so strong as to be observed to a considerable distance. This plant does not appear to exist in either of the national herbaria in London, and I have had no opportunity of comparing its taste with that of galbanum.

Dr. Aitchison lately recorded the occurrence of the galbanum plant, *F. galbaniflua*, Boiss., in Afghanistan. But through his kindness in presenting to the Society a specimen of the plant collected by him, and through that of the Director of Kew Gardens in presenting a small portion of the gum resin collected from the plant, I am enabled to state that the plant collected by Dr. Aitchison cannot be the source of galbanum, since the gum resin does not resemble galbanum either in appearance or in taste, whilst the chemical examination to which it was submitted by Mr. E. G. Baker shows that even in chemical characters it does not agree with galbanum. Dr. Aitchison has himself pointed out that his plant differed from Buhse's plant in having a hollow instead of a solid stem, but that it seemed otherwise to agree with Buhse's description.‡ He mentions also that it had an odour of celery when fresh. He was probably misled by the native name "Birzand Jaoshir" given to the resin, Gaoshir§ being the Bombay name for galbanum. The plant evidently

* *Pharm. Journ.*, [3], vii., pp. 391, 572.

* An excellent figure of *F. rubricaulis* is given by Berg und Schmidt, 'Officin. Gewächse,' t. 31b, under the name of *F. erubescens*, Boiss.

† Mentioned in Bentley and Trimen's 'Medicinal Plants,' No. 128.

‡ The striking resemblance of different species of umbelliferæ is very remarkable. Of this *Dorema Ammoniacum* and *Ferula Narthex*; *Ferula fœtidissima* and *F. Jaeschkeana* are remarkable instances.

§ The same name is stated by Dr. Polak to be given to *Diplotœnia cachrydifolia*, Boiss., but he spells the word Dschawshir.

resembles it in appearance, but cannot be identical with Buhse's *F. galbaniflua.*

From the account given by Borszczow of *Ferula Schair* it would seem probable that this plant may be the source of the Persian galbanum of commerce, which has a remarkably penetrating odour. Its place of growth would also explain its entering commerce by way of Russia.

So far as can be deduced from the evidence at present obtainable it appears probable that the so-called Levant galbanum is afforded by *Ferula galbaniflua* and its var., *β-Aucheri*, and the so-called Persian galbanum by *Ferula Schair*, Borszczow.

But the results obtained by an examination of the fruits found in the liquid Persian galbanum, and of the gum-resin itself, indicate that this form of the drug is probably collected from a different species from any of those already mentioned.

A section of the fruit compared with that of Boissier's specimens of *Ferula galbaniflua* shows that the structure is almost identical in both. The vittæ are large and fill the valleculæ (or spaces between the dorsal ridges) and appear to be septate, the septum being near the ridges, thus indicating that a second and narrower vittæ is present in each vallecula, and runs parallel with the first. These vittæ are not easily seen from the exterior.

In *Ferula Schair*, as represented in Borszczow's illustration, the vittæ are single and of small size in each vallecula, and the fruit is not winged.

When a small portion of the liquid Persian galbanum is either shaken or warmed with a mixture of one part of sulphuric acid and three of alcohol, a beautiful bluish-violet colour is developed, deeper in tint and more distinct than in any variety of Levant galbanum similarly treated. For the purpose of comparison some of the original specimens of Persian and Levant galbanum examined by Hirschsohn were treated in the same way by Mr. J. Eastes and myself. (These specimens exist in the Hanbury collection of materia medica, and are portions of those sent by the late Daniel Hanbury to Hirschsohn.)

It is evident from the above-mentioned results that whilst in chemical reaction the liquid Persian galbanum approaches very closely to the Levant kind it is entirely different in its odour and taste as well as in its physical characters. It is therefore only possible to conclude that liquid Persian galbanum must be derived from an undescribed species nearly allied to *F. galbaniflua* (Boiss.), if that plant really is the source of Levant galbanum. It must be acknowledged, however, that so far as the taste of the fruits of Boissier's specimens is concerned, that of the *Ferula galbaniflua, β-Aucheri*, Boiss. (= *F. gummosa*, Boiss.), approaches more nearly to that of the Levant galbanum than do the fruits of the typical plant. In conclusion, I may remark that Levant galbanum, when heated, gives off a pleasant aromatic scent, but that Persian galbanum gives off a turpentiny odour sufficiently disagreeable to render it easy to understand why galbanum has been sometimes classed among the fœtid gum-resins. If galbanum is really the galbanum used by Moses* in the preparation of the sacred incense, it was probably the Levant and not the Persian kind that was employed.

The PRESIDENT, in proposing a vote of thanks to Mr. Holmes for the paper, said he had sent a few microscopic slides which could be examined at the close of the meeting. It was very difficult at present to get a drug at all bearing the character of the true galbanum, and the paper was therefore all the more valuable.

(*To be continued.*)

* Exodus, xxx., 34.

The British Association for the Advancement of Science.

SIXTIETH ANNUAL MEETING.

THE PRESIDENT'S ADDRESS.

(*Concluded from page* 178.)

The difficulties to which I have referred have suggested to some thinkers a different view of things, according to which it is not necessary to suppose that one part of the system gravitationally supports another. The whole may consist of a congeries of discrete bodies even if these bodies be the ultimate molecules of matter. The planets may have been formed by the gradual accretion of such discrete bodies. On the view that the material of the condensing solar system consisted of separate particles or masses, we have no longer the fluid pressure which is an essential part of Laplace's theory. Faye, in his theory of evolution from meteorites, has to throw over this fundamental idea of the nebular hypothesis, and he formulates instead a different succession of events in which the outer planets were formed last; a theory which has difficulties of its own.

Professor George Darwin has recently shown, from an investigation of the mechanical conditions of a swarm of meteorites, that on certain assumptions a meteoric swarm might behave as a coarse gas, and in this way bring back the fluid pressure exercised by one part of the system on the other, which is required by Laplace's theory. One chief assumption consists in supposing that such inelastic bodies as meteoric stones might attain the effective elasticity of a high order which is necessary to the theory through the sudden volatilization of a part of their mass at an encounter, by which what is virtually a violent explosive is introduced between the two colliding stones. Professor Darwin is careful to point out that it must necessarily be obscure as to how a small mass of solid matter can take up a very large amount of energy in a small fraction of a second.

Any direct indications from the heavens themselves, however slight, are of so great value, that I should perhaps in this connection call attention to a recent remarkable photograph by Mr. Roberts of the great nebula in Andromeda. On this plate we seem to have presented to us some stage of cosmical evolution on a gigantic scale. The photograph shows a sort of whirlpool disturbance of the luminous matter which is distributed in a plane inclined to the line of sight, in which a series of rings of bright matter, separated by dark spaces, greatly foreshortened by perspective, surround a large undefined central mass. We are ignorant of the parallax of this nebula, but there can be little doubt that we are looking upon a system very remote, and therefore of a magnitude great beyond our power of adequate comprehension. The matter of this nebula, in whatever state it may be, appears to be distributed, as in so many other nebulæ, in rings or spiral streams, and to suggest a stage in a succession of evolutional events not inconsistent with that which the nebular hypothesis requires. To liken this object more directly to any particular stage in the formation of the solar system would be "to compare things great with small," and might be indeed to introduce a false analogy; but on the other hand, we should err through an excess of caution if we did not accept the remarkable features brought to light by this photograph as a presumptive indication of a progress of events in cosmical history following broadly upon the lines of Laplace's theory.

The old view of the original matter of the nebulæ, that it consisted of a "fiery mist,"

> "a tumultuous cloud
> Instinct with fire and nitre,"

fell at once with the rise of the science of thermodynamics. In 1854 Helmholtz showed that the supposition of an original fiery condition of the nebulous stuff was unnecessary, since in the mutual gravitation of widely separated matter we have a store of potential energy sufficient to generate the high temperature of the sun and stars. We can scarcely go wrong in attributing the light of the nebulæ to the conversion of the gravitational energy of shrinkage into molecular motion.

The idea that the light of comets and of nebulæ may be due to a succession of ignited flashes of gas from the encounters of meteoric stones was suggested by Professor Tait, and was brought to the notice of this Association in 1871 by Sir William Thomson in his Presidential Address.

The spectrum of the bright-line nebulæ is certainly not such a spectrum as we should expect from the flashing by collisions of meteorites similar to those which have been analysed in our laboratories. The strongest lines of the substances which in the case of such meteorites would first show themselves, iron, sodium, magnesium, nickel, etc., are not those which distinguish the nebular spectrum. On the contrary, this spectrum is chiefly remarkable for a few brilliant lines, very narrow and defined, upon a background of a faint continuous spectrum, which contains numerous bright lines, and probably some lines of absorption.

The two most conspicuous lines have not been interpreted; for though the second line falls near, it is not coincident with a strong double line of iron. It is hardly necessary to say that though the near position of the brightest line to the bright double line of nitrogen, as seen in a small spectroscope in 1864, naturally suggested at that early time the possibility of the presence of this element in the nebulæ, I have been careful to point out, to prevent misapprehension, that in more recent years the nitrogen line and subsequently a lead line have been employed by me solely as fiducial points of reference in the spectrum.

The third line we know to be the second line of the first spectrum of hydrogen. Mr. Keeler has seen the first hydrogen line in the red, and photographs show that this hydrogen spectrum is probably present in its complete form, or nearly so, as we first learnt to know it in the absorption spectrum of the white stars.

We are not surprised to find associated with it the line D_3, near the position of the absent sodium lines, probably due to the atom of some unknown gas, which in the sun can only show itself in the outbursts of highest temperature, and for this reason does not reveal itself by absorption in the solar spectrum.

It is not unreasonable to assume that the two brightest lines, which are of the same order, are produced by substances of a similar nature, in which a vibratory motion corresponding to a very high temperature is also necessary. These substances, as well as that represented by the line D_3, may be possibly some of the unknown elements which are wanting in our terrestrial chemistry between hydrogen and lithium, unless indeed D_3 be on the lighter side of hydrogen.

In the laboratory we must have recourse to the electric discharge to bring out the spectrum of hydrogen; but in a vacuum-tube, though the radiation may be great, from the relative fewness of the luminous atoms or molecules or from some other cause, the temperature of the gas as a whole may be low.

On account of the large extent of the nebulæ, a comparatively small number of luminous molecules or atoms would probably be sufficient to make the nebulæ as bright as they appear to us. On such an assumption the average temperature may be low, but the individual particles, which by their encounters are luminous, must have motions corresponding to a very high temperature, and in this sense be extremely hot.

In such diffuse masses, from the great mean length of free path, the encounters would be rare but correspondingly violent, and tend to bring about vibrations of comparatively short period, as appears to be the case if we may judge by the great relative brightness of the more refrangible lines of the nebular spectrum.

Such a view may perhaps reconcile the high temperature which the nebular spectrum undoubtedly suggests with the much lower mean temperature of the gaseous mass, which we should expect at so early a stage of condensation, unless we assume a very enormous mass; or that the matter coming together had previously considerable motion, or considerable molecular agitation.

The inquisitiveness of the human mind does not allow us to remain content with the interpretation of the present state of the cosmical masses, but suggests the question—

> "What see'st thou else
> In the dark backward and abysm of time?"

What was the original state of things? how has it come about that by the side of ageing worlds we have nebulæ in a relatively younger stage? Have any of them received their birth from dark suns, which have collided into new life, and so belong to a second or later generation of the heavenly bodies?

During the short historic period, indeed, there is no record of such an event; still it would seem to be only through the collision of dark suns, of which the number must be increasing, that a temporary rejuvenescence of the heavens is possible, and by such ebbings and flowings of stellar life that the inevitable end to which evolution in its apparently uncompensated progress is carrying us can, even for a little, be delayed.

We cannot refuse to admit as possible such an origin for nebulæ.

In considering, however, the formation of the existing nebulæ we must bear in mind that, in the part of the heavens within our ken, the stars still in the early and middle stages of evolution exceed greatly in number those which appear to be in an advanced condition of condensation. Indeed, we find some stars which may be regarded as not far advanced beyond the nebular condition.

It may be that the cosmical bodies which are still nebulous owe their later development to some conditions of the part of space where they occur, such as conceivably a greater original homogeneity, in consequence of which condensation began less early. In other parts of space condensation may have been still further delayed, or even have not yet begun. It is worthy of remark that these nebulæ group themselves about the Milky Way, where we find a preponderance of the white-star type of stars, and almost exclusively the bright-line stars which Pickering associates with the planetary nebulæ. Further, Dr. Gill concludes, from the rapidity with which they impress themselves upon the plate, that the fainter stars of the Milky Way also, to a large extent, belong to this early type of stars. At the same time other types of stars occur also over this region, and the red hydrocarbon stars are found in certain parts; but possibly these stars may be before or behind the Milky Way, and not physically connected with it.

If light matter be suggested by the spectrum of these nebulæ, it may be asked further, as a pure speculation, whether in them we are witnessing possibly a later condensation of the light matter which had been left behind, at least in a relatively greater proportion, after the first growth of worlds into which the heavier matter condensed, though not without some entanglement of the lighter substances. The wide extent and great diffuseness of this bright-line nebulosity over a large part of the constellation of Orion may be regarded perhaps as pointing in this

direction. The diffuse nebulous matter streaming round the Pleiades may possibly be another instance, though the character of its spectrum has not yet been ascertained.

In the planetary nebulæ, as a rule, there is a sensible increase of the faint continuous spectrum, as well as a slight thickening of the bright lines towards the centre of the nebula, appearances which are in favour of the view that these bodies are condensing gaseous masses.

Professor G. Darwin, in his investigation of the equilibrium of a rotating mass of fluid, found, in accordance with the independent researches of Poincaré, that when a portion of the central body becomes detached through increasing angular velocity, the portion should bear a far larger ratio to the remainder than is observed in the planets and satellites of the solar system, even taking into account heterogeneity from the condensation of the parent mass.

Now this state of things, in which the masses though not equal are of the same order, does seem to prevail in many nebulæ, and to have given birth to a large class of binary stars. Mr. See has recently investigated the evolution of bodies of this class, and points out their radical differences from the solar system in the relatively large mass-ratios of the component bodies, as well as in the high eccentricities of their orbits brought about by tidal friction, which would play a more important part in the evolution of such systems.

Considering the large number of these bodies, he suggests that the solar system should perhaps no longer be regarded as representing celestial evolution in its normal form—

> "A goodly Paterne to whose perfect mould
> He fashioned them . . ."

but rather as modified by conditions which are exceptional.

It may well be that in the very early stages condensing masses are subject to very different conditions, and that condensation may not always begin at one or two centres, but sometimes set in at a large number of points, and proceed in the different cases along very different lines of evolution.

Besides its more direct use in the chemical analysis of the heavenly bodies, the spectroscope has given to us a great and unexpected power of advance along the lines of the older astronomy. In the future a higher value may, indeed, be placed upon this indirect use of the spectroscope than upon its chemical revelations.

By no direct astronomical methods could motions of approach or of recession of the stars be even detected, much less could they be measured. A body coming directly towards us or going directly from us appears to stand still. In the case of the stars we can receive no assistance from change of size or of brightness. The stars show no true discs in our instruments, and the nearest of them is so far off that if it were approaching us at the rate of a hundred miles in a second of time, a whole century of such rapid approach would not do more than increase its brightness by the one-fortieth part.

Still it was only too clear that, so long as we were unable to ascertain directly those components of the stars' motions which lie in the line of sight, the speed and direction of the solar motion in space, and many of the great problems of the constitution of the heavens, must remain more or less imperfectly known. Now the spectroscope has placed in our hands this power, which, though so essential, appeared almost in the nature of things to lie for ever beyond our grasp; it enables us to measure directly, and under favourable circumstances to within a mile per second, or even less, the speed of approach or of recession of a heavenly body. This method of observation has the great advantage for the astronomer of being independent of the distance of the moving body, and is therefore as applicable and as certain in the case of a body on the extreme confines of the visible universe, so long as it is bright enough, as in the case of a neighbouring planet.

Doppler had suggested as far back as 1841 that the same principle, on which he had shown that a sound should become sharper or flatter if there were an approach or a recession between the ear and the source of the sound, would apply equally to light; and he went on to say that the difference of colour of some of the binary stars might be produced in this way by their motions. Doppler was right in that the principle is true in the case of light, but he was wrong in the particular conclusion which he drew from it. Even if we suppose a star to be moving with a sufficiently enormous velocity to alter sensibly its colour to the eye, no such change would actually be seen, for the reason that the store of invisible light beyond both limits of the visible spectrum, the blue and the red, would be drawn upon, and light-waves invisible to us would be exalted or degraded so as to take the place of those raised or lowered in the visible region, and the colour of the star would remain unchanged. About eight years later Fizeau pointed out the importance of considering the individual wave-lengths of which white light is composed. As soon, however, as we had learned to recognize the lines of known substances in the spectra of the heavenly bodies, Doppler's principle became applicable as the basis of a new and most fruitful method of investigation. The measurement of the small shift of the celestial lines from their true positions, as shown by the same lines in the spectrum of a terrestrial substance, gives to us the means of ascertaining directly in miles per second the speed of approach or of recession of the heavenly body from which the light has come.

An account of the first application of this method of research to the stars, which was made in my observatory in 1868, was given by Sir Gabriel Stokes from this chair at the meeting at Exeter in 1869. The stellar motions determined by me were shortly after confirmed by Professor Vogel in the case of Sirius, and in case of other stars by Mr. Christie, now Astronomer Royal, at Greenwich; but, necessarily, in consequence of the inadequacy of the instruments then in use for so delicate an inquiry, the amounts of these motions were but approximate.

The method was shortly afterwards taken up systematically at Greenwich and at the Rugby Observatory. It is to be greatly regretted that, for some reasons, the results have not been sufficiently accordant and accurate for a research of such exceptional delicacy. On this account probably, as well as that the spectroscope at that early time had scarcely become a familiar instrument in the observatory, astronomers were slow in availing themselves of this new and remarkable power of investigation. That this comparative neglect of so truly wonderful a method of ascertaining what was otherwise outside our powers of observation has greatly retarded the progress of astronomy during the last fifteen years, is but too clearly shown by the brilliant results which within the last couple of years have followed fast upon the recent masterly application of this method by photography at Potsdam, and by eye with the needful accuracy at the Lick Observatory. At last this use of the spectroscope has taken its true place as one of the most potent methods of astronomical research. It gives us the motions of approach and of recession, not in angular measures, which depend for their translation into actual velocities upon separate determinations of parallactic displacements, but at once in terrestrial units of distance.

This method of work will doubtless be very prominent in the astronomy of the near future, and to it pro-

bably we shall have to look for the more important discoveries in sidereal astronomy which will be made during the coming century.

In his recent application of photography to this method of determining celestial motions, Professor Vogel, assisted by Dr. Scheiner, considering the importance of obtaining the spectrum of as many stars as possible on an extended scale without an exposure inconveniently long, wisely determined to limit the part of the spectrum on the plate to the region for which the ordinary silver-bromide gelatine plates are most sensitive, namely, to a small distance on each side of G, and to employ as the line of comparison the hydrogen line near G, and recently also certain lines of iron. The most minute and complete mechanical arrangements were provided for the purpose of securing the absolute rigidity of the comparison spectrum relatively to that of the star, and for permitting temperature adjustments and other necessary ones to be made.

The perfection of these spectra is shown by the large number of lines, no fewer than 250 in the case of Capella, within the small region of the spectrum on the plate. Already the motions of about fifty stars have been measured with an accuracy, in the case of the larger number of them, of about an English mile per second.

At the Lick Observatory it has been shown that observations can be made directly by eye with an accuracy equally great. Mr. Keeler's brilliant success has followed in great measure from the use of the third and fourth spectra of a grating 14,438 lines to the inch. The marvellous accuracy attainable in his hands on a suitable star is shown by observations on three nights of the star Arcturus, the largest divergence of his measures being not greater than six-tenths of a mile per second, while the mean of the three nights' work agreed with the mean of five photographic determinations of the same star at Potsdam to within one-tenth of an English mile. These are determinations of the motions of a sun so stupendously remote that even the method of parallax practically fails to fathom the depth of intervening space, and by means of light-waves which have been, according to Elkin's nominal parallax, nearly 200 years upon their journey.

Mr. Keeler with his magnificent means has accomplished a task which I attempted in vain in 1874, with the comparatively poor appliances at my disposal, of measuring the motions in the line of sight of some of the planetary nebulæ. As the stars have considerable motions in space it was to be expected that nebulæ should possess similar motions, for the stellar motions must have belonged to the nebulæ out of which they have been evolved. My instrumental means, limiting my power of detection to motions greater than twenty-five miles per second, were insufficient. Mr. Keeler has found in the examination of ten nebulæ motions varying from two miles to twenty-seven miles, with one exceptional motion of nearly forty miles.

For the nebula of Orion, Mr. Keeler finds a motion of recession of about ten miles a second. Now this motion agrees closely with what it should appear to have from the drift of the solar system itself, so far as it has been possible at present to ascertain the probable velocity of the sun in space. This grand nebula, of vast extent and of extreme tenuity, is probably more nearly at rest relatively to the stars of our system than any other celestial object we know; still it would seem more likely that even here we have some motion, small though it may be, than that the motions of the matter of which it is formed were so absolutely balanced as to leave this nebula in the unique position of absolute immobility in the midst of whirling and drifting suns and systems of suns.

The spectroscopic method of determining celestial motions in the line of sight has recently become fruitful in a new but not altogether unforeseen direction, for it has, so to speak, given us a separating power far beyond that of any telescope the glass-maker and the optician could construct, and so enabled us to penetrate into mysteries hidden in stars apparently single, and altogether unsuspected of being binary systems. The spectroscope has not simply added to the list of the known binary stars, but has given to us for the first time a knowledge of a new class of stellar systems, in which the components are in some cases of nearly equal magnitude, and in close proximity, and are revolving with velocities greatly exceeding the planetary velocities of our system.

The K line in the photographs of Mizar, taken at the Harvard College Observatory, was found to be double at intervals of fifty-two days. The spectrum was therefore not due to a single source of light, but to the combined effect of two stars moving periodically in opposite directions in the line of sight. It is obvious that if two stars revolve round their common centre of gravity in a plane not perpendicular to the line of sight, all the lines in a spectrum common to the two stars will appear alternately single or double.

In the case of Mizar and the other stars to be mentioned, the spectroscopic observations are not as yet extended enough to furnish more than an approximate determination of the elements of their orbits.

Mizar especially, on account of its relatively long period, about 105 days, needs further observations. The two stars are moving each with a velocity of about fifty miles a second, probably in elliptical orbits, and are about 143 millions of miles apart. The stars of about equal brightness have together a mass about forty times as great as that of our sun.

A similar doubling of the lines showed itself in the Harvard photographs of β Aurigæ at the remarkably close interval of almost exactly two days, indicating a period of revolution of about four days. According to Vogel's later observations, each star has a velocity of nearly seventy miles a second, the distance between the stars being little more than seven and a half millions of miles, and the mass of the system 4·7 times that of the sun. The system is approaching us at the speed of about sixteen miles a second.

The telescope could never have revealed to us double stars of this order. In the case of β Aurigæ, combining Vogel's distance with Pritchard's recent determination of the star's parallax, the greatest angular separation of the stars as seen from the earth would be 1–200th part of a second of arc, and therefore very far too small for the highest powers of the largest telescopes. If we take the relation of aperture to separating power usually accepted, an object glass of about eighty feet in diameter would be needed to resolve this binary star. The spectroscope, which takes no note of distance, magnifies, so to speak, this minute angular separation 4,000 times; in other words, the doubling of the lines, which is the phenomenon that we have to observe, amounts to the easily measurable quantity of twenty seconds of arc.

There were known, indeed, variable stars of short period, which it had been suggested might be explained on the hypothesis of a dark body revolving about a bright sun in a few days, but this theory was met by the objection that no such systems of closely revolving suns were known to exist.

The Harvard photographs of which we have been speaking were taken with a slitless form of spectroscope, the prisms being placed, as originally by Fraunhofer, before the object glass of the telescope. This method, though it possesses some advantages, has the serious drawback of not permitting a direct comparison of the star's spectrum with terrestrial spectra. It is obviously unsuited to a variable star like Algol, where one star only is bright, for in such a case there would be no doubling of the lines, but only a small shift to and fro of the lines of the bright star as it

moved in its orbit alternately towards and from our system, which would need for its detection the fiducial positions of terrestrial lines compared directly with them.

For such observations the Potsdam spectrograph was well adapted. Professor Vogel found that the bright star of Algol did pulsate backwards and forwards in the visual direction in a period corresponding to the known variation of its light. The explanation which had been suggested for the star's variability, that it was partially eclipsed at regular intervals of 68·8 hours by a dark companion large enough to cut off nearly five-sixths of its light, was therefore the true one. The dark companion, no longer able to hide itself by its obscureness, was brought out into the light of direct observation by means of its gravitational effects.

Seventeen hours before minimum Algol is receding at the rate of about 24½ miles a second, while seventeen hours after minimum it is found to be approaching with a speed of about 28½ miles. From these data, together with those of the variation of its light, Vogel found, on the assumption that both stars have the same density, that the companion, nearly as large as the sun, but with about one-fourth his mass, revolves with a velocity of about fifty-five miles a second. The bright star of about twice the size and mass moves about the common centre of gravity with the speed of about twenty-six miles a second. The system of the two stars, which are about 3¼ millions of miles apart, considered as a whole, is approaching us with a velocity of 2·4 miles a second. The great difference in luminosity of the two stars, not less than fifty times, suggests rather that they are in different stages of condensation, and dissimilar in density.

It is obvious that if the orbit of a star with an obscure companion is inclined to the line of sight, the companion will pass above or below the bright star and produce no variation of its light. Such systems may be numerous in the heavens. In Vogel's photographs, Spica, which is not variable, by a small shifting of its lines reveals a backward and forward periodical pulsation due to orbital motion. As the pair whirl round their common centre of gravity, the bright star is sometimes advancing, at others receding. They revolve in about four days, each star moving with a velocity of about fifty-six miles a second in an orbit probably nearly circular, and possess a combined mass of rather more than 2½ times that of the sun. Taking the most probable value for the star's parallax, the greatest angular separation of the stars would be far too small to be detected with the most powerful telescopes.

If in a close double star the fainter companion is of the white-star type, while the bright star is solar in character, the composite spectrum would be solar with the hydrogen lines unusually strong. Such a spectrum would in itself afford some probability of a double origin, and suggest the existence of a companion star.

In the case of a true binary star the orbital motions of the pair would reveal themselves in a small periodical swaying of the hydrogen lines relatively to the solar ones.

Professor Pickering considers that his photographs show ten stars with composite spectra; of these, five are known to be double. The others are: τ Persei, ζ Aurigæ, δ Sagittarii, 31 Ceti, and β Capricorni. Perhaps β Lyræ should be added to this list.

In his recent classical work on the rotation of the sun, Dunér has not only determined the solar rotation for the equator but for different parallels of latitude up to 75°. The close accordance of his results shows that these observations are sufficiently accurate to be discussed with the variation of the solar rotation for different latitudes, which had been determined by the older astronomical methods from the observations of the solar spots.

Though I have already spoken incidentally of the invaluable aid which is furnished by photography in some of the applications of the spectroscope to the heavenly bodies, the new power which modern photography has put into the hands of the astronomer is so great, and has led already, within the last few years, to new acquisitions of knowledge of such vast importance, that it is fitting that a few sentences should be specially devoted to this subject.

Photography is no new discovery, being about half a century old; it may excite surprise, and indeed possibly suggest some apathy on the part of astronomers, that though the suggestion of the application of photography to the heavenly bodies dates from the memorable occasion when, in 1839, Arago, announcing to the Académie des Sciences the great discovery of Niepce and Daguerre, spoke of the possibility of taking pictures of the sun and moon by the new process, yet that it is only within a few years that notable advances in astronomical methods and discovery have been made by its aid.

The explanation is to be found in the comparative unsuitability of the earlier photographic methods for use in the observatory. In justice to the early workers in astronomical photography, among whom Bond, De la Rue, J. W. Draper, Rutherfurd, Gould, hold a foremost place, it is needful to state clearly that the recent great successes in astronomical photography are not due to greater skill, nor, to any great extent, to superior instruments, but to the very great advantages which the modern gelatine dry plate possesses for use in the observatory over the methods of Daguerre, and even over the wet collodion film on glass which, though a great advance on the silver plate, went but a little way towards putting into the hands of the astronomer a photographic surface adapted fully to his wants.

The modern silver-bromide gelatine plate, except for its grained texture, meets the needs of the astronomer at all points. It possesses extreme sensitiveness; it is always ready for use; it can be placed in any position; it can be exposed for hours; lastly, it does not need immediate development, and for this reason can be exposed again to the same object on succeeding nights, so as to make up by several instalments, as the weather may permit, the total time of exposure which is deemed necessary.

Without the assistance of photography, however greatly the resources of genius might overcome the optical and mechanical difficulties of constructing large telescopes, the astronomer would have to depend in the last resource upon his eye. Now we cannot by the force of continued looking bring into view an object too feebly luminous to be seen at the first and keenest moment of vision. But the feeblest light which falls upon the plate is not lost, but is taken in and stored up continuously. Each hour the plate gathers up 3,600 times the light-energy which it received during the first second. It is by this power of accumulation that the photographic plate may be said to increase, almost without limit, though not in separating power, the optical means at the disposal of the astronomer for the discovery or the observation of faint objects.

Two principal directions may be pointed out in which photography is of great service to the astronomer. It enables him within the comparatively short time of a single exposure to secure permanently with great exactness the relative positions of hundreds or even of thousands of stars, or the minute features of nebulæ or other objects, or the phenomena of a passing eclipse, a task which by means of the eye and hand could only be accomplished, if done at all, after a very great expenditure of time and labour. Photography puts it in the power of the astronomer to accomplish in the short span of his own life, and to

enter into their fruition, great works which otherwise must have been passed on by him as an heritage of labour to succeeding generations.

The second great service which photography renders is not simply an aid to the powers the astronomer already possesses. On the contrary, the plate, by recording light-waves which are both too small and too large to excite vision in the eye, brings him into a new region of knowledge, such as the infra-red and the ultra-violet parts of the spectrum, which must have remained for ever unknown but for artificial help.

The present year will be memorable in astronomical history for the practical beginning of the Photographic Chart and Catalogue of the Heavens, which took their origin in an International Conference which met in Paris in 1887, by the invitation of M. l'Amiral Mouchez, Director of the Paris Observatory.

The richness in stars down to the ninth magnitude of the photographs of the comet of 1882 taken at the Cape Observatory under the superintendence of Dr. Gill, and the remarkable star charts of the Brothers Henry which followed two years later, astonished the astronomical world. The great excellence of these photographs, which was due mainly to the superiority of the gelatine plate, suggested to these astronomers a complete map of the sky, and a little later gave birth in the minds of the Paris astronomers to the grand enterprise of an International Chart of the Heavens. The actual beginning of the work this year is in no small degree due to the great energy and tact with which the Director of the Paris Observatory has conducted the initial steps, through the many delicate and difficult questions which have unavoidably presented themselves in an undertaking which depends upon the harmonious working in common of many nationalities, and of no fewer than eighteen observatories in all parts of the world. The three years since 1887 have not been too long for the detailed organization of this work, which has called for several elaborate preliminary investigations on special points in which our knowledge was insufficient, and which have been ably carried out by Professors Vogel and Bakhuyzen, Dr. Trépied, Dr. Scheiner, Dr. Gill, the Astronomer Royal, and others. Time also was required for the construction of the new and special instruments.

The decisions of the Conference in their final form provide for the construction of a great photographic chart of the heavens, with exposures corresponding to forty minutes' exposure at Paris, which it is expected will reach down to stars of about the fourteenth magnitude. As each plate is to be limited to four square degrees, and as each star, to avoid possible errors, is to appear on two plates, over 22,000 photographs will be required. For the more accurate determination of the positions of the stars, a *réseau* with lines at distances of 5 mm. apart is to be previously impressed by a faint light upon the plate, so that the image of the *réseau* will appear together with the images of the stars when the plate is developed. This great work will be divided, according to their latitudes, among eighteen observatories provided with similar instruments, though not necessarily constructed by the same maker. Those in the British dominions and at Tacubaya have been constructed by Sir Howard Grubb.

Besides the plates to form the great chart, a second set of plates for a catalogue is to be taken, with a shorter exposure, which will give stars to the eleventh magnitude only. These plates, by a recent decision of the Permanent Committee, are to be pushed on as actively as possible, though as far as may be practicable plates for the chart are to be taken concurrently. Photographing the plates for the catalogue is but the first step in this work, and only supplies the data for the elaborate measurements which have to be made, which are, however, less laborious than would be required for a similar catalogue without the aid of photography.

Already Dr. Gill has nearly brought to conclusion, with the assistance of Professor Kapteyn, a preliminary photographic survey of the Southern heavens.

With an exposure sufficiently long for the faintest stars to impress themselves upon the plate, the accumulating action still goes on for the brighter stars, producing a great enlargement of their images from optical and photographic causes. The question has occupied the attention of many astronomers whether it is possible to find a law connecting the diameters of these more or less over-exposed images with the relative brightness of the stars themselves. The answer will come out undoubtedly in the affirmative, though at present the empirical formulæ which have been suggested for this purpose differ from each other. Captain Abney proposes to measure the total photographic action, including density as well as size, by the obstruction which the stellar image offers to light.

A further question follows as to the relation which the photographic magnitudes of stars bear to those determined by eye. Visual magnitudes are the physiological expression of the eye's integration of that part of the star's light which extends from the red to the blue. Photographic magnitudes represent the plate's integration of another part of the star's light, namely, from a little below where the power of the eye leaves off in the blue to where the light is cut off by the glass, or is greatly reduced by want of proper corrections when a refracting telescope is used. It is obvious that the two records are taken by different methods in dissimilar units of different parts of the star's light. In the case of certain coloured stars the photographic brightness is very different from the visual brightness; but in all stars changes, especially of a temporary character, may occur in the photographic or the visual region, unaccompanied by a similar change in the other part of the spectrum. For these reasons it would seem desirable that the two sets of magnitudes should be tabulated independently, and be regarded as supplementary of each other.

The determination of the distances of the fixed stars from the small apparent shift of their positions when viewed from widely separated positions of the earth in its orbit is one of the most refined operations of the observatory. The great precision with which this minute angular quantity, a fraction of a second only, has to be measured, is so delicate an operation with the ordinary micrometer, though, indeed, it was with this instrument that the classical observations of Sir Robert Ball were made, that a special instrument, in which the measures are made by moving the two halves of a divided object glass, known as a heliometer, has been pressed into this service, and quite recently, in the skilful hands of Dr. Gill and Dr. Elkin, has largely increased our knowledge in this direction.

It is obvious that photography might be here of great service, if we could rely upon measurements of photographs of the same stars taken at suitable intervals of time. Professor Pritchard, to whom is due the honour of having opened this new path, aided by his assistants, has proved by elaborate investigations that measures for parallax may be safely made upon photographic plates, with, of course, the advantages of leisure and repetition; and he has already by this method determined the parallax for twenty-one stars with an accuracy not inferior to that of values previously obtained by purely astronomical methods.

The remarkable successes of astronomical photography, which depend upon the plate's power of accumulation of a very feeble light acting continuously through an exposure of several hours, are worthy to be regarded as a new revelation. The first chapter opened when, in 1880, Dr. Henry Draper obtained a picture of the nebula of Orion; but a more important

advance was made in 1883, when Dr. Common, by his photographs, brought to our knowledge details and extensions of this nebula hitherto unknown. A further disclosure took place in 1885, when the brothers Henry showed for the first time in great detail the spiral nebulosity issuing from the bright star Maia of the Pleiades, and shortly afterwards nebulous streams about the other stars of this group. In 1886, Mr. Roberts, by means of a photograph to which three hours' exposure had been given, showed the whole background of this group to be nebulous. In the following year Mr. Roberts more than doubled for us the great extension of the nebular region which surrounds the trapezium in the constellation of Orion. By his photographs of the great nebula in Andromeda, he has shown the true significance of the dark canals which had been seen by the eye. They are in reality spaces between successive rings of bright matter, which appeared nearly straight owing to the inclination in which they lie relatively to us. These bright rings surround an undefined central luminous mass. I have already spoken of this photograph.

Some recent photographs by Mr. Russell show that the great rift in the Milky Way in Argus, which to the eye is void of stars, is in reality uniformly covered with them. Also quite recently Mr. George Hale has photographed the prominences by means of a grating, making use of the lines H and K.

The heavens are richly but very irregularly inwrought with stars. The brighter stars cluster into well-known groups upon a background formed of an enlacement of streams and convoluted windings and intertwined spirals of fainter stars, which becomes richer and more intricate in the irregularly rifted zone of the Milky Way.

We, who form part of the emblazonry, can only see the design distorted and confused; here crowded, there scattered, at another place superposed. The groupings due to our position are mixed up with those which are real.

Can we suppose that each luminous point has no more relation to the others near it than the accidental neighbourship of grains of sand upon the shore, or of particles of the wind-blown dust of the desert? Surely every star from Sirius and Vega down to each grain of the light-dust of the Milky Way has its present place in the heavenly pattern from the slow evolving of its past. We see a system of systems, for the broad features of clusters and streams and spiral windings which mark the general design are reproduced in every part. The whole is in motion, each point shifting its position by miles every second, though from the august magnitude of their distances from us and from each other, it is only by the accumulated movements of years or of generations that some small changes of relative position reveal themselves.

The deciphering of this wonderfully intricate constitution of the heavens will be undoubtedly one of the chief astronomical works of the coming century. The primary task of the sun's motion in space together with the motions of the brighter stars has been already put well within our reach by the spectroscope method of the measurement of star-motions in the line of sight.

From other directions information is accumulating: from photographs of clusters and parts of the Milky Way, by Roberts in this country, Barnard at the Lick Observatory, and Russell at Sydney; from the counting of stars, and the detection of their configurations, by Holden and by Backhouse; from the mapping of the Milky Way by eye, at Parsonstown; from photographs of the spectra of stars, by Pickering at Harvard and in Peru; and from the exact portraiture of the heavens in the great international star chart which begins this year.

I have but touched some only of the problems of the newer side of astronomy. There are many others which would claim our attention if time permitted. The researches of the Earl of Rosse on lunar radiation, and the work on the same subject and on the sun, by Langley. Observations of lunar heat with an instrument of his own invention by Mr. Boys; and observations of the variation of the moon's heat with its phase by Mr. Frank Very. The discovery of the ultra-violet part of the hydrogen spectrum, not in the laboratory, but from the stars. The confirmation of this spectrum by terrestrial hydrogen in part by H. W. Vogel, and in its all but complete form by Cornu, who found similar series in the ultra-violet spectra of aluminium and thallium. The discovery of a simple formula for the hydrogen series by Balmer. The important question as to the numerical spectral relationship of different substances, especially in connection with their chemical properties; and the further question as to the origin of the harmonic and other relations between the lines and the groupings of lines of spectra; on these points contributions during the past year have been made by Rudolf v. Kövesligethy, Ames, Hartley, Deslandres, Rydberg, Grünwald, Kayser and Runge, Johnstone Stoney, and others. The remarkable employment of interference phenomena by Professor Michelson for the determination of the size, and distribution of light within them, of the images of objects which when viewed in a telescope subtend an angle less than that subtended by the light-wave at a distance equal to the diameter of the objective. A method applicable not alone to celestial objects, but also to spectral lines, and other questions of molecular physics.

Along the older lines there has not been less activity; by newer methods, by the aid of larger or more accurately constructed instruments, by greater refinement of analysis, knowledge has been increased, especially in precision and minute exactness.

Astronomy, the oldest of the sciences, has more than renewed her youth. At no time in the past has she been so bright with unbounded aspirations and hopes. Never were her temples so numerous, nor the crowd of her votaries so great. The British Astronomical Association formed within the year numbers already about 600 members. Happy is the lot of those who are still on the eastern side of life's meridian!

Already, alas! the original founders of the newer methods are falling out — Kirchhoff, Angström, D'Arrest, Secchi, Draper, Becquerel. But their places are more than filled; the pace of the race is gaining, but the goal is not and never will be in sight.

Since the time of Newton our knowledge of the phenomena of Nature has wonderfully increased, but man asks, perhaps more earnestly now than in his days, what is the ultimate reality behind the reality of the perceptions? Are they only the pebbles of the beach with which we have been playing? Does not the ocean of ultimate reality and truth lie beyond?

Proceedings of Societies in London.

INTERNATIONAL CONGRESS OF HYGIENE AND DEMOGRAPHY.

(*Concluded from page* 183.)

SECTION OF ENGINEERING IN RELATION TO HYGIENE.

In this section, which was presided over by Sir John Coode, K.C.M.G., the following paper on "*The Present State of our Knowledge Concerning the Self-Purification of Rivers*," was read by Dr. Percy F. Frankland.—The author referred to the more important experiments which have been made on the subject in this country, viz., those of the Rivers Pollution Com-

mission on the rivers Irwell, Mersey, Darwen, and Thames, and those of the author on the Thames from Oxford to Hampton, and on the Ouse between Richmond and York. These experiments, he said, all negative the theory of self-purification as regards dissolved organic matter, although unmistakable improvement is traceable in the case of suspended matter. Of the work of foreign authors, having a similar object, the more noteworthy are those of Hulwa on the Oder near Breslau, of Frank on the Spree at Berlin, and of Prausnitz on the Isarat, Munich. The author reviewed the work of these several investigators, who in some respects are out of harmony with each other, Hulwa supporting self-purification, even as regards dissolved organic matter, Frank limiting it to suspended matter, and Prausnitz adopting an intermediate couse. The author referred to his own experiments on the removal of microbes from water by agitation with solid particles, and points out how his results serve to explain the diminution in the number of microbes in river water through sedimentation as observed by Prausnitz and Frank. The self-purification of rivers had frequently been supposed to justify the use of river water, which had received sewage contamination, for town supply, but the author contended that the evidence of purification was wholly inadequate to justify such a course. Unanimity only existed with regard to self-purification by sedimentation, a process which could never guarantee the absence of danger, whilst of the removal of dissolved organic matter to any large extent there was no evidence at all. Of far more importance in securing the greater safety of water supplies from rivers and surface sources generally was their efficient filtration through sand.

Professor Robinson thought that in considering the conclusions arrived at by Dr. Percy Frankland, that the quality of the water between Oxford and Hampton so far from improving became deteriorated, it was important to ascertain whether the water passing at various points from which the specimens were taken was the same water and under the same conditions. Between Oxford and Hampton there were conditions which quite accounted for the water deteriorating.

Mr. Baldwin Latham said Dr. Odling had put the matter very tersely when he showed on the previous day that disease germs were destroyed upon reaching flowing water, and the only question was as to the destructability and regeneration of the spores of the germ. He considered the experiments made by Dr. Frankland were not upon the same water. As it took several days for the water to flow from Oxford to Hampton, it was impossible that the same water could have been taken, and unless you dealt with absolutely the same water it was quite futile to say that no purification took place in a river. The State Board of Health of Massachusetts, U.S., had made important investigations of all the rivers in their district, and the conclusion arrived at was that a considerable degree of self-purification took place, after all contingencies had been taken into account. With regard to sedimentation, of course if matter subsided in the bed of the stream, when a flood came it was washed out and the results ought to be obtained in an analysis. When the Thames was in flood chemists universally condemned the water supply. The last great flood of the Thames was in January, 1887, and Dr. Frankland then said that the London supply was utterly unfit for all dietic purposes; but at the same time the Registrar-General reported that the health of London had never been surpassed, all classes of disease being a long way below the average. Speaking upon the biological aspect of the question, he said it seemed to be the fashion to say that when microbes were found in the water it was injurious, but there was a nitrifying organism, sometimes called a "friendly microbe," which existed in water and had the power of destroying to a great extent all injurious matters.

Mr. Kummel (Hamburg) said the result of experiments made in Frankfort went to confirm the view expressed by Dr. Percy Frankland.

Mr. Moult agreed with Mr. Latham that from an engineering point of view the experiments conducted by Dr. P. Frankland were hardly satisfactory as proving the conclusions arrived at, as it was evident similar water was not analysed. He should like to know what was the ultimate result of purification by sedimentation; were the organisms (whether in a perfect state of vitality and activity or in the state of spores) finally got rid of by being deposited? He considered that the beds of sediment must become nurseries and breeding places for organisms lower down.

After some remarks from Mr. Church, Dr. Solomon C. Smith and Mr. Anderson,

Dr. P. Frankland, in reply, said it was very easy to pick holes in the way the experiments were conducted, but no one had suggested a better way of conducting them. It was absolutely impossible to take a stream and examine the same water at two different points. There was hardly any stream to be found in which either the volume was not decreased or fresh pollutions came into it along the course. Some method of compromise had to be adopted, and the method adopted by him was as satisfactory as anything that could be found, viz., of examining the water at different points on the same day and repeating the experiments on a number of different days and then taking the mean of the results. The figure thus obtained represented the relative quantity of impurity in the river along its course. As a matter of fact, pollution entered the Thames from tributary streams which were already polluted to a slight extent. Mr. Baldwin Latham had spoken of the ultimate fate of organisms which entered the river, and had referred to Dr. Odling's remarks, but it must not be forgotten that the experiments were made by Dr. Odling in company with Professor Crooks and Dr. Tidy. They found that the *bacilli anthrax* underwent rapid destruction in water, and he had performed similar experiments with similar results, but with one point of difference. The *bacilli anthrax* were capable of producing spores, which spores were possessed of more power of endurance than the parent which produced them, and it ought never to be forgotten that in the experiments of Odling, Crooks and Tidy the organisms employed were carefully prepared, to have no spores in them. He had the greatest affection for the nitrifying organism, but there was no evidence that it was destructive of other organisms. The conditions under which it lived were totally different from those of ordinary organisms; whereas pathogenic organisms required a large amount of organic matter for propagation and growth, the nitrifying organism grew in liquids destitute of organic matter. Therefore he was afraid they could not rely on this very important organism for effecting the destruction of the pathogenic form. There was no evidence that organisms which subsided in sluggish rivers were destroyed. Boiling the water was almost an absolute guarantee against zymotic disease, and as disease was frequently communicated by milk he thought it most important that milk should be boiled before being used.

Provincial Transactions.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The usual weekly excursion of the Dundee Chemists' Assistants' Association was held on Wednesday when a visit was made to the fine gardens of Clement

Park, Lochee, the residence of Miss Cox. There was a good turn out of members. The party was conducted by the head gardener—Mr. James Moir—over the extensive gardens and conservatories. A very pleasant and profitable afternoon was spent. Mr. Moir is a successful cultivator of orchids, and the collection at Clement Park is magnificent. Several particularly fine specimens of these plants were in bloom, and were much admired, the opportunity being taken to photograph them. The visit is the last of the series of Wednesday afternoon excursions it is proposed to hold during the season. A vote of thanks was awarded to Mr. Moir for his courtesy.

VISIT OF SHEFFIELD PHARMACISTS TO BIRMINGHAM.

On Thursday, the 27th August, the Sheffield Pharmaceutical Association Cricket Club travelled to Birmingham to take part in a return cricket match with the cricket section of the Midland Counties Association. Owing, however, to the wet weather the match could not be played, so the visitors were entertained by the local club, a visit to the public buildings of the city being followed by a luncheon, a supper and a smoking concert. Mr. A. Southall took the chair, and several apologies for absence were received, including one from Mr. Newsholme.

Obituary.

Notice has been received of the death of the following:—

On the 20th of August, Mr. John Shemmonds, Chemist and Druggist, Winton. Aged 44 years.

On the 28th of August, Mr. Walter Owen, Chemist and Druggist, Duke Street, Park, Sheffield. Aged 62 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Compressed Tablets.

Sir,—I have recently met with a communication in which the writer advocates the question of the use of compressed tablets in preference to other forms of administering medicines. The writer's idea, which seems to be a fairly common one, is that it would be a vast improvement if all drugs were to be prescribed and dispensed in the form of compressed pellets. But from this view of the matter I beg to differ.

To begin with, the cost of such a stock of tablets as would meet the requirements of every prescriber and patient would be something enormous; and in these days, when something new is turning up every day, the risk of being left with £50 worth of "gone out" stock on his hands would be more than the most enterprising chemist would care to run. Better by far, if you keep drugs ready dispensed, to stick to the good old pill, which has been, and always will be, co-existent with the healing art itself. Good coated pills are to be had as low as ½*d.* a dozen, and, as a rule, bear more profit by a long way than tablets.

Again, if the use of tablets become universal, how long will it be before every grocer and oilman is selling all kinds at 1½*d.* a dozen or therabouts, whereas in the mixture form we have been getting a shilling at the least for twelve doses of medicine? It will simply be handing over to the unqualified dealer that one last sheet-anchor of the pharmacist's profession—dispensing. And how if the pharmacist should not happen to have by him the particular tablet the doctor or patient requires?—a by no means remote contingency. Either he will have to go to the further expense of providing himself with a machine or, not having the option of supplying the medicine in any other form, keep the may-be necessitous patient waiting while he gets them down from the makers. No, no; it will not do.

I was going to adopt the approved stereotyped negative style and say "I will not mention" the exceptional facilities which compressed medicines offer to the adulterator; but I will mention them, because what I refer to is a most serious bar to their general use. Of this we have had more than one instance lately.

In conclusion, let me ask how in the world is a poor apprentice to pass his Minor nowadays, when dispensing only too frequently consists in filling a bottle with some quack medicine in disguise, which medical men are inveigled into prescribing by specious advertisements and crafty commercial travellers, whose sole purpose in life seems to be to worry the physician on whom he calls to test his precious samples; when galenical preparations are to be bought at a lower price than the raw ingredients; when infusions, tinctures and the like are made by adding seven of water to one of somebody's "liquors;" and now, when by the look of matters the required three years' dispensing experience is to mean nothing more than writing labels and wrapping up bottles of somebody else's "tablets?" Indeed, the necessity for an enforced curriculum is very apparent. Apprentice.

Mel Boracis.

Sir,—Between willow boxes and vials your correspondent, Ralph Robinson, appears to be greatly tried. Did the idea of a wide-mouth bottle for dispensing mel boracis ever enter his head? I think that such a vessel suits the purpose very well.

The B.P. orders "mel depuratum" for making mel boracis, but our friend R. R. gives "mellis" in his "improved" formula.

What is the use of a Pharmacopœia if every other chemist is to have a formula of his own? A customer may get the "improved" preparation at one shop and the "orthodox" substance at the next one. What will the customer think? Where is such a state to end?

Have the editors of the B.P. to keep nothing in view except the chemist with his bottles and pots?

Is there any use of a patient being dosed with tragacanth or any other gum needlessly, "just for the look of the thing." Thos. Massie.

Ellon.

Œnanthe crocata.

Sir,—I was much struck during a recent visit in Sussex by the immense quantities of water-dropwort (*Œnanthe crocata*) which I saw growing in the hedge-bottoms of the lanes, and also in the "dicks" or "diks" (dykes) of the marshland. Some of the farmers take but little notice of this noxious weed, and they will even allow it to grow where cattle are pasturing; others, who have learnt its properties by sad experience, try to eradicate it from their farms. One farmer near Winchelsea told me he had lost a very valuable horse through its eating this plant, and some of his neighbours had lost cows and sheep in the same manner. The water-dropwort is known in Sussex as "water-bendick" to distinguish it from "dry-bendick" (*Angelica sylvestris*).

Sheffield. J. Austen.

W. Herbert.—Probably the paper you are in search of is that by Mr. Jessop on the "Physiological Value of Meat Food for Invalids and Waste in Methods of Preparation," published in this Journal, September 7, 1889, p. 194.

Smith.—We are unable to suggest a method of changing the colour of the ointment as desired without affecting the properties of the principal ingredient.

W. H. Symons.—We do not think it is desirable to raise a discussion upon the opinion expressed.

Communications, Letters, etc., have been received from Messrs. Powell, Shepheard, Payne, Rideal, Norman, Herbert, Farr, Liebermann, Forret, Mossop, Green, W. D. S., Swansea Chemist.

EARLY BOTANY AND MATERIA MEDICA IN ENGLAND.

I.—SAXON WORTCRAFT.

The best view of Saxon wortcraft preserved for the student is afforded by the Saxon version of the "Herbarium" of Apuleius and the Saxon "Leech Book," edited by Mr. Cockayne for the Rolls series.

The MS. of the "Herbarium" selected by Mr. Cockayne as the basis of his text, Bibl. Cotton Vitellius, C. iii., dates from about the year 1250. It received considerable damage in the great fire at Ashburnham House, 1731, and to supply the lacunae in its text it has been carefully collated with the Bodleian and other MSS. of the "Herbarium." The latter part of the "Herbarium" contains a number of passages drawn from a Latin version of Dioscorides.

Apuleius, who is reported to have flourished under the Antonines, gives in his "De Herbis, sive de Nominibus ac Virtutibus Herbarum" the names of medicinal herbs in the Greek, Latin, Egyptian, Punic, Celtic and Dacian tongues. After each name follows a short description of the plant, its place of growth, and its properties, together with the diseases to which the plant is applicable.

The Saxon MSS. follow the general plan of "De Herbis," while giving only the Saxon and Latin names, many of which, however, are inaccurate. For example, the "*Centaurea major*, *i.e.*, churnel the greater," of the Herbarium is properly *Chlora perfoliata*, while "*Centaurea minor*, *i.e.*, churnel the less," is *Erythrea centaurium*. Of "Betony the wort," the first plant treated of, we are told that "It is produced in meadows and on clean downlands, and in shady places. It is good whether for the man's soul or for his body. It shields him against monstrous nocturnal visitors and against frightful visions." The roots of this wort were gathered in August and powdered for medicinal use. It was then deemed a remedy for sores, dim and bleared eyes, tooth-ache, indigestion, nausea, snake-bites, and for "foot addle," or gout. A decoction of the powdered root seems to have been drunk in most cases, but poultices of betony are recommended for sore throat and gout.

Other remedies for gout, which seems to have been a troublesome disease among the mead-drinking Saxons, were way-bread, tomentilla, powdered verbascum, groundsel, or pellitory pounded with lard and laid to the foot; also of course the mandrake, *Atropa mandragora*, "the insane root that takes the reason prisoner." The directions for gathering the mandrake are taken from Dioscorides: "It shineth at night altogether like a lamp; when first thou seest its head, then inscribe thou it instantly with iron lest it fly from thee; its virtue is so mickle and so famous that it will immediately fly from an unclean man when he cometh to it, hence as we before said do thou inscribe it with iron, and so shalt thou delve about as that thou touch it not with the iron, but thou shalt earnestly with an iron staff delve the earth. And when thou seest its hands and its feet" (alluding to the curious tendency of the mandrake to assume a similarity to the human figure by giving off two lateral branches above and ending in two limbs below) "then tie thou it up. Then take the other end and tie it to a dog's neck, so that the hound be hungry; next cast meat before him, so that he may not reach it except he jerk up the wort with him. Of this wort it is said that it hath so mickle might that what thing soever tuggeth it up, that it shall soon in the same manner be deceived. Therefore as soon as thou see that it be jerked up and have possession of it, take it immediately in hand, and twist it and wring the ooze out of its leaves into a glass ampulla, or pitcher."

These directions for plucking the mandrake are as old as Josephus, who says in his "Wars of the Jews," "They dig a trench quite round about it, till the hidden part of the root be very small; they then tie a dog to it, and when the dog tries hard to follow him that tied him, this root is easily plucked up, but dog dies immediately, as if it were instead of the man that would take the plant away; nor after this need anyone be afraid of taking it into their hands." He goes on to say, "Yet after all this pains in getting, it is only valuable on account of one virtue it hath, that if it be only brought to sick persons, it quickly driveth away those called Demons, which are no other than the spirits of the wicked, that enter into men that are alive, and kill them unless they can obtain some help against them." The Saxon leech held the mandrake to be a specific for "devil sickness" and the evil eye, as well as the periwinkle (*Vinca*) and *Artemisia vulgaris*; but he was alive to its emetic, purgative, and narcotic properties.

The Saxon remedies for insanity are many and curious. The lunatic was given a decoction of *Teucrium polion* mixed with vinegar, or *Ranunculus acris* was tied with a red thread about his neck when the moon was on the wane in April or the early part of October. A more sovereign remedy was the pæony. If laid over the lunatic as he lies, we are told "Soon he upheaveth himself whole, and if he hath this wort with him, the disease never again approaches him." The Leech book contains another mode of cure, certainly sufficiently drastic. "In case a man be lunatic, take the skin of a porpoise, work it into a whip, swinge the man therewith, and soon he will be well. Amen."

Of *Ranunculus sceleratus* the Herbarium tells us gravely "Whatsoever man fasting eats this wort, leaves his life laughing." The leech made poultices of it to purify wounds and running sores, and drive away swellings and warts. *Ruta montana*, "herb of grace," was used by him for gastric troubles, as also were pennyroyal and rosemary. For the stone, he administered infusions of *Saxifraga granulata* or *Glechoma hederacea*. Heliotrope and woad he thought good for snake bite, though he gave way-bread for a mad dog's bite. Ivy, he held, cured the dropsy. For the dread disease of leprosy, it was his custom to take *Euphorbia lathyris* and smear the leper with the heads of this wort, sodden in tar. For sea sickness, he gravely advised the vigorous smearing of the person with a decoction of pennyroyal and wormwood, pounded with oil and vinegar. It is interesting to note that the lily was already naturalized in England, and its pounded leaves used to reduce swellings.

The Leech book, edited by Mr. Cockayne, is an earlier production than the Saxon version of Apuleius, dating as it does from the latter half of the tenth century. The author seems to have been acquainted with the writings of some of the Greek doctors, but for the most part, while adopting diagnosis and theory from the Greek medical writers, he doctors as a herborist, nor does he neg-

lect the question of diet. The sick man is to take "light meats, and juicy broths, and beaten eggs, and bread broken in hot water, and periwinkles removed from the shell."

In a very interesting passage, we are told that King Alfred sent to Helias, the patriarch of Jerusalem, for new remedies. He recommended to the king various drugs sold in the Syrian drug shops or apothikae—scammony, gutta ammoniaca, a sort of liquid volatile salts, gum dragon, aloes, galbanum, balsam, petroleum, the famous Greek preparation θηριαχή, and alabaster renowned for its magic virtues.

A jejeune and ridiculous compilation is the translation of the Medicina de Quadrupedibus of Sextus Plautus, from which it would appear that the Saxon leech had faith in the medicinal virtues of neat, fox, hart, hare, he-goat, ram, boar, wolf, hound, lion, bull, and elephant. The raw beef steak, the schoolboy's remedy for a black eye, is anticipated by the recipe "To remove ugly marks from the face, smear with bull's blood, it taketh away all the marks." But for the most part, the recipes are as useless as the one enjoining the binding of a new goat's cheese round the head for the cure of headache.

The Saxon leech trusted much in charms, of which a variety are given by Mr. Cockayne. But in this matter he was anticipated by Dioscorides. Following him, he says of *Ricinus communis*, "If thou hangest some seed of it in thyne house, or have it, or its seed, in any place whatsoever, it driveth away the tempestuousness of hail, and if thou hangest its seed on a ship, to that degree wonderful it is, that it smootheth every tempest. This herb thou shalt take, thus speaking, 'Wort Ricinus, I pray that thou be at my incantations and that thou turn away hail and lightning and all tempests, through the name of Almighty God, who hight thee to be produced.'"

The popularity of Apuleius lasted through the Middle Ages, and the Materia Medica of Dioscorides has given rise to a crowd of commentators. But of the seven hundred plants which Dioscorides describes a large number cannot be identified, for his descriptions are chiefly confined to colour, size, mode of growth, and comparison of the leaf and root with those of other plants well known and therefore left undescribed. The Saxon translator has slavishly copied from his originals, instead of studying Saxon plants in the field, but both the Herbarium and the Leech book show that the Saxon leech was at bottom a herbalist and his craft "wort cunning."

ON PERIQUE TOBACCO.

BY A. L. METZ.

An industry peculiar to our section of the state is the growing and preparation of a tobacco known as "Perique tobacco."

It is well known that tobacco requires an unusual amount of care and attention; in fact, the cultivation of tobacco is of supreme importance, as much of the aroma and fineness depend upon it. Yet, the cultivation of Perique tobacco is essentially peculiar to our own locality, and attempts made to cultivate and prepare Perique tobacco in other places have met with failure.

A very remarkable fact is, that tobacco from any seed, grown in the section of country extending from the mouth of the Mississippi River to Natchitoches, and subjected to the primitive manner (which will be explained hereafter) by our so-called Arcadian population, produces the tobacco known as "Perique." The parish of St. James of the State of Louisiana produces all the Perique tobacco needed for consumption, and a much larger quantity of this tobacco could be raised, but there is not sufficient demand, as it is considered too strong by the general smokers.

The manner in which this tobacco is collected does not differ much from the collection of other tobacco, except that the leaves are dried in the shade, and, as soon as dry, are stripped at their midrib, in the usual manner. Great care is exercised to prevent sweating or fermentation at this stage of the process. In the manufacture of ordinary tobacco fermentation is induced to take place immediately after the drying is completed, and thus it is shipped upon the market, for the use of cigar makers and tobacconists.

In the case of Perique tobacco, the stripping of the midrib from the leaf causes the leaf to fall into two lateral halves which are placed on top of each other in such a manner that the blade of one-half of the leaf alternates with the apex of the other. These are then twisted into what are called "torquets." These torquets are folded upon themselves, side by side, and are placed in strong boxes, which are about twelve inches square, and subjected to pressure. After twenty-four hours these torquets are taken out, and repacked in the same manner as before, every twenty-four hours for the period of a week, the idea being evidently to subject the torquets to a uniform pressure throughout. After this period has elapsed these torquets are repacked every three days for about two weeks. During all this time the tobacco is subjected to a constant, steady pressure with a press of the most primitive kind.

I should not forget to state that after the tobacco has been placed in the press one week, a black juice flows out of the box which has a pleasant odour, not unlike freshly cooked prunes. Square pieces of cottonade, 18 × 18 inches are laid out, and on this the torquets are opened, or, to use the term of the English-speaking Arcadians, the torquets are unravelled, great care being necessary to separate each leaf. The largest leaves are laid upon the cottonade first, so that when rolled the largest leaves will serve as a covering of the carrotte presently to be described; the smaller leaves are placed longitudinally upon the larger ones, until 3½ to 4 lbs. are placed upon the piece of cottonade, the ends of which are turned inwardly. The cottonade and contents are now rolled into carrottes, the ends of the cottonade are pulled out and a string tied to each end to prevent the carrotte from opening, and the whole wrapped in a clothes-line, usually made of cotton. The wrapping is performed in the primitive manner that characterizes the operation throughout. Use is made of a windlass and a rope; the end of the rope is made fast to the carrotte, passed round a post (driven into the ground), a twist is now made round the carrotte, and with each turn of the carrotte the pressure is increased. This is continued until the whole of the carrotte is enveloped; the end is made fast by passing it through several turns of the rope. This finishes the carrotte, but, before it is placed upon the market, it is allowed to age, which is usually from six months to a year. During this time the tobacco is allowed to undergo a slow fermentation which gives the aroma and taste that distinguishes this tobacco from all others. The amount of Perique grown and manufactured has averaged during the five years preceding 1890, 19,000 carrottes of 4 lbs per annum. Messrs. S. Hernsheim Bros. and Co., of this city, wholesale tobacconists, have expressed the doubt that any modern method would produce tobacco with as fine flavour as that produced by the old and primitive manner just described.—*Pharmaceutical Era.*

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, SEPTEMBER 12, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE SOMERSET HOUSE LABORATORY.

PUBLIC chemical laboratories of one kind or another are now so plentiful throughout the country that many will be hardly able to realise the fact that not so very long since there was no such thing in existence even in London. The Pharmaceutical Society took the lead in altering that state of things by establishing a chemical laboratory for the more especial purpose of instructing pharmaceutical students in practical chemistry. The example was followed shortly afterwards at University College by the foundation of the Birkbeck laboratory, which was intended for more general instruction in chemistry. Among the early students at that institution were a number of excise officers, who went there in order to be trained for the performance of certain chemical operations connected with the exercise of their duties. And although the work done by them in this direction was of such a mechanical nature as to excite the rather contemptuous appreciation of dandy chemists, it was of such a useful nature and of so much practical value that the excise chemists have now advanced to a very much better position for commanding respect. A special laboratory has long since been established at Somerset House for carrying out the analytical work required by the Excise Department, and the extent to which the status of the Excise chemists has since then been advanced may be judged of by the fact that the chief of their body has occupied the position of PRESIDENT of the Institute of Chemistry. But it is not only in connection with the Excise Department that the services of the Excise chemists have been engaged and that there has been a very considerable development of the chemical laboratory of the Inland Revenue Office. Other Governmental departments recognizing the utility of chemical analysis for the conduct of their business have had recourse to the laboratory at Somerset House for such assistance as they required in that way. It has also become a sort of Court of Appeal for the final decision of questions raised in cases of prosecution under the Food and Drugs Act, and if we may judge from a statement in the recently published report of the PRINCIPAL of the Laboratory, it is also becoming an educational establishment, since it appears that six students who have received a course of instruction in theoretical and practical chemistry have been examined by Dr. THORPE with a satisfactory result.

From what has already been said it is evident that some account of the work done at the Somerset House laboratory cannot fail to be of interest. Some idea of the extent of that work may be formed from the fact stated in the report, that the total number of samples analysed during the past year ending the 31st of March last, has been greater than in any former year, and amounted to no less than 48,426 or 1246 more than in the previous year. The greater part of this increase has been due to the requirements of the excise in the examination of samples of beer taken from publicans with a view to the protection of the beer duty. Some portion of the increase has been caused by a matter more closely related to pharmaceutical work; viz., the growth of the export trade in medicinal tinctures, consequent upon the the introduction of new regulations relating to that trade. In addition to this work an extensive and elaborate investigation has been carried out at the request of a Committee of the House of Commons for the purpose of ascertaining the nature of the changes which take place in various kinds of potable spirit when stored in casks. Further, the authorities of the Trinity House have obtained permission from the Board of Inland Revenue to have recourse to the laboratory for having various articles analysed in order to ensure that the supplies delivered to them are of proper quality. The number of instances in which the laboratory has been called into requisition to decide questions connected with the administration of the Food and Drugs Act has amounted to sixty-eight in the past year, a number considerably above the average of former years and more than double that of the previous year. As usual the articles so examined have consisted of milk, buttermilk, butter, lard, vinegar, coffee, and carbolic acid. A large proportion of these samples were milk, and it is satisfactory to find that in the large majority of instances the results obtained supported the conclusions which had been arrived at by the public analysts. This appears to show that public analysts' work is generally being conducted in a better manner. But in the case of butter greater discrepancies occurred, and in one instance, where the sample in question was alleged by the public analyst to be pure margarine, while the analyst employed for the defence asserted it to be pure butter, the results obtained in the Somerset House laboratory led to the conclusion that the sample really contained an admixture of fifteen per cent. of

foreign fat. The samples of lard examined did not furnish results indicating the admixture of oil or other foreign fatty material. Of three samples of vinegar, two were found to be diluted with water, and the third was ordinary commercial vinegar of low quality. In most of the other instances of reference the results obtained accorded with those of the public analysts. Therefore the trading community as well as the general public have reason to be satisfied that with the control provided by the reference of disputed cases to the Somerset House chemists, the working of the Food and Drugs Act is being carried on in a manner consistent with the interests of all parties.

Among the governmental departments which have had recourse to the Somerset House laboratory for assistance in analytical work, the India Office stands first, no less than six hundred and nine samples having been examined. Some of these were beer for the use of troops in India, but the larger portion were of a miscellaneous nature, comprising dyed woollen goods, soap, pickles, leather, and various kinds of oil and paint. Out of these nearly 22 per cent. were not genuine or inferior to the pattern sample, clearly showing the practical utility of chemical analysis in all cases of contract supply, and that there cannot safely be any relaxation of the scrutiny exercised in such cases. The Board of Trade has also availed itself largely of the services of the Somerset House laboratory, the number of samples analyzed for this department having been 552. These consisted mostly of lime or lemon juice and spirits, and in a few instances the articles were found to be unfit for use. The Admiralty is another department which has had analyses made to the number of 235 during the year, comprising dyed woollen goods, tinned essence of beef, gold lace, and electro plate, butter, vinegar, enamelled goods, lime juice, and various articles of food, etc. More than half of the samples of woollen goods were found defective, some of the essence of beef was unfit for use, and nine out of fifteen samples of enamelled ware were found to contain deleterious metal. In connection with the Customs and Inland Revenue departments the Somerset House analysts have attended 192 cases of prosecution for violation of the revenue laws. In most of these cases convictions were obtained with penalties amounting in the aggregate to £2,068. Tobacco has received considerable attention in this direction, upward of 15,000 samples having been examined in regard to adulteration and excess of moisture. In connection with the brewing industry, upwards of 10,000 samples have been analysed to assist the surveying officers to control the operations at breweries and to protect the revenue as well as to prevent adulteration. Altogether this record of the year's work furnishes ample proof that the laboratory at Somerset House is a very useful public institution, and that although its isolated development appears likely to place it in a somewhat anomalous position there can be no question as to the really serviceable work that has been done there hitherto.

We desire to call especial attention to the suggestion made by Mr. Kirkby in the concluding paragraph of his letter in this week's Journal in reference to the introduction of subjects of more general interest into the proceedings of the British Pharmaceutical Conference. Unfortunately it is too true that many are quite indifferent to the work of that body, but it may be hoped that if subjects of a different kind were brought forward for discussion that the prevailing indifference would be done away with. The limitation of the Conference subjects to those of a scientific nature showed a laudable aspiration on the part of the founders of that body, and it was no doubt a wise measure under the conditions which then prevailed. But while the ideal thus set up has not been very thoroughly attained, there is good reason for believing that the discussion of subjects of such as that dealt with by Mr. Maben last week, and even others of a more decidedly political nature would present a much greater attraction for the average chemist and druggist. Possibly the projected annual meetings of the Pharmaceutical Society in provincial towns may, if carried out, afford opportunity for a modification of the rules by which the Conference proceedings have been governed hitherto and prove the means of doing good to both bodies as well as to the community they severally represent.

* * *

Both at Glasgow and Leeds further prosecutions have been instituted for the sale of tinned peas containing copper as a colouring agent. In the Glasgow case the evidence was very conflicting, some authorities declaring that copper is a cumulative poison, and that its presence even in small proportion in peas is highly deleterious, whilst others took a different view, urging that the copper being in an insoluble condition is innocuous, and that they had never known any case in which peas coloured with copper had proved poisonous or hurtful. As a result the hearing of the case was adjourned. In the two cases at Leeds the evidence supported the view that the presence of copper is injurious, and the magistrates inflicted a penalty of twenty shillings and costs in both cases.

* * *

The Cutlers' Company, of Hallamshire, which is one of the old guilds that are still alive and doing useful work, has just held at Sheffield its annual feast, which has come to be designated the "Banquet of the North," and it was attended, as is usually the case, by a number of distinguished celebrities. Among the guests on this occasion we notice that the Pharmaceutical Society was represented by Mr. Newsholme.

* * *

From the Report of the Commissioners of Her Majesty's Inland Revenue for the year ending 1st of March last it appears that the amount received for "patent" medicine stamps amounted to £225,701, showing an increase upon the amount received in the previous year of £8,437. The number of licences issued for the sale of these articles in the United Kingdom was 27,295, of which 25,257 were for England and 2,038 for Scotland. The amount of revenue derived from these licences was £6,824. The total revenue accruing from the trade in "patent" medicines was therefore £232,525.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

On Wednesday, the 2nd inst., the monthly meeting of the Council of this Society was held in the board-room of their newly acquired house, No. 67, Lower Mount Street, Dublin, at 3 o'clock.

The Vice-President, Mr. F. W. Wells, junior, occupied the chair. Other members of the Council present were, Messrs. Charles Evans, W. J. McNeight, W. J. Rankin, Samuel Gibson, P. J. Lyons, P. Merrin, Johnston Montgomery, Alex. E. Doran, G. H. Grindley, G. D. Beggs, Chas. Johnston, W. N. Moore, R. Simpson, Dr. Burnes and Professor Tichborne.

A letter was read from Messrs. Casey and Clay, solicitors of the Council, reporting the result of prosecutions recently instituted in Dublin.

The Vice-President said: Before we take this and some other letters connected with the matter into consideration, I should like to make a short statement. Most of you are aware that some years ago the Council of the Society took the opinion of counsel as to whether it was legal for partners, one of whom was qualified, and the other not, to carry on together the business of a chemist. They were informed that it was not legal, the Act distinctly stating that every partner must be qualified. Some licentiates of the Society who were then in partnership with others who were not qualified then adopted the system of opening a shop within a shop. The Law Committee have been always of opinion that this was not legal. But this system having since grown so much, your Law Committee thought the thing should be tested by taking the opinion of a magistrate, for the opinions of counsel are often worth very little. Accordingly several cases having been reported to us, we took out summonses against three defendants. We had three distinct charges against each, viz., first that he kept open shop for selling prescriptions without being lawfully authorized to do so, secondly that he compounded medical prescriptions, and thirdly that he sold them. The first case was that against Mr. Anderson, which was proceeded with in the Southern Divisional Police Court, before Mr. Byrne. Mr. Clay, I should state, made a very able case for us. In fact, I do not think the Attorney-General could have made a clearer one. The defence which was made was that Mr. Holmes, a qualified man, owned the compounding department, and Mr. Holmes produced a stamped agreement between him and Mr. Anderson, under which he (Mr. Holmes) rented the back portion of the shop with a right to the use of the front, and the right to put up a sign-board outside the door. Mr. Holmes was cross-examined, and maintained that this agreement was genuine, but unfortunately for them it was dated April 15, and Mr. Ferrall, our Registrar, discovered that the stamp on the document was dated the 1st of last month. The attention of the magistrate was drawn to this, and after having gone very fully into the case, he grasped the situation, and gave a decision in favour of the Council, holding that it was unlawful for an unqualified man to carry on business even with the aid of a qualified man in the shop, the unqualified owner being, according to law, the person "keeping open shop." We then prosecuted a Mr. Farlow in the Northern Divisional Court, and his case was stronger than the other, because he had an agreement dated two years ago with the same Mr. Holmes. The magistrate, after hearing the case, suggested to Mr. Clay that we should proceed only upon the charge of keeping open shop for the sale of prescriptions, and withdraw the other two. He said if we did that it would shorten the case, because there was no doubt that the defendant did keep open shop. We acquiesced in the suggestion, although we had ample proof that he did compound prescriptions and actually himself sell them. Another of our cases was against Mr. Little, of Donnybrook, an unqualified owner who was not even a registered druggist, and who kept open shop for the sale of prescriptions, and in that case the defendant pleaded guilty Mr. Clay was anxious to have the question tried as to whether an unqualified assistant in the employment of an unqualified man could not also be made amenable, and accordingly a Mr. Price, assistant to Mr. Little, of Donnybrook, was summoned for illegally compounding prescriptions, but he pleaded guilty. I make this statement because I think it necessary that every registered druggist and everybody else throughout the country should understand the state of the law. I see Mr. McNeight here, and wish to ask him a question. A statement has been made that Mr. McNeight had a hand in sending out a circular to registered druggists throughout the country stating that it was perfectly legal for a registered druggist to employ a qualified pharmacist and so carry on the compounding business. I may add that we had a complaint of this having been done, and the defence was that the party had been informed that he was perfectly within his rights, and that he intended to snap his fingers at us. If no such circular has been sent out I would ask Mr. McNeight to do everything he can to inform gentlemen throughout the country as to what the real state of the law is, for now that the Council have started this matter they will have to follow it up.

Mr. McNeight: Have you seen the circular?

The Vice-President: No.

Mr. McNeight: Well, I should like to see it, for I have not seen it. I never heard of it before.

The Vice-President: It has been published that you were connected with it.

Mr. McNeight: Well, let the person that published that produce the circular. It is the first I heard of it.

The Vice-President: I heard that you stated to a friend of mine that such was the law.

Mr. McNeight: No, but I will tell you what occurred. I was under the impression that a registered druggist could manage a business for a person who was not a registered druggist, and that the clause you speak of only referred to pharmaceutical men. But the next day I looked at the clause and found that what your father stated about it was correct, and then I sent back and told him so.

The Vice-President: He said you told him that it was lawful for a drugggist to employ a pharmaceutical chemist to carry on pharmaceutical business.

Mr. McNeight: No, it was nothing about compounding at all. The whole conversation with your father was with reference to registered druggists.

The Vice-President: A statement was made to our Registrar that a party had in his possession a circular from you.

Mr. McNeight: Well, I should like to see the circular. I think the Registrar should give the name of the party who made the statement to him.

The Vice-President: I do not think that would be fair.

Mr. McNeight: Oh I do not think it would; I think the imputation is a very severe one.

The Vice-President said he only wanted to have the law clearly understood. If they were to have union between the two grades, it could only be accomplished by the registered druggists abstaining from what was certainly the lawful business of the pharmaceutical chemists.

Mr. McNeight: That is quite right. I have nothing to say against it.

The Vice-President: We have a letter from a gentleman in the country, saying that he intended to continue doing this thing, but he only read the marginal note of section 17 and did not look at the words with

which the section begins, "any person or persons lawfully keeping open shop."

Mr. McNeight said the statement which had been made about his having been connected with the issue of a circular was a very serious one, and he requested the Vice-President to let him have the name of the author of it.

The Vice-President: Well, I will not at present, but I am only too happy to hear your contradiction of it. My object in mentioning the matter was to give you the opportunity of contradiction.

Mr. Rankin: Mr. McNeight denies the statement *in toto*, and that should end the matter for the present.

Mr. McNeight said that if the names of any persons to whom it could be shown that he had made either verbally or in writing an erroneous statement of the law were given to him, he would be most happy to contradict the statement made to them. It was quite possible that at the time the Amendment Act passed he might have made some inaccurate statement, but he had no recollection of either speaking or writing to any one beyond what he had stated now.

Mr. Moore said he thought the name of the informant as to the alleged circular was the property of the Council and ought to be given.

The Vice-President said that as a member of the Law Committee he could not give it. According to the regulations the Law Committee had power to deal with these matters quite independently of the other members of the Council. They could take proceedings and report afterwards to the Council.

The Council then went into Committee for the purpose of considering some letters connected with the prosecutions. Letters were read from Mr. J. L. McAlister, L.P.S.I., of Belfast, and Mr. J. T. Holmes, L.P.S.I., of Dublin, notifying change of address.

A report of the Declarations Committee, relating to applications for registration under the Amendment Act, and setting forth the evidence given by each applicant, was read and discussed.

In the course of discussion the Vice-President remarked that in a great many cases applicants had been registered on their poisons book, but in some cases poisons books which were obviously manufactured had been sent to the Committee.

The report stated that the committee had accepted the following for registration under schedule A of the Amendment Act:—Messrs. Edward Shera, Boyle; William Moss, 11, Camberwell Terrace, Belfast; R. S. Pellissier, Clonmel; James Mulligan, Castlepollard; John Webb, Temple Lane, Dublin; Robert J. Downes, Dublin; J. O'Neil Donnellan, Ballinrobe; Michael Rynne, Ennis; and Miss Jane Moore, Killucan.

The Vice-President called attention to a recommendation in the report that although there were only nine candidates for examination as druggists in Belfast, an examination should nevertheless be held in that city, notwithstanding the rule requiring that there should be twelve candidates. The committee desired to save the gentlemen the trouble and expense of coming to Dublin; at the same time they wished it to be understood that they would not make such a recommendation where there were only a few candidates.

The report was adopted.

Mr. Beggs moved that Surgeon John Evans be re-elected examiner in practical pharmacy.

Mr. Doran seconded the motion.

The Vice-President, in putting it, said Surgeon Evans was a practical man and had given them satisfaction, and there was no reason why he should not be re-elected.

The motion was unanimously agreed to.

On the motion of the Vice-President, seconded by Mr. Lyons, the following were elected members of the Society:—George W. Camlin, 87, Donegall Pass, Belast; John Gorman, Bangor Co. Down; James McAlister, 5, Clarendon Place, Belfast; Thomas N. Moffitt, 117, Crumlin Road, Belfast; John Thompson, 100, Peter Hill, Belfast.

On the motion of Mr. Robinson, seconded by the Vice-President, the following were elected Associate-druggists:—Richard Ellis, Maryville, Military Road, Limerick; Humphrey Smith, J.P., Mountmellick.

On the motion of Mr. Boyd, seconded by Mr. Robinson, the following were elected Associate-druggists: Samuel E. A. Acheson, 42, Cromac Street, Belfast; Josiah P. Middleton, 12, Grafton Street, Dublin.

Proposed by Mr. Merrin, seconded by Mr. Boyd:—Joseph Annesley, Arklow; Arthur Burns, Mohill; Mrs. Mary A. Bryne, Ballinakill; Mrs. E. M. Cunningham, Ballymore; J. F. Donaghy, 47, Lower Gardiner Street, Dublin; Dennis Donohoe, Naas; Robert Dormer, Newtownbarry; Henry Farrell, Naas; Thomas E. Gordon, Gorey; J. R. Gorman, Ballymote; F. C. Judge, Mitchelstown; John Lavin, Elphin; Thomas Maxwell, 3, Alexandra Terrace, Bray; George Meares, Moyvore; Gerald O'Toole, Tullow; J. M. Ross, Carlow; E. P. Ryan, Thurles; John Smyth, Trim and Patrick Toole, Westport.

On the motion of Mr. Grindley, seconded by Mr. Beggs, Mr. Johnston Montgomery and Mr. Samuel Gibson were appointed Visitors to attend the Examination of Druggists, to be held in Belfast on Tuesday, 8th inst.

On the motion of Mr. Grindley, seconded by Mr. Charles Evans, Mr. S. P. Boyd and Mr. P. Merrin were appointed Visitors to attend the Examination of Druggists to be held in Dublin on the 3rd inst.

Mr. Gibson said he had been asked by people in Belfast when they would get their certificates.

The Vice-President: There has been so much work to be done that the preparation of them has been delayed, but, if possible, they will be issued this month.

Mr. W. J. McNeight proposed, and Mr. W. F. Moore seconded, a motion that the following be nominated for election as Associated Druggists:—Messrs. William Doyle, Athlone; J. J. McTighe, Roscrea; William Walsh, Oldcastle; J. Keily, Frankford; James Pelan, Gorey; Thomas Fagan, Athboy; George Plunket, Trim; Daniel Brogan, Castlepollard; Miss M. A. Egan, Kilcullen; Samuel Baker, Cork; and Patrick Egan, Tullamore.

On the motion of Mr. Gibson, seconded by Mr. Rankin, Mr. William Jameson, Townhall Street, Belfast, was nominated an Associate-druggist.

The Vice-President: These gentlemen cannot be elected in time for the October meeting of the Society.

Mr. McNeight: Not unless you call a special meeting for their election.

The Vice-President: The point has never been raised before as to whether we can elect on less than a month's notice.

Mr. Grindley: We have hitherto acted on the principle of having candidates for membership of the Society nominated at one meeting and elected at the next monthly meeting.

The Vice-President: Of course, if Mr. McNeight presses for a special meeting it will be my duty to call it. I should, however, like the Council to say whether it would be a right thing to do or not. My own reading of the rule is that I can do it, although I do not think it was contemplated.

Professor Tichborne: Special meetings are only intended to be called for the despatch of special business but not for the election of members. Besides, a requisition signed by seven members should be sent to the President.

The Vice-President: No, it is quite sufficient for a member to ask the President to call a special meeting, and the President may do so if he pleases. I will take on myself to call the special meeting, if Mr. McNeight desires it.

Mr. McNeight: I do.

Mr. McNeight suggested that the voting papers to be sent out for the election of the new Council at the October annual meeting should contain the addresses as well as the names of the candidates. At the last election—which was the only one he had as yet any experience of—the addresses were omitted, and the result was that people did not know whether or not they were voting for men who could attend the Council meetings.

The Vice-President said the rule only required that the names of the candidates should be given.

The Vice-President moved and Mr. Grindley seconded that the following be nominated for election as members: Messrs. W. H. Griffin, R. J. Rousselle, W. R. S. Gilbert, Geo. Gilmore, J. F. Meyler, A. Watterson, Geo. M. Ryan, John Joze, J. T. McAdam, Richard Howard, William Bleakely, George Strong, J. A. Woodside, J. Black, R. J. Downes, J. Costello, W. H. Bowers, John P. Timmon, John J. Curtin, W. K. Bourke, W. R. Beck, J. Thompson, W. S. Duggan, W. Macartney, E. W. Allison, R. A. Jones, D. P. Brosnan, M. S. Lalor, R. J. Herron, E. S. Leybourne, William Dowling, E. J. O'Callaghan, W. P. Ryan, J. Burnett and W. D. Porter.

On the motion of Mr. P. J. Lyons, seconded by Mr. Johnston Montgomery, Mr. R. W. McKnight, 43, Donegall Place, Belfast, was nominated for membership of the Society.

Some financial business having been disposed of, the Council adjourned.

LICENCE EXAMINATION.

At the Quarterly Registered Druggist Licence Examination, held at Dublin on the 3rd inst., the following passed:—

Canaway, R.....Headford.
Collopy, E. H. .....Limerick.
Curry, J. .....Borris.
Cussen, P. D. .....Limerick.
Fleming, J. .....Kingstown.
Leary, J. .....Ballinagh.
Morris, T.....Crossmaglen.
Murphy, A. and J. J. .....Cork.
Shirley, J.....Dublin.
Taylor, R. L.....Tinahely.
White, J. J. .....Dublin.

Five were rejected.

At a Registered Druggist Licence Examination, held at Belfast on the 8th inst., the following passed:—

Baxter, Wm. .....Belfast.
Hunter, H. B. .....Belfast.
Lindsay, F. .....Belfast.
MacNaughton, A. .....Belfast.
Minnis, F. W. .....Saintfield.
Montgomery, G. .....Belfast.
Moss, W. R. .....Belfast.
Quirey, W. D. .....Belfast.
Sandford, J.....Portadown.
Storey, W. J. .....Belfast.

Two were rejected.

British Pharmaceutical Conference.

MEETING AT CARDIFF.

FIRST DAY'S PROCEEDINGS.

Tuesday, August 18.

(*Continued from page* 196.)

The next paper was—

A Short Description of the Present and Future Water Supply of Cardiff.

BY THOMAS HUGHES, F.I.C., F.C.S.

As will be seen from the present census the population of Cardiff has increased very much of late, and several years ago the Corporation, foreseeing this, determined to increase the supply of water, and concluded to expend no less than £373,000 in order to get a large and pure supply from the Upper Taff Valley.

Before referring to the Taff Fawr works and the quality of the water, I will deal shortly with the present sources of supply, as these can always be used to supplement the Taff Fawr in the future should that supply prove temporarily inadequate.

There are two sources whence the present public supply is taken, viz., the Ely Pumping Station and the gathering grounds of Lisvane and Llanishen.

The water from the Ely Pumping Station is obtained from headings or culverts driven into the magnesium limestone by the side of the river for collecting the water. Although, no doubt, some river water percolates through the gravel and sand of the bed of the river into these headings, yet the bulk is obtained from the strata itself, the water pumped being much harder than that of the river.

The total solid matter in solution in the river water is from 18 to 20 parts per 100,000 and the total hardness is about 12 parts, whereas that from the strata has about thirty-two parts of solid matter and a total hardness of from 28 to 30 parts.

The total amount of water obtained from this source is about one million gallons per day, part being pumped into the Cogan and thence in the Llandough reservoir, and from these tanks the outlying districts of Cogan and Penarth are supplied by gravitation, the remainder being usually pumped directly into the mains for the use of parts of the Canton district—the Penhill reservoir, near Llandaff, being now but little used for distribution. There is a good deal of cultivated land about the gathering ground, and the strata being somewhat broken or fissured permits the surface polluted water to travel considerable distances, and it will be noted from the undermentioned analyses that the water obtained from this station contains distinct traces of nitrates.

This source cannot be considered all that is desirable for a public supply for, apart from the somewhat suspicious character of the gathering ground, it contains an excess of magnesia and other hardening salts, and is unsuited for such domestic purposes as washing.

Analyses of Water from Ely Pumping Station in Parts per 100,000.

	Total solid matter.	Albuminoid ammonia	Free ammonia.	Nitrogen as nitrates.	Previous sewage or animal contamination.	Chlorine as chlorides.	Sulphuric acid as sulphate.	Magnesium salts	Hardness.			Date.
									Temporary.	Permanent.	Total.	
A.	32·25	0·004	nil.	0·14	trace	1·95	3·19	excessive	15·6	14·5	30·1	1890
B.	30·8	0·012	0·002	0·12	,,	1·85	3·20	,,	15·0	14·3	29·3	,,
A.	30 0	0·007	0·003	0·13	,,	1·75	3·22	,,	15·2	12·3	27·5	1891

A. These samples were clear and practically colourless. B. Sample of a faint yellow colour, but clear.

The sources whence the Llanishen and Lisvane reservoirs draw their supplies are the streams Nant Mawr, Llanishen Brook, Nant Draw, Nant Felin (two branches) and Nant Dulas, which rise in the gathering ground formed by the Lisvane hills, occurring to the south of the Caerphilly range.

This gathering ground embraces an effective area of about 2200 acres, consisting of mountain, arable and pasture land, by no means highly cultivated and so tolerably free from manurial pollution. One of the brooks in the north-east of the water-shed passes through ground of a peaty character, and is usually strongly coloured with organic matter, thus conferring a somewhat peaty character on the whole supply.

These streams yield about two million gallons per day, of which the greater proportion is obtained from the Nant Mawr and Llanishen Brooks, although the former has occasionally become turbid and discoloured from marly matter in suspension obtained from the red marls covering the Old Red Sandstone, which form part of the gathering ground and through which it passes.

Owing to the large amount of water rising as springs from a band of carboniferous limestone on the north-west portion of the gathering ground, the supply is rather hard, though much less so than that of the Ely, as will be seen from the analyses.

For a town supply the chief objections to this source are the amount of organic pollution, although this is not, as a rule, excessive, and its hardness. There is also the restricted character of the gathering ground to be considered and the tendency to growth of population in this district, with its increased risk of pollution.

No doubt the present supply, the best of the water being taken, will form a valuable adjunct at need, but there can be no doubt that a further and purer supply will soon be urgently needed, and this is to be procured from the Taff Fawr Valley.

The present sources yield about 20 gallons per head of the population.

The river Taff, which passes through Cardiff, takes its rise in the Blaen Taff Fawr, between the Gryn and

Analyses of Water from the Llanishen Filter Beds in Parts per 100,000.

	Total solid matter.	Albuminoid ammonia.	Free ammonia.	Nitrogen as nitrates.	Previous sewage or animal contamination.	Chlorine as chlorides.	Sulphuric acid as sulphates.	Magnesia salt.	Hardness.			Date.
									Temporary.	Permanent.	Total.	
A	18·4	0·009	0·001	0·01	—	1·6	1·68	slight	3·8	12·6	16·4	1890
B	17·8	0·009	0·002	0·02	—	1·55	1·95	,,	3·5	12·8	16·3	,,
C	18·8	0·012	0·002	nil.	—	1·45	1·88	,,	5·0	11·9	16·9	1891

A. Very faint yellow colour and clear.
B. Ditto.
C. Yellowish colour, but clear.

Analyses of Taff Vawr Water in Parts per 100,000.

	Total solid matter.	Albuminoid ammonia.	Free ammonia.	Nitrogen as nitrates.	Total nitrogen found.	Previous sewage or animal contamination.	Magnesia salts.	Chlorine as chlorides.	Hardness.			Date.
									Temporary.	Permanent.	Total.	
Taff Fawr Hendre Isaf	6·4	0·0055	0·003	—	0·008	—	—	0·75	0·7	4·3	4·4	1881
Taff Fawr Crew Isaf	8·0	0·0035	0·0025	—	0·005	—	—	0·65	1·5	3·2	4·7	1881
Taff Fawr . . .	5·6	0·005	0·002	—	0·007	—	—	0·75	0·4	3·5	3·9	1890

All samples were clear and practically colourless.

the Beacons in Breconshire, and it is from this valley that the new water supply is to be taken. The valley is on the Old Red Sandstone, and its available rainfall is considered to be about 35 inches, as against 17 inches in the Lisvane gathering ground. The total area of the water-shed is estimated at 10,400 acres, and consists of mountain pasture land.

The portion of the scheme already in hand and approaching completion takes up a drainage area of 4000 acres. These works consist of one storage pond at Crew Isaf called the Cantreff Reservoir, having a storage capacity of 320,000,000 of gallons, with the necessary pipe line to Llanishen, three relieving tanks *en route*, and a small covered reservoir of half a million gallons capacity, with filters for the supply of Llandaff, Penarth, and other high-lying places by gravitation.

The large reservoirs already at Llanishen are to be used as distributing ponds in the new works, and into which the Taff Fawr water will be finally discharged on its way to Cardiff.

The estimated cost of this portion of the scheme is £240,000. Mr. Williams, the Borough Water Engineer, estimates that, when the Cantreff Reservoir is completed and filled and the two storage reservoirs at Llanishen and Lisvane are filled with Taff Fawr water, amounting to 700,000,000 of gallons, the district of Cardiff can be supplied by judicious management with nearly 4,000,000 gallons per day in a very dry year like 1887, after providing the statutory quantity of compensation water to be sent down the river for the upper 4000 acres of gathering ground, amounting to 2,979,000 gallons per 24 hours.

The quality of the water is excellent, being very soft and most favourably free from organic contamination. The total solid matter varies from 6 to 8 parts and other constituents are satisfactory, as may be

seen from the analyses quoted under. In its chemical constitution the water closely resembles that of the Manchester supply, but is superior to it in its physical character. It also resembles the Loch Katrine water, but is somewhat harder, which, however, in my estimation, is by no means a drawback.

The bleak and uncultivated character of this district, and its distance from any centres of population, appear sufficient to guarantee safety from future pollution, and this, taken with so much as is known of the character of the water and its almost unlimited abundance, seem to show that in going to its natural gathering ground Cardiff has obtained one of the finest in Great Britain.

In conclusion, I beg to express my thanks to Mr. J. W. Thomas, my predecessor, for the use of his notes and work on this subject, also to acknowledge my indebtedness to the report of the Borough Water Engineer and Mr. Priestley.

———

The PRESIDENT remarked that with the rapid growth of population in Cardiff it was well to look ahead in such an important matter as the public water supply, and he was glad to hear that there was a likelihood of getting from the upper reaches of the Taff a supply which would compare in purity with that of Manchester from Thirlmere. He should like to know the degree of hardness of the new supply; he understood that the present supply was from 20 to 30 degrees, whilst that from the river was only 12. He should also like to know whether the present supply ever showed any opalescence, such as was sometimes shown by waters which contained carbonate of magnesium in solution.

Mr. J. BARCLAY asked if the action of the proposed water on lead had been tested. Many moorland waters were so soft that they had a strong action on lead pipes; in Sheffield, for instance, lime had to be added to the water before it could be used safely.

Mr. R. H. DAVIES was glad to find that the municipality were going to work so liberally. He should like to know the degree of freedom from organic matter possessed by this water.

Mr. DOTT said Edinburgh was at the present moment engaged in the same task of looking out for a fresh water supply. The composition of this water seemed much the same as that of Edinburgh, and that had little or no action on lead. The present Cardiff supply of 20 gallons per head was very small.

Dr. RIDEAL said the question of the action of the new water supply on lead pipes was most important. In some towns where a soft moorland water supply had this effect, the difficulty was got over by using for the pipes an alloy of lead and tin. It was quite worth while spending a little more time and energy in working such an alloy, as the results obtained by its use were highly satisfactory.

Mr. SCHACHT asked if there were any chance of utilizing the magnificent mass of water which is being pumped daily out of the Severn Tunnel for some of the large towns on that side of the river. It was not comparable with so-called well water in respect to freedom from inorganic matter, but he understood that was remediable, and it was almost absolutely free from organic impurity of any kind whatever. At one time it was contemplated to bring it to Bristol as an addition to the present supply, but the project was defeated mainly owing to the opposition of the existing water company. One of the chief objections put forward was the large amount of saline matter it contained, but its purity in other respects was admitted. Some samples of it had passed through his hands, and he was perfectly astounded at its freedom from organic matter. Another objection was that to bring this water to Bristol would necessitate the making of another tunnel under the bed of the Severn, but this would not apply to its utilization for any of the towns on that side.

Mr. ATKINS, who had not heard the whole of the paper, but should take care to read it, said there was a most intimate connection between a pure water supply and the health of a community. In his own town (Salisbury), with a population of about 18,000, until a supply had been obtained from a deep well in the chalk, the only objection to which was that it was a little hard, the death rate had been 32 or 33 per thousand, but since then it had been reduced to 15 or 16. There had no doubt been an improvement in the general sanitary arrangements also, but the medical men attributed the enormous reduction in the death rate which immediately followed the pure water supply as being produced by it.

The PRESIDENT remarked that for a town or domestic supply the happy mean between too hard and too soft a water was the best.

Mr. HUGHES, in reply, said the question of the action of the water on lead was gone into before the Parliamentary Committee, and it might be taken that the result was satisfactory, but not having gone into that point himself he had not alluded to it. The present supply of water from the Ely pumping station was never opalescent, but was quite clear. The hardness of the proposed supply was very low, viz., between 4 and 5 parts, and of total solid matter 6 to 8 parts per 100,000. It was also very satisfactory with regard to organic matter, only 0·3 to 0·6 parts per 1,000,000. This was accounted for by its coming from mountainous ground which was entirely uncultivated. The present supply was no doubt very small; that was why it was necessary to add to it. With regard to the Severn Tunnel water, one great objection was its excessive hardness; if he remembered rightly it was impossible to reduce it below 17 parts per 100,000 even with the aid of Clark's process, which made it unsuitable for a public supply.

A vote of thanks was passed to Mr. Hughes for his paper.

———

The next paper was on—

THE ALKALOIDAL VALUE OF SOME COMMERCIAL HENBANES.

BY A. W. GERRARD.

It will be within the recollection of many members of this Conference that at our Leeds meeting I presented a communication on the "Alkaloidal Values of Annual and Biennial Henbanes," the samples examined being from plants grown in various parts of this country. At the time my paper was read I had no intention whatever of carrying my investigation of the subject any further, as it was satisfactorily shown that the leaves of the annual henbane were equal in alkaloidal value to those of the biennial plant. The following circumstance, however, altered my views, and has enabled me to present a further note on the subject. Soon after the publication of my paper in the *Pharmaceutical Journal*, I received a letter from Messrs. Evans, Lescher and Webb, stating "We are sending you 4 lbs. of henbane leaves of the kind largely used in Germany, and obtained from Leipsic, which, we believe, is the foreign annual plant; we shall be glad to know the result of your examination of the same." Subsequently, in reply to a note from me, the same firm obtained and forwarded a large sample of French henbane, with the remark, "This is collected in France, and is, we believe, what is there used for medicinal purposes."

The opportunity thus generously afforded determined me to examine these henbanes at the earliest occasion, and compare them as to alkaloidal value with ordinary English varieties. Judging from appearances and other circumstances, the foreign henbanes were at the very least two years old, and might have been more

so to make the comparison as fair and equal as possible, English samples of a not less age were obtained. It is fair to state that although no positive information as to the age of any sample was to be obtained, yet I feel confident in saying that all of them had been collected two years, and one English sample was to my own knowledge three years old; anyhow, all the samples examined may be taken as fairly representative of the henbanes of European commerce.

The following remarks may be useful as giving the general appearance of each sample. The German kind had a rough look, was composed largely of the entire annual plant, root, stem, fruit, and leaves, in various stages of development; with it was mixed about one-fourth its weight of first year's biennial leaves, in some cases with the roots attached; a few grasses and some leaves of unknown plants were intermixed. Its odour was somewhat musty and narcotic, colour dull green. The French variety had a very fair appearance, was entirely the first year's biennial plant, consisting mainly of leaves, but here and there a root was found. Its colour was pale green, and odour mildly narcotic. The English varieties examined were of the two kinds which constitute the bulk of the henbane used in British pharmacy, that is, the second year's biennial tops, and first year's biennial leaves. The first of these were the usual flatish masses of flower and small leaves, forming the helicoid cyme of the plant, collected before the fruit had formed. Its colour was pale green, odour hay like and scarcely narcotic. This is the most highly valued variety of the drug, commanding the highest price. The second kind was the first year's growth of the biennial plant, consisting of the large leaves of the scape. Its colour was dark green, and odour strongly narcotic. It is worthy of notice that this kind of henbane is sometimes sold as annual, but its large size, hairiness and long petiole enables it to be easily distinguished from the thinner, less hairy, and almost sessile leaves of the annual plant.

The process followed for the extraction of the alkaloids was exactly the same as used in previous investigations; it will be found fully described in the 'Year-Book of Pharmacy,' 1890, p. 337. Briefly it is as follows:—A proof spirit extract is made from 1 kilogram of the plant; the alkaloids are freed by ammonia and shaken out with chloroform. The chloroform residue of impure bases is dissolved in pure ether, then shaken out with hydrochloric acid. Again the bases are extracted from the hydrochlorides by ammonia and ether. Finally on evaporation of the ether the basic residue is estimated by a volumetric solution of hydrochloric acid, each c.c. of which neutralizes ·0289 gram of base, which may be either hyoscyamine or atropine; as their basic power is the same no error results. The following table gives the results of the examination in parts per 1000. It should be remarked that the henbanes were dried over a water-bath until of constant weight.

Whence obtained.	Part used.	Yield of alkaloids from 1000 parts.
Germany. . .	Entire annual herb	·295
France . . .	First year's biennial leaf	·398
England . . .	First year's biennial leaf	·390
England . . .	Second year's biennial tops	·451

A consideration of the figures shows that the German henbane is of low quality, containing roundly one-fourth less alkaloids than the French and English leaves, and one-third less than the English tops. Considering the rough character of the German sample, and the amount of stem present, the result is not contrary to expectation. Had the specimen consisted entirely of leaves it is certain it would have come out fairly level with the others.

I do not suppose, or even suggest, that this quality of henbane is the kind in common use in Germany, as the care I have seen exercised in that country by pharmacists in the selection and storage of herbs is worthy of emulation. It is, however, a fact that much of this coarse article is sold and distributed to various parts of the world, presumably for manufacture into preparations the quality of which must be very low.

One important point the above figures appear to show, is that a falling off of the alkaloidal value of the leaves takes place with age; for the specimens examined last year, all of which were freshly collected and carefully dried, gave an average yield of ·665 per 1000 as against ·383 from the old leaves now examined. Such a wide difference of yield cannot be altogether attributed to the influence of locality or conditions of growth, for two of the old samples were grown in this country, and one of them analysed three years ago ·600 of alkaloids per 1000; so this is strong evidence that changes detrimental to the quality of the drug must take place with age.

In conclusion, it is worthy of remark that a fresh, bright coloured, well preserved sample of henbane, whether of the annual or biennial kind, can certainly be relied on for yielding good preparations; whereas old or dark coloured leaves should be avoided, as they are invariably of low quality. It is further gratifying to know that the English grown drug is fully equal in quality to those of the foreign markets.

Mr. Moss said he had been for some time in the habit of examining henbane with the view of determining its alkaloidal value, and in doing so had availed himself of Mr. Gerrard's previous suggestions. He had found one difficulty in carrying out that process. When he came to shake out with ether in the second part of the process he found it almost impossible to get away the whole of the alkaloid. He had shaken it not merely three times but thirteen, and still found traces of alkaloid; no doubt the quantity was very small, but in the aggregate it must affect the result. His result with English biennial henbane was somewhat in excess of that obtained by Mr. Gerrard, which might be due to the extra number of shakings. His figures were a little in excess of ·7 per 1000, whilst Mr. Gerrard gave them as from ·6 to ·7. With regard to foreign henbane he had also obtained a specimen, which was better than the one now shown; it was green, not so stalky, and not at all musty, and he obtained from it alkaloid corresponding to about ·4 per 1000.

Dr. RIDEAL said he had no experience with regard to henbane, but it appeared to him very misleading to refer to the alkaloidal strength of plants without stating exactly the conditions of the different samples. It would be interesting to know if Mr. Gerrard had determined the alkaloidal value of the leaves, the stem and the root, with a view to ascertaining the quality of alkaloid from the amount of these different parts present in any particular sample. The result obtained from a German sample in which the root and twig were attached must, he took it, be much lower than from French and English picked samples. He would suggest that Mr. Gerrard might next year give a communication on the alkaloidal strength of the same four samples, which would furnish a conclusive test of the effect of age on strength.

Mr. RANSOM said he had experienced the same difficulty as Mr. Moss had mentioned in the extraction of the alkaloid with ether; he found chloroform more satisfactory, as it took it out more quickly and with the same degree of purity. He understood that last

year Mr. Gerrard found the first and second year's leaf practically the same, but this year that the second year's was rather superior to the first.

Mr. J. S. WARD said the remarks he might have made had been largely anticipated by previous speakers. Mr. Gerrard was pre-eminently an authority on henbane, and it was interesting to learn from him that last year he found the first and second year's leaves of the biennial plant were about equal, while this year the second year's leaves were more active, both, however, being much less active than those examined last year. It would be highly interesting if Mr. Gerrard could inform them whether he had examined a portion of the same leaves as those examined last year, but probably they were totally different samples. Seeing that they all appeared to diminish in value with age it would be well to know if they did so equally, or if one kind had better keeping properties than another. Another point was as to the two English varieties, whether the alkaloidal value bore any relation to the colour. He believed it was of great importance in drying herbs that they should be dried within certain limits of temperature, and that with plants like this, where some of the constituents were volatile, they were much better if green than when of a dark brown colour.

The PRESIDENT said he gathered that the French and English varieties were practically identical as far as the yield of alkaloid was concerned, but still that only referred to alkaloidal value by titration, which might not be absolutely the same as the yield of crystallizable alkaloid. A large quantity of henbane was brought to London from Germany, where he believed the leaves of the wild plant were gathered. This year seemed to be a luxurious one for the growth of henbane, for he had lately seen it growing in some profusion in the south of England, and had noticed a collector of simples with a large parcel, and also another of horehound.

Mr. GERRARD said his object had been to show things as they were, it not being in his power to make them as they ought to be. If he could he would have henbane always uniform in quality, so that everyone might know exactly what he was using, and have a preparation of definite strength. Mr. Moss and Mr. Ransom had put similar questions, and he might say in answer that he exhausted the extract first with chloroform; he did not start with ether. He was perfectly aware that chloroform was the best alkaloidal solvent, but it was not the best alkaloidal purifier. If the material were extracted with chloroform and the alkaloid removed from the chloroform by shaking with hydrochloric acid, and then treated a second time with ammonia and ether, the alkaloid would be obtained in a state of purity in which it could not be got if it were taken out once for all with chloroform. Chloroform should be used to begin with and ether to finish with. Perhaps one reason why Mr. Moss had not been able to remove quite the whole of his alkaloid—of course it was impossible to do so absolutely—was that ether sometimes contained traces of alcohol, and when such ether was shaken with an aqueous mixture a good deal of such ether went into solution, and so held back the alkaloid. There was always a balance between the solubility of atropine in the ether on the one hand and in the aqueous fluid on the other, and he had endeavoured to overcome that to some extent. If a solution containing a considerable amount of alkaloid were shaken up with ether three or four times there would be left behind a tolerably weak alkaloidal solution; still one would like to get out the whole of the alkaloid present, and what he did as a rule was to make the solution neutral with a weak acid, such as tartaric or citric, evaporate it to a small volume, treat it afresh with ammonia and give it a final shaking with ether; if there were anything worth taking out of the residue that process would remove it. In reply to Dr. Rideal, he must refer him to his paper of last year, in which he showed that the root had a considerably higher value than the leaf at any period of its growth. The value of the stem he had not gone into, because it was not used in pharmacy; he did not suppose there would be anything worth extracting in a woody substance such as the stem. German henbane, which contained a good deal of this cellulose matter, came out very low in quantity of alkaloid.

Dr. RIDEAL asked if the quantity of alkaloid in the sample of German henbane could not have been estimated from the proportion of stem and root in the parcel.

Mr. GERRARD said it would depend very much on the age. Given a fresh specimen, grown under fair conditions and properly dried, he thought the yield of base from that would be about ·39 per 1000 instead of ·29; the low figure was due to the admixture of foreign leaves and the large amount of stem present. With regard to the diminution in value with age, this was his first opportunity of going into that part of the subject. There had long been a suspicion that leaves and drugs which had been kept in bottles for months or years were of little or no value, and it was not unusual to throw them away. He thought there was really good ground for that practice, and when any specimen was at all suspected it was well to reject it and get a fresh one. The colour of a crude drug was some guide, though not an absolute one; but in the case of a leaf, if it had a fresh green colour they knew it must have been collected and dried carefully, and such a leaf would, as a rule, yield an active preparation.

Mr. MOSS said he was glad to have extracted from Mr. Gerrard a very important modification of his process. He had got the alkaloid out of the leaf, but not by merely shaking a few times with ether. He was also glad to find that Mr. Gerrard estimated that a good sample of foreign leaves would yield ·39 per 1000, which was very near his own experience, viz., ·4.

The PRESIDENT then moved a vote of thanks to Mr. Gerrard for this addition to a series of papers which were very valuable, and hoped he would continue his investigations, as there was still a good deal to be done.

The vote of thanks was unanimously agreed to.

The next paper read was a—

NOTE ON THE CONSTITUENTS OF HENBANE SEED.

BY F. RANSOM, F.C.S.

The presence of an alkaloid in henbane seed appears to have been first noticed by Brandes, and its isolation was effected by Geiger and Hesse in 1833. It was probably, however, first prepared in a pure state by Höhn and Reichardt in 1872. Ladenburg demonstrated the isomerism of hyoscyamine with atropine in 1880, and contributed largely to our knowledge of the composition and chemical properties of the alkaloid. He also found hyoscine, another isomeric alkaloid, to be present. Various statements have been made as to the amount of alkaloid present in the seed, which is usually considered to be the most active part of the plant, and has been suggested for use in galenical preparations. Thorey finds ·08 to ·16 per cent. in the dried seed, while the authors of the 'Pharmacographia' state that only ·05 per cent. is present. With a view to ascertain the actual alkaloidal value I have endeavoured to devise a process for estimation. Considerable difficulty has been encountered owing to the large amount of fixed oil present, which interferes with the rapid exhaustion of the seed by usual solvents. It has been suggested to remove the oil before extracting the alkaloid, but this is found to be undesirable in a process of estimation, as the alkaloid itself is to some extent soluble in the oil. It was found, however, that by

long-continued percolation with ordinary methylated spirit (64 per cent. over proof) complete exhaustion could at length be obtained. The alcohol was then evaporated from the percolate at a temperature not exceeding 78° C., and on cooling the oil separated from the residual extract. The oil was decanted and washed with water acidulated with hydrochloric acid. The extract was dissolved in warmed acidulated water, and the washings added. The solution was then rendered slightly alkaline with ammonia and exhausted by agitation with chloroform. After separation the alkaloid was removed from the chloroform solution by agitation with very dilute hydrochloric acid, the acid solution was rendered alkaline with ammonia, and the alkaloid finally extracted with chloroform. The chloroform solution, allowed to evaporate spontaneously, left a very slightly coloured crystalline residue. To determine the alkaloidal purity of this residue, weighing when dried in a dessicator ·05 gram., it was dissolved in very dilute hydrochloric acid and precipitated with a solution of iodine in iodide of potassium. The precipitate was collected on a filter, washed and dissolved in a solution of sodium hyposulphite, in which it was entirely soluble. Ammonia was added to the solution and the alkaloid extracted with chloroform, which on spontaneous evaporation left a crystalline residue weighing when dried in a dessicator ·0495 gram., and thus indicating the purity of the original residue.

For the process of estimation 150 grams. of the finely-powdered seed were treated by the method described above, and yielded a residue which when dried at 100° C. weighed ·0805 gram., or ·054 per cent. A specimen of the same seed was afterwards carefully dried, and found to contain 7 per cent. of water. A correction is therefore necessary, and the percentage of alkaloid in the dried seed may be taken as ·058. This is slightly below the total alkaloid found in the dried leaf by Gerrard, as stated in a paper read at a sitting of this Conference at Leeds last year.

The fixed oil was estimated and found to be present to the extent of 18·8 per cent. in the dried seed. It is dark olive-brown in colour and has a specific gravity of ·935. It is soluble in ether, chloroform, absolute alcohol, petroleum ether, and benzine.

The seeds experimented upon were obtained from biennial plants of *Hyoscyamus niger* grown at Hitchin.

It would appear from the above results that henbane seed is not so rich in alkaloid as has at times been supposed, and on this account, and from the large amount of fixed oil present, it would not seem desirable to recommend it for galenical preparations.

The PRESIDENT said there was only one point in which the seed had an advantage over the leaf, viz., that it kept better. As Mr. Gerrard had pointed out, the leaves of plants were apt to lose their virtues, and seeds were a little more stable. No doubt they too lost their vitality in time, though cases had been known in which, after being buried for centuries at the base of an old Roman wall, they had germinated.

Mr. GERRARD asked whether Mr. Ransom had worked upon commercial seeds or upon selected ones. He put the question because he knew that many henbane seeds did not really ripen, and had not completed their development, though when the fruit was dried and the seeds were shaken out they would appear to the ordinary observer to be ripe. No doubt the bulk of seeds in commerce consisted of such mixed seeds, and if selected seeds, all of which were known to be ripened, were employed, a higher alkaloidal value would be obtained. He should like to know if any peculiar odour was observed to belong to the fatty matter separated from the seeds. Some years ago, when working with a large quantity of leaf, he was surprised to find that in a portion which had been set aside a butyric compound was developed, which was found to be a butyric ether. It might have been formed by a very slow decomposition after the collection of the leaf, and he should like to know if any similar odour had been noticed in the fat obtained from the seeds.

Mr. DOTT asked if the fixed oil contained any alkaloid. It was always very troublesome to extract the alkaloid from the seed.

Mr. J. C. UMNEY said he had found a difficulty in extracting the alkaloid from stavesacre; in that case he found the solubility of alkaloid in the oil was as great as 1½ to 2 per cent.

The PRESIDENT asked if the alkaloid was soluble in the oil when pressed out.

Mr. UMNEY: Either pressed out or extracted with ether.

The PRESIDENT said he understood that in Germany most of the alkaloid was manufactured from seed, and no doubt the Germans adopted the cheapest source. Probably the seed was treated by some means to get rid of the oil before extracting the alkaloid.

Mr. PETER MACEWAN asked if there was not a tradition that German henbane seed was kiln dried.

The PRESIDENT thought it was more a tradition than anything else; but the reason generally assigned was to prevent the seed being used in England for growing the plant.

Mr. RANSOM said the seed he had examined was a fair example of English grown seeds; probably the greater amount of commercial seed was foreign, and that he had not dealt with. He had not noticed any odorous principle in the seeds, though he had in the leaf. The oil did dissolve the alkaloid, and therefore by extracting the oil first and not taking account of it some alkaloid was lost.

The Conference then adjourned until the next day.

Wednesday, August 19.

The first paper read on Wednesday was on—

GLACIAL PHOSPHORIC ACID.

BY JOHN HODGKIN, F.L.S., F.I.C., F.C.S.

A sample of glacial phosphoric acid was recently brought under my notice by an American correspondent, which was stated to be the quality usually imported from Europe for his market. An analysis was made, and revealed large quantities of sodium; it, therefore, became a matter of some interest to collect and analyse a few samples, both English and foreign, in order to see what was being ordinarily sold as "glacial phosphoric acid." A few remarks as to what this acid is, and how it is directed to be made, will be of assistance. When a solution of orthophosphoric acid, such as the syrupy phosphoric acid, 1·750, used in pharmacy, is evaporated under proper conditions, most of the water is driven off, and the sticky, viscous mass, consisting chiefly of metaphosphoric acid, remains, $H_3PO_4 = HPO_3 + H_2O$. This product is, however, not one that can be conveniently or readily dealt with, as it is extremely deliquescent, and is not in such a form as to permit of its ready manipulation. It was afterwards prepared by calcining phosphate of ammonia, the supposition being that the ammonia would all be expelled at a red heat. The process as given by Parrish ('Treatise on Pharmacy,' 1885, p. 204) is practically that given in most handbooks, and is as follows:—"It is made from calcined bones by decomposing them with sulphuric acid, by which process a superphosphate of lime is produced. The superphosphate is neutralised by carbonate of ammonium, which generates phosphate of ammonium in solution with precipitation of carbonate of calcium. By calcining phosphate of ammonium at a red heat, the volatile ingredient is expelled and the solid HPO_3 remains."

He further adds: "This acid is no longer officinal in the United States Pharmacopœia; that which has been in the market for some years past has been largely adulterated with phosphate of sodium or phosphate of ammonium."

For the purposes of comparison, I have prepared a sample of glacial phosphoric acid from phosphate of ammonia, which I have marked A; B, and C, are English makes; D is German, in lumps; E, the same maker's production in sticks; F is the American sample already referred to; G is an experimental sample deliberately adulterated with phosphate of soda, and H is the product of calcining microcosmic salt, or hydro-ammonio-sodic phosphate.

Before discussing the results of the analysis, I should like to make a few remarks as to the method employed. The constituents of importance to be ascertained were as follows:—free hydric metaphosphate, combined metaphosphate, ammonium, sodium, water.

It was a matter of considerable difficulty to devise a process, satisfactory in its results, for estimating the free and combined metaphosphates. Eventually the following method, based upon Thompson's researches on indicators, referred to in Sutton's 'Volumetric Analysis,' was adopted, and yielded very satisfactory results.

The sample of glacial acid under examination was, after solution in distilled water, boiled for 1 hour to effect the conversion into orthophosphoric acid; $HPO_3 + H_2O = H_3PO_4$.

This does not take place readily, as has been stated, and therefore prolonged boiling is essential. This solution is made up to a given bulk (10 per cent. is a convenient strength), and then 25 c.c. of this is titrated directly with normal NaHO solution, using 1 drop of dilute *Methyl-orange* as an indicator, the reaction point being the sharp change from faint pink to an almost imperceptible lemon yellow. The number of c.c. used is noted, each c.c. being equivalent to 0·08 grm. HPO_3. The reaction that takes place is as follows:—

$$H_3PO_4 + NaHO = NaH_2PO_4 + H_2O.$$

Now whilst this dihydrosodic phosphate is *neutral* to methyl-orange, it is *acid* to Phenolphthalein, so that by this means, using this latter indicator, we can volumetrically determine the amount of *combined* acid.

To the *same* solution, now almost colourless, add 1 drop of alcoholic phenolphthalein, and continue to run in NaHO solution until the reaction point, which is a sudden change to a pink or crimson tint, is reached. The number of c.c. used is noted. We have now data for calculating the free and combined acid; the first reading with methyl-orange shows the free acid; the latter, with phenolphthalein, shows the total acid, free and combined. The reactions are:—

(1) $H_3PO_4 + NaHO = NaH_2PO_4 + H_2O.$

Then this NaH_2PO_4 is converted by the addition of NaHO into the hydrodisodic phosphate, which is neutral to phenolphthalein:—

(2) $NaH_2PO_4 + NaHO = Na_2HPO_4 + H_2O.$

But in addition, in all the samples examined there was a certain percentage of base present, either sodium or ammonium, and as this coexisted with an *excess* of free acid, it could *only* have been present as—

NaH_2PO_4 or $(NH_4)\ H_2PO_4$;

neither of which are indicated by methyl orange as they are *neutral* to it, but both are readily shown by phenolphthalein since they are *acid* to it. To the above reactions we must therefore add—

$$NaH_2PO_4 + NaHO = Na_2HPO_4 + H_2O;$$

or $(NH_4)\ H_2PO_4 + NaHO = (NH_4)\ NaHPO_4 + H_2O.$

So that if we subtract from the total number of c.c. NaHO used, the amount required to convert the H_3PO_4 into Na_2HPO_4, we obtain the number of c.c. required to convert the combined phosphate into Na_2HPO_4. The amount is twice the number of c.c. shown by the methyl-orange, since it takes *two* equivalents of NaHO to form the Na_2HPO_4, whereas the methyl-orange reading shows only *one* equivalent—

$H_3PO_4 + NaHO$, neutral to methyl-orange

$H_3PO_4 + 2\ NaHO$, neutral to phenolphthalein.

For example: supposing it took 8 c.c. to reach the methyl-orange reaction point, then 8 c.c. × ·08 would indicate the percentage of HPO_3 originally present in the *free* state. On adding phenolphthalein, and again running in NaHO, suppose the reaction point to be 20 c.c., then $20 - (2 \times 8) = 4$ c.c. × 0·08 would be the combined HPO_3 originally present. Supposing there had been no *combined* acid, the reaction point would have been 16 c.c., *i.e.*, another independent measure of the H_3PO_4. The phenolphthalein reaction, of course, gives the same reading for free H_3PO_4 as the methyl-orange, the factors being in the former case, 1 c.c. = 0·04 HPO_3; in the latter, 1 c.c. = 0·08 HPO_3. These factors are for metaphosphoric acid HPO_3 values; for orthophosphoric acid H_3PO_4, they would have to be expanded.

These reactions are extremely simple and accurate, the only necessity is that the conversion of the metaphosphoric acid into the orthophosphoric acid should have been complete; since, whilst metaphosphoric acid reacts directly with methyl-orange, with phenolphthalein there is no definite reaction.

The conversion is rendered certain by boiling the sample for ten minutes with a small definite amount of normal H_2SO_4, of course in each case subtracting the same amount of normal soda from each titration result. This boiling must take place in a flask with inverted funnel to prevent loss by spirting, and sulphuric acid must be used, since other acids would lose by their volatility.

The results obtained by this method were carefully checked against the uranium method, which, of course, only shows the *total* phosphate, free and combined, and does not discriminate as this method does.

Another point in favour of this method is that it shows the *available* HPO_3 at once, since this acid reacts directly with methyl-orange and NaHO, so that to determine free acidity no boiling is required. All that is necessary is to dissolve the sample in water and titrate with normal soda, 1 c.c. = 0·08 HPO_3, the results before and after boiling being identical.

The *Ammonia* was estimated by distilling with an excess of soda into decinormal acid, and titrating with methyl orange.

The *Soda* was estimated as sodium chloride by Bettendorf's method (*Zeitschrift für analytische Chemie*, 1888, p. 24), which consists in placing 3 to 4 grams of the glacial acid into 50 c.c. of fuming hydrochloric acid, sp. gr. 1·190, and allowing the mixture to stand for 24 hours. Filter the resulting NaCl through spongy platinum, and wash several times with fuming hydrochloric acid, ignite and weigh. The solubility of the sodium chloride in the fuming acid is 1 part by weight in 1348 parts of the acid, of a sp. gr. of 1·190.

The accompanying table shows the results obtained.

Sample A is in bright colourless lumps and is to a certain extent deliquescent. It was prepared from syrupy phosphoric acid, 1·750, and ammonia. The analysis shows that it is impossible to drive off all the ammonia, the amount left in being equal to 8·05 per cent. ammonium. It contained a small quantity of silica, which was originally present in the phosphoric acid employed. The free HPO_3 is 48 per cent; the combined, as $-PO_3$, 42·98 per cent.: or total acid, as HPO_3, 91·52 per cent.

Sample B was of English make, in colourless lumps, but not nearly so bright as A, and somewhat deliquescent. It will be noticed that both soda and ammonia are present, the total base being 7·82 per cent. against 8·05 per cent. in A. The free HPO_3 is 52·80 per cent.;

Glacial Phosphoric Acid.

Sample.	Origin.	Form.	Free HPO_3	Combined. HPO_3.	Equal to $-PO_3$	Total HPO_3.	Total by Uranium.	Total Base	Ammonium.	Sodium.	Equal to $Na_2\{PO_4+H\}$ 12aq.	Water.	Silica.	Arsenic.	Total.
A . .	Made by the ammonia process.	Lump	48·00	43·52	42·98	91·52	91·84	8·05	8·05	None.	—	Tr.	0·54	Tr.	99·57
B . .	English	,,	52·80	40·00	39·50	92·80	93·14	7·82	6·48	1·34	10·44	,,	—	0·08	100·20
C . .	,,	,,	46·08	39·36	38·87	85·44	85·40	9·79	0·07	9·72	75·63	5·60	—	Tr.	100·34
D . .	German	,,	31·68	52·80	52·14	84·48	84·98	14·09	0·05	14·04	109·30	2·40	—	,,	100·31
E . .	,,	Sticks	36·48	47·36	46·77	83·84	83·70	13·49	0·06	13·43	104·48	3·25	—	,,	100·00
F . .	Europ'n*	Lump	42·21	37·89	37·41	80·10	80·41	10·20	none.	10·20	79·30	10·10	—	,,	99·92
G . .	Experimental.	,,	44·16	46·72	46·14	90·88	90·65	10·10	4·87	5·23	40·67	Tr.	—	,,	100·40
H . .	Do. from microcosmic salt.	,,	none	—	—	—	78·12	22·50	—	22·50	—	—	—	—	99·70

* F is the sample referred to as sent from America and being of European origin.

the combined acid, $-PO_3$, 39·5, or total acid, as HPO_3, 92·80 per cent., against 91·52 per cent. in A. This sample contains arsenic to the extent of 0·08 per cent., probably due to the phosphoric acid employed not having been properly prepared.

Sample C.—English, in white lumps; portions slightly opaque; hard and only slightly deliquescent. Effloresces rapidly if exposed to the air. The total acid is now diminishing in quantity, whilst the base, now practically soda, is increasing. The sodium present in the sample is equivalent to 75·63 per cent. of ordinary hydrodisodic phosphate; *i.e.*, every pound of this glacial acid contains sodium equal to $\frac{3}{4}$ lb. of phosphate of soda. It also contains over 5 per cent. of water.

Sample D.—German; in lumps with a pink tint; very hard and very slightly deliquescent. The free acid is now considerably diminished, being only 31·68 per cent. The total base is no less than 14 per cent., being equivalent to over 109 per cent. phosphate of soda. Water is also present.

Sample E.—German, *in sticks*, bright white, very hard and very slightly deliquescent. The amount of free HPO_3 in this sample is greater than that in the "lump" of the same maker. The ammonia is about the same, the soda a little less, but there is more water.

Sample F is the sample referred to by my American correspondent. When received it was partially effloresced, but eventually it deliquesced. It was therefore dried at about 160° C. and then analysed, when it gave about 10 per cent. of water. Probably as sent out from the makers it was not very different from Sample C.

Sample G is an experiment to note the effect of the addition of phosphate of soda to a phosphate of ammonia liquor, and then calcining. The result is curious, as nearly 5 per cent. of ammonium is retained, whilst in the next *Sample H*, made from microcosmic salt,

$$\left.\begin{matrix} H \\ NH_4 \\ Na \end{matrix}\right\} PO_4$$

all the ammonium is expelled and pure metaphosphate of soda $(NaPO_3)_n$ is the result, giving a glass-hard non-deliquescent product.

To sum up the results:—Taking A as the standard, B is on the whole the best acid, but should not contain arsenic to such an extent as to allow of its being estimated. This, however, is probably due to careless selection of phosphoric acid.

The *free* acid is somewhat greater than that in A, the *total* acid being close, as is also the amount of the total base, being 8·05 per cent. in A and 7·82 per cent. in B. This slight addition of soda seems to increase materially the *hardness*, though whether that is sufficient to gain to excuse the adulteration, and to overcome the disadvantage of having a fixed instead of a volatile base, must be a question for others to decide.

In C, D, E and F, sodium is being freely added, the percentages when worked out to ordinary hydrodisodic phosphate being respectively

C.	D.	E.	F.
75·63	109·3	104·48	79·30.

Water is present in these samples containing much soda, in estimating which it was noticed that part was easily got rid of, whilst the remainder was only expelled with great difficulty: possibly this water is attached to the sodium phosphate.

In the lump acids the introduction of sodium is in my opinion a distinct adulteration, and is unnecessary, and as far as I can find is not given in any of the methods for making glacial phosphoric acid. As regards the *stick acid*, soda is added to render the sticks permanent, as if made from the pure glacial acid by ammonia, they will not retain their form. Surely from the consumer's point of view it must be a very questionable advantage to buy or use such an acid, when it must of necessity be accompanied by such large percentages of undesirable and extraneous matter.

In conclusion, I would urge pharmacists and others who use glacial phosphoric acid not to use the "stick" form at any price, and to insist that the "lump" shall be soda free, and made by the ammonia process. Bettendorff's method, described above, is a ready means for detecting qualitatively (and quantitatively, if desired) whether sodium is present. This test should be rigorously applied, and samples which give sodium chloride should be condemned, each 1 per cent. of sodium found meaning 7 to 8 per cent. of phosphate of soda. Silica, if in large quantity, would be shown here, but as this is insoluble in water, no mistakes need arise on that score; whilst as a check upon the percentage of free acidity being kept up, a simple titration with standard soda and methyl-orange affords a ready indication. Phosphate of ammonia is not likely to be used as an adulterant, and if present in large quantity it can only be through imperfect calcination.

———

The PRESIDENT said the Conference was much obliged to Mr. Hodgkin for this interesting communication, in which he had clearly pointed out what the glacial phosphoric acid of commerce consisted of. He

knew that if it were made from phosphate of ammonia it always contained traces of ammonia. It was impossible to prepare it from pure phosphoric acid, because made in that way it was too deliquescent for commercial purposes. It was probably impossible to get it free from traces of iron; but he was surprised to find that traces of arsenic were found in nearly every sample. He thought it was now possible to obtain phosphorus free from arsenic.

Mr. HODGKIN said that was so, but as a matter of fact all these samples did contain traces of arsenic, and one more than a trace.

The PRESIDENT added that the mode of distinguishing between that containing soda, which if more than a trace was an adulteration, and that which did not, would be very useful.

Mr. THOS. TYRER said his experience with regard to phosphoric acid was so recent that he could not be considered an expert, but he had made some careful investigations into the subject, and the general conclusions to which he had come agreed in the main with those of Mr. Hodgkin. Whilst accepting absolutely the position Mr. Hodgkin had taken up, he took it the chief value of the paper would not be so much the analyses, which were a demonstration to those who understood them, but the exposition of the methods by which pharmacists with any pretensions to manipulative skill could determine for themselves whether they had phosphoric acid worthy of the name or not. On the other hand, and as a matter of ethics, it must not be forgotten that while it was extremely desirable and in fact one's duty to supply the article asked for, yet as in two cases mentioned on the previous day (one milk of sulphur, and the other euonymin, with or without sulphate of barium or magnesia), so one had in the case of phosphoric acid certain substances added for the purpose of securing a certain physical state. In the one case something was added to prevent the too great absorption of moisture; in this case the only justification for the addition was to produce a certain trade or technical appearance. While elegant pharmacy was recognized as an undoubted desideratum both from the manufacturer's and dispenser's point of view, he presumed no one would say that conditions of purity so far as they could be obtained were not to be insisted on. If that were accepted it would follow that people must give up asking for phosphoric acid in any particular form, or if they did they must be prepared to find it, as in the case of euonymin when it got abroad, a mass which was not very definite or tangible to deal with. Accepting these considerations, he agreed that the time had come when manufacturers of glacial phosphoric acid in this country should adopt a form which they could substantiate chemically, and which in its viscous physical condition was not nasty or unpresentable. It was perfectly clear that the publication of this paper and the discussion upon it would tend to put pharmacists in the right position with regard to this article. He must confess that the presence of arsenic was a surprise to him, but the fact was one often did not look for what one did not expect to find, and it was evident that this was not always safe. But considering the enormous amount of concentration that had taken place in the acid, and that only traces were found, it was evident that the contamination was not serious, and in a solution it would scarcely be found at all. It was an axiom with him that if one wanted to make a pure article one must begin by having pure materials; the way to keep out impurities was to take care not to have them at the beginning. With regard to the particular methods of analysis described, he had been a little curious to know how the point was hit between the two indicators, knowing the difficulty there was in other quantitative tests where one indicator was followed by another; there was a point between the two, except under perfectly understood conditions, where there was a loss. But that was perfectly cleared up, and he had no doubt of the absolute reliability of the method; the diagram was quite convincing on that point. Mr. Hodgkin was to be congratulated on the paper, and pharmacists and manufacturers were much indebted to him.

Mr. A. H. ALLEN asked if any traces of platinum had been found in any of these products. A good many years ago, when making experiments on glass, he found that glacial phosphoric acid dissolved not only glass but platinum also, and seeing that this acid had been concentrated in platinum, he should like to know if any of that metal had been found, or if it had been tested for.

Mr. TYRER said it was matter of common knowledge that his predecessor had his platinum dishes stolen, and one of the many peculiarities of the case was that though these dishes had been in use for twenty-five years, portions of them were identified by Messrs. Johnson and Matthey, he believed by their mechanical structure, certain portions being thinner in one part than another, indicating that the metal had been wrought. Calculations were made of the relation of the piece examined to the area of the whole dish, and it was found that the loss was inappreciable after that long period of wear and tear. He held one of the proofs of identity, meeting the statement that the platinum could not have been used in the concentration of phosphoric acid, was the discovery by Mr. Bernard Dyer, the chemist engaged in the case, of distinct traces of meta-phosphoric acid on the internal surface. He had some specimens of phosphoric acid, the remanets of many years, which he had examined for every possible impurity, including arsenic, which he did not find, and he certainly did not find platinum, though he found a trace of manganese. He found that iron too gave in a small experimental evaporation just the same result as that obtained by Mr. Hodgkin, but he found no platinum. He had been anxious to know if anything else would answer the purpose, the platinum having disappeared; therefore he tried everything, but no glass of English manufacture would resist the action of concentrating phosphoric acid, even dilute, nor would any porcelain dish, crucible, or glaze of any kind. In fact, when phosphoric acid was concentrated to a condition in which it could be said to be anything like glacial it was astonishing how even the best evaporating dishes, beakers and crucibles became absolutely spoiled by it. The glaze went first, and then there was a most interesting corrugation of the surface.

Mr. ALLEN said he found the dish in which he operated became corroded, and therefore he presumed it was acted on by the phosphoric acid. When he said that phosphoric acid dissolved platinum he did not mean that it exerted a powerful action with effervescence.

Mr. HODGKIN said it was not considered necessary to test for platinum, but he was certain that it was not there. It was quite true that all glazes were attacked by concentrated phosphoric acid, and occasionally samples of foreign acid were met with which contained large quantities of silica, and which clearly had been evaporated in porcelain or earthenware vessels. Platinum was the only thing which could properly be used. As shown by the analyses the amount of sodium necessary to add to obtain a fairly hard sample was only 1·34 per cent., so that when it mounted up to 10 per cent. or more, it might be taken to be an adulteration. Why he recommended pharmacists to condemn samples containing sodium was that they knew if they had it present, they might have anything from 1½ up to 13 or 14 per cent. Filtering through spongy platinum, so as to estimate the sodium quantitatively was not

very easy, but the method given was quite sufficient to show qualitatively the presence of sodium as sodium chloride. The moral was that glacial phosphoric acid ought not to be used at all for ordinary purposes; it was really an antiquated form which ought to be relegated to the limbo of exploded notions; but if used at all it should be free from sodium. As regards arsenic Mr. Tyrer was quite right; he did emphasize the word traces, and there were only traces; and considering the amount of concentration it was not surprising that they should be found.

The PRESIDENT then moved a vote of thanks to Mr. Hodgkin, saying he agreed with him that glacial phosphoric acid should be relegated to the same limbo as calcareous milk of sulphur.

The vote of thanks was unanimously agreed to.

(*To be continued.*)

The British Association for the Advancement of Science.

ADDRESS TO THE BIOLOGICAL SECTION.

BY FRANCIS DARWIN, M.A., M.B., F.R.S., ETC.

On Growth-curvatures in Plants.

A seedling plant, such as a young sunflower when growing in a state of nature, grows straight up towards the open sky, while its main root grows straight down towards the centre of the earth. When it is artificially displaced, for instance, by laying the flower-pot on its side, both root and stem execute certain curvatures by which they reach the vertical once more. Curvatures such as these, whether executed in relation to light, gravitation, or other influences, may be grouped together as growth curvatures, and it is with the history of our knowledge on this subject that I shall be occupied to-day. I shall principally deal with geotropic curvatures, or those executed in relation to gravitation, but the phenomena in question form a natural group, and it will be necessary to refer to heliotropism and, indeed, to other growth-curvatures. The history of the subject divides into two branches, which it will be convenient to study separately.

When a displaced apogeotropic organ curves so as to become once more vertical, two distinct questions arise, which may be briefly expressed thus:—

1. How does the plant recognize the vertical line; how does it know where the centre of the earth is?

2. In what way are the curvatures which bring it into the vertical line executed?

The first is a question of irritability, the second of the mechanism of movement. Sachs has well pointed out that these two very different questions have been confused together.* They should be kept as distinct as the kindred questions how, by what nervous apparatus, does an animal perceive changes in the external world; and how, by what muscular machinery, does it move in relation to such changes?

The history of our modern knowledge of geotropism may conveniently begin with Hofmeister's researches, because in an account of his work some of the points which re-occur in recent controversy are touched, and also because in studying his work the necessity of dividing the subject into the two above-named headings, Irritability and Mechanism, will be more clearly perceived.

In 1859† Hofmeister published his researches on the effect of disturbance, such as shaking or striking a turgescent shoot. This appears at first sight sufficiently remote from the study of geotropism, but the facts published in this work were the basis of the theory of geotropism formed by Hofmeister and accepted with some modification by Sachs. When an upright, vigorously-growing, turgescent shoot is struck at its base the upper end is made to curve violently towards the side from which the blow came. When the shoot comes to rest it is found to be no longer straight, but to have acquired a permanent bend towards the side on which it was struck. In explaining this phenomenon Hofmeister described those conditions of growth which give rise to what is known as the tension of tissues; these facts are still an important part of botanical study, though they hold quite a different position from that assigned to them by Hofmeister. The classification into active or erectile tissue and passively extended tissue was then first made. The pith, which is compressed, and strives to become longer, is the active or erectile part, the cortical and vascular constituents being passively extended by the active tissue. Hofmeister showed that when the shoot is violently bent the elasticity of the passive tissues on the convex side is injured by overstretching. The system must assume a new position of equilibrium; the passive tissues are now no longer equally resisting on the two sides, and the shoot must necessarily assume a curvature towards that side on which passive tissues are most resisting.

In a second paper, in 1860, Hofmeister* applied these principles to the explanation of geotropism. It is true that in his second paper he does not refer to the former one, but I think that it can hardly be doubted that the knowledge which supplied the material for his paper of 1859 suggested the theory set forth in 1860. He had shown that in the system of tensions existing in a turgescent shoot lay the power of producing artificial curvatures, and he applied the same principle to the natural curvatures. When an apogeotropic organ is placed in a horizontal position Hofmeister† supposed that the resisting tissues on the lower side became less resisting, so that they yielded more readily than those on the upper side to the longitudinal pressure of the turgescent pith. The system in such a case comes to rest in a new position, the shoot curving upwards; the passive tissues on the upper and lower sides once more resist the expansion of the pith in equal degrees. In this way Hofmeister hit on an explanation which, as far as mechanism is concerned, is in rough outline practically the same as certain modern theories, which will be discussed in the sequel.

His views resembled more modern theories in this, too; he clearly recognized that they were, *mutatis mutandis*, applicable to acellular‡ organs. The manner in which Hofmeister compared the mechanics of multicellular and acellular parts was curious; nowadays we compare the turgescent pith of a growing shoot with the hydrostatic pressure inside the acellular organ. Just as the pressure inside a single cell stretches the cell-walls, so in a growing shoot the turgescent pith stretches the cortex. As pith is to cortex, so is cell-pressure to cell-membrane. But Hofmeister would not have accepted any such comparison. In the case of acellular organs he localised both the erectile and passive tissues in the membrane. The cuticle was said to be passively extended by the active growth of the inner layers of the cell-wall.

It is remarkable that the obvious source of power which the pressure of the cell-sap against the cell-walls

* *Arbeiten*, ii, p. 282 (1879).

† Hofmeister, *Berichte d. k. Sächs, Gess. d. Wiss.*, 1859.

* Hofmeister, *Berichte d. k. Sächs, Gess. d. Wiss.*, 1860.

† Knight had previously suggested an explanation (*Philosophical Transactions*, 1806), which is so far similar, that the sinking downwards by gravitation of the juices of the plant is supposed to be the primary cause of apogeotropism. Knight's explanation of positive geotropism is practically the same as Hofmeister's.

‡ Sachs' term *acellular* is, in the present connection, equivalent to *unicellular*.

supplies should have been so much neglected. This may perhaps be accounted for as a revulsion against the excessive prominence given to osmosis in the works of Dutrochet.

The great fault of Hofmeister's views was the purely mechanical manner in which he believed changes in extensibility in the passive tissues to be brought about. When an apogeotropic shoot is placed horizontal there would be a tendency, according to Hofmeister, for the resisting passive tissues along the lower side of the shoot to become waterlogged, owing to the fluid in the shoot gravitating towards that side. They would thus be rendered more extensible, and the shoot would bend up, since its lower parts would yield to the erectile tissues in the centre. Such a conception excludes the idea of gravitation acting as a stimulus, and tends to keep geotropism out of the category in which it now takes its place along with such obvious cases of response to stimulation as the movements of Mimosa. In this respect it was a retrogression from the views of some earlier writers. Dutrochet's clear statement (1824) as to growth-curvatures being an affair of stimulus and response will be quoted lower down. Treviranus in his 'Physiologie' (1838) speaks of geotropism as a *Trieb*, or impulse, and adds that though there is no question of desire or sensation as in the impulses of animals, yet geotropism must be thought of as something higher than a merely mechanical or chemical action.

In taking such a view Hofmeister naturally neglected the biological side of the study of geotropism. Now we think of gravitation as a stimulus, which the plant translates according to its needs. The plant, so to speak, knows where the centre of the earth is, and either grows away from it, towards it, according as either direction suits its mode of existence.

We have seen how Hofmeister's view enabled him to apply a common explanation to acellular and multicellular organisms. But it led him into an error which more than counterbalances the credit due to such a generalization, namely, into separating what are now universally considered parts of a single phenomenon—viz., negative and positive geotropism. He gave totally different explanations of the bending down of a root and the bending up of a stem. It is well known that he supposed a root to be plastic, and to bend over by its own weight, like a tallow candle on a hot day or a piece of heated sealing-wax.

The development of a unified view of heliotropism, geotropism, and other similar curvatures is a part of my subject, and for that reason the curious want of unity in Hofmeister's views is interesting.

In 1865 Sachs published his 'Experimental-Physiologie.' He here accepts Hofmeister's views with certain modifications.

Irritability.

When by a touch on a trigger the explosion of a pistol is caused we do not say that the pistol is irritable, but when in an organism a similar release of stored-up energy occurs we apply the term *irritability* to the phenomenon, and we call the influence which produced the change a stimulus. At this time (1865) there was, as far as I can discover, no idea that growth-curvatures were produced by external influences acting as stimuli. Gravitation and light were supposed to act directly, and not as releasing forces. This is all the more remarkable, because Dutrochet* had expressed with great clearness the conception which we now hold. He wrote:—"La cause inconnue de l'attraction n'est que la cause occasionelle du mouvement descendant des racines et de l'ascension des tiges; elle n'en est point la cause immédiate; elle agit dans cette circonstance comme agent nervimoteur. Nous verrons plus bas de nouvelles preuves de la généralité de ce fait important en physiologie, savoir que les mouvements visibles des végétaux sont tous des mouvements *spontanés*, exécutés à l'occasion de l'influence d'un agent extérieur et non des mouvements imprimés par cet agent." Nothing could be more to the purpose than this, and it is one of the most curious points in the history of the subject that the botanical mind should have taken more than fifty years to assimilate Dutrochet's view.

In 1868, Albert Bernhard Frank published his valuable 'Beiträge zur Pflanzenphysiologie,' which was of importance in more than one way. In this work the term "geotropism" was first suggested in imitation of the existing expression "heliotropism." This uniformity of nomenclature had an advantage beyond mere convenience, for it served to emphasize the view that the curvatures were allied in character. His criticisms of Hofmeister and Sachs were directed against the following views:—(i.) That roots and other positively geotropic organs bend owing to plasticity. By repeating and varying certain older experiments, Frank helped materially to establish the now universally accepted view that positive geotropism is an active, not a passive, curvature, and that it depends, like apogeotropism, on unequal distribution of longitudinal growth. Here, again, he introduced unity, bringing what had been considered different phenomena under a common heading. By studying the distribution of growth and of tension in a variety of curvatures he helped still more to unite them under a common point of view.

(ii.) He showed that Hofmeister's classification of organs into those (1) which have and (2) which have not tension, was valueless in connection with growth-curvatures; that is to say that apogeotropism is not necessarily connected with the form of longitudinal tension found in growing shoots, and that the distinct kind of tension existing in roots has no connection with their positive geotropism. His work thus served to bring the subject into a more purely physiological condition, not only by his downright opposition to a mechanical theory backed by the great name of Hofmeister, but also by giving importance to physiological individuality.

In 1870 Frank published a more important work, "Die natürliche wagerechte Richtung der Pflanzentheilen." The paper not only tended to unite geotropism and heliotropism by proving the phenomena described to be common to both categories, but it more especially widened the field of view by showing that horizontal growth must be considered as kindred to vertical growth, and thus introduced a new conception of the reaction of plants to light and gravitation which has been most fruitful.

Frank showed that certain parts of plants, for instance the runners of the strawberries, even when kept in the dark, grow horizontally, and when displaced from the horizontal returned to it. Here, said Frank, is a new type of geotropism, neither positive nor negative, but *transverse*. Ten years later Elfving,* working in Sachs' laboratory, got similar results with rhizomes of Scirpus, etc. These experiments are more conclusive than Frank's in one way, because the strawberry runners when darkened were in abnormal conditions, whereas the rhizomes used by Elfving were normally freed from light-effects. When a rhizome which has been placed so as to point obliquely upwards moves down towards the horizontal position it is, according to the old nomenclature, positively geotropic, and *vice*

* *Recherches anat. sur la Structure intime, etc.*, 1824, p. 107. Dutrochet, however, was not consistent in this matter, and later on gave explanations as mechanical as Hofmeister's.

* Elfving, Sachs' *Arbeiten*, 1880.

versâ, when it reaches the horizontal from below it is negatively geotropic. But it cannot be both positively and negatively geotropic. We are bound to assume that it is so organized that it can only assume a position of rest, and continue to grow in a straight line when it is horizontal, just as an ordinary geotropic organ cannot devote itself to rectilinear growth unless it is vertical. In this way Frank's conception of transverse geotropism paved the way for the theory that there are a variety of different organizations (or, as we may now say, irritabilities) in growing plants; and that, whether a plant grows vertically upwards or downwards or horizontally, depends on the individual and highly sensitive constitution of the plant in question. It is, of course, true that those who seek for mechanical explanations of growth curvatures might be able to find such a one for transverse geotropism. But when Frank's conception has once been seized such views are less and less acceptable; and judging from my own experience, I cannot doubt that Frank's work deserved to have a powerful effect in preparing the minds of physiologists for a just view of irritability.

The belief in transverse geotropism received interesting support from Vöchting's* work on the movement of certain flowers which retain a horizontal position under the influence of gravitation.

Frank's views, it may be added, were accepted by my father and myself in our 'Power of Movement,' in which the term diageotropism was proposed, and has been generally accepted, for transverse geotropism. Nevertheless, though Frank was undoubtedly right, his views were strongly opposed at the time. He held similar views on the effect of light, believing that the power possessed by leaves of placing themselves at right angles to the direction of incident light must be considered as a new type of heliotropic movement, transverse or diaheliotropism. Frank's views were criticised and opposed by De Vries,† who, by means of experiments carried out in the Würzburg laboratory tried to show that Frank's results can be explained without having resort to new types of geo- or heliotropism. De Vries believed, for instance, that a leaf may be apheliotropic and apogeotropic, and that its horizontal position under vertical illumination is due to a balance struck between the opposing tendencies, one of which calls forth an upward, the other a downward curvature.

The same point of view occurs again in Sachs' paper on "Orthotrope and Plagiotrope Plant-members."‡ Sachs holds to the opinion that Frank's theory is untenable, that it is upset by De Vries, and that the oblique or horizontal position is to be explained as the result of a balance between opposing tendencies.

In a paper published the following year (1880)§ I attempted to decide between the opposing views. My experiments proved that at least certain leaves can place themselves at right angles to the direction of incident light when there is no possibility of a balance being struck. The outcome of my experiments was to convince me that Frank's views are correct, namely, that the quality of growth called transverse heliotropism does exist.

This view was accepted by my father in the "Power of Movement." The conclusions of Vöchting, in the *Bot. Zeitung*, 1888, and Krabbe in Pringsheim's "Jahrbücher," 1889, vol. xx., are on the same side of the question.

The general result of these confirmations of Frank's conception has been to bring to the front a belief in the individuality of the plant in deciding what shall be the effect of external conditions. Such a view does not necessarily imply irritability in a strict sense, for Frank himself explained the facts, as we shall see, in a different way. But it could not fail to open our eyes to the fact that in growth-curvatures as in other relations to environment external changes are effective as guides or sign-posts, not as direct causes.

Frank saw clearly that plants may gain such various aptitudes for reacting to light and gravitation as best suit their modes of life.

In stating this view he refers to the influence of the "Origin of Species," which had shown how any qualities useful to living things might be developed by natural selection. Frank described the qualities thus gained under the term *polarity*. He supposed that the cell-membranes of a transversely heliotropic leaf (for instance) were so endowed that a ray of light striking it obliquely from base to apex produced an increase of growth on the side away from the light; while a ray oblique from apex to base caused a reverse movement. The polarity-assumption of Frank is a purely gratuitous one, and, if strictly interpreted, hardly tends to bring growth curvatures into harmony with what we know of the relation of life to environment.

It will no doubt appear to be a forcing of evidence if, after such a statement as the last, I still claim for Frank that he led the way to our modern view of irritability. I can of course only judge of the effect of his writings on myself, and I feel sure that they prepared me to accept the modern views. It must also be insisted that Frank, in spite of his assumption of polarity, seems to have looked at the phenomena in a manner not very different to ours of the present day. Thus he compares the action of gravitation on plants to the influence of the perception of food on a chicken. He speaks too of custom,* or use, building up the specialized "instinct" for certain curvatures. These are expressions consistent with our present views, and I think that Vines† is perfectly just in speaking of Frank's belief in different kinds of irritability, although in so judging he may perhaps have followed equity rather than law.

One of the chief bars to the development of our present views on irritability was the fact that simple growth in length is influenced, and markedly influenced, by differences in illumination. Plants grow more quickly, *cæteris paribus*, in darkness than in light. With this fact to go on it was perfectly natural that simple mechanical explanations of heliotropism should be made. De Candolle, as is well known, explained such curvatures by the more rapid growth of the shaded side. Thus it came about that heliotropism was discussed, for instance, in Sachs' 'Text-Book,' edit. 4, 1874, under the same heading as the influence of light on rectilinear growth.

Shortly afterwards, in 1876, a pupil of Sachs, Müller-Thurgau, published‡ a research carried out in the Würzburg Laboratory, which is of some importance. In the introductory remarks he wrote:—"It has been hitherto supposed that heliotropic curvatures depend on a difference in intensity of illumination on the two sides. Sachs came to a different opinion in his work on geotropism: he found himself compelled to believe that in heliotropic just as in geotropic curvatures it is not a question of different intensities on opposite sides, but rather that heliotropic effect depends on the direction of the light."§

(*To be continued.*)

* *Die Bewegung der Blüthen und Früchte*, 1882.
† De Vries, Sachs' *Arbeiten*, 1872.
‡ Sachs' *Arbeiten*, 1879.
§ *Journal Linn. Soc.*, 1880.

* *Loc. cit.*, p. 91.
† Vines' *Physiology*.
‡ *Flora*, 1876.
§ In his *Vorlesungen*, p. 854, Sachs states that he wrote Müller-Thurgau's introduction.

Parliamentary and Law Proceedings.

The Council of the Pharmaceutical Society of Great Britain *v.* White.

Before his Honour Judge Abdy, at the Southend County Court, on the 8th instant, the Council of the Pharmaceutical Society of Great Britain sued Henry White, of 68, Park Street, Southend, to recover a penalty of £5 under Sec. 15 of the Pharmacy Act, 1868, for keeping open shop for the retailing, dispensing or compounding of poison.

Mr. C. Langley Flux appeared for the Society.

Mr. Willis appeared for the defendant.

Mr. Langley Flux stated that defendant was sued for a penalty of £5 which he had incurred on the 8th of July last, by keeping open shop for the retailing of poison, having on that day sold to a Mrs. Schmidt two 3*d.* packets of Battle's vermin killer, which contained strychnine, one of the poisons enumerated in the schedule to the Pharmacy Act of 1868. The defendant was not a chemist or druggist, and therefore rendered himself liable for the penalties imposed by Section 15 of the act. This sale of Battle's vermin killer led to a serious result, for it became the means by which the purchaser terminated her life.

Mr. Willis: I will admit that the defendant did sell a packet of Battle's vermin killer on July 8 last. My case is that he is entitled to sell it.

His Honour: Do you admit that it contains strychnine?

Mr. Willis: My client does not know its contents.

His Honour: The case had better be proved.

Mr. John Harrison, examined by Mr. Langley Flux: I am the Coroner for East Essex. I conducted the inquiry concerning the death of Mrs. Schmidt. The defendant was examined before me on that inquiry. I produce the original depositions: Defendant deposed: "I am a chemist and druggist, and carry on business at Southend, Essex. On July 8, 1891, I sold to Mrs. Schmidt one 3*d.* packet of Battle's vermin killer. This contains strychnine amongst other ingredients." I produce the verdict of the Jury: They found that the cause of Mr. Schmidt's death was strychnine poisoning.

Dr. G. F. Jones, examined by Mr. Langley Flux: I practice in Southend. I was called in to see Mrs. Schmidt. I found all the symptoms of strychnine poisoning. There was the peculiar arching. The cause of her death was strychnine poisoning.

Miss Schmidt, examined by Mr. Langley Flux: My mother died from the effects of taking Battle's vermin killer.

Mr. Willis, for the defendant, said that he admitted the sale, and that the principal question was whether defendant was entitled to sell Battle's vermin killer. There was, he said, a peculiar feature in this case, and he submitted that the case did not come within the scope of the Act. He said that many persons sold Battle's vermin killer with a licence, and his client had a licence to sell patent medicines, and that under that licence he was entitled to sell Battle's vermin killer. He contended that it was a patent medicine, and that his client, as licensee, was entitled to keep open shop for its sale and to sell it.

His Honour: You made an impression upon me when you said other persons sold Battle's vermin killer with a licence.

Mr. Willis: No, sir, without a licence.

His Honour: That is the strongest point against you. This Act says that if a person professes to deal in anything poisonous or professes to act as a chemist, he must be registered. Now your client sold this poison and he has rendered himself liable. If I am satisfied that there is any poison in it, he cannot sell it without being a registered man.

Mr. Willis: Your Honour is against me; I must ask you to take a most lenient view and to inflict as small a penalty as possible.

Mr. Langley Flux in reply pointed out that Battle's vermin killer was not an article which could be sold under cover of the patent medicine licence. The statute said any person who sold poison not being a chemist and druggist should be liable, consequently only chemists and druggists could sell this vermin killer, and even then certain precautions had to be taken as provided for by another section. He reminded his Honour that the amount of penalty was fixed by the statute. The law concerning the sale of poisons was clearly laid down in the case of the Pharmaceutical Society *v.* Wheeldon, to which he invited his Honour's attention.

His Honour: I am glad to know that this is an Act to be kept in view by all persons who think they are entitled to sell poisons. The Act says any person can be proceeded against for selling poison if he is not upon the Register of Chemists and Druggists. All I can say is that if grocers or any one else not a chemist and druggist sells Battle's vermin killer woe betide them. The Act is a very wholesome and beneficial Act; it is assumed that persons can sell poisons in a most reckless manner, but this Act is intended to stop them. The defendant has brought himself completely under this Act. It is true he has a patent medicine licence, but that does not enable him to sell this vermin killer. I find for the plaintiffs upon the facts. I must inflict the penalty; the case has been proved beyond all doubt.

Mr. Langley Flux: As a case of public interest your Honour has power under the County Court Act concerning costs.

His Honour: Yes; I will certify for costs on the higher scale.

Judgment for penalty of £5, with costs upon the higher scale.

Prosecution for the Sale of Adulterated Tartaric Acid.

At Glasgow County Buildings on the 5th inst. John Cooper, grocer, 159, Main Street, Gorbals, was fined 25*s.* for having on July 23 sold ¼lb. of tartaric acid, which, on analysis, was found to contain 9 per cent. of alum, 35 per cent. of sulphate of lime, and ·607 per cent. of lead, all extraneous to tartaric acid. Defendant pleaded guilty, but said he bought the tartaric acid from an old and respectable firm with whom he had been dealing for some time, under the belief that it was unadulterated. They had stated that they would give a guarantee at the time, but had not done so, and as a consequence he had nothing left him but to sell it on their word.—*Scottish Leader.*

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

"Pharmaceutical Ethics."

Sir,—I am pleased to see Mr. Maben's paper on "Pharmaceutical Ethics" in the last number of the Journal. It is especially pleasing to me because the tendency of it is in the same direction as one written by myself about eighteen months ago. As Mr. Maben no doubt is more anxious to have attention directed to the principle of selling pharmacopœial articles of standard strength rather than to the three articles he uses for the illustration of that principle, I will refrain from making any remarks upon the desirability or otherwise of a pharmacist supplying vinegar of the pharmacopœial strength.

Although Mr. Maben's paper does not need any reinforcement of mine to give it weight, yet I feel that I ought to say how thoroughly I am in accord with Mr. Maben

upon this question. All conscientious pharmacists must recognize the necessity for having drugs and preparations pure and uniform in strength. But among this class it is to be feared there are many who are content to trust to the carefulness and integrity of the wholesale houses. The consequence is that goods are stocked which are not of full strength, and it has happened several times in my own experience that a wrong but similar article has been received and stored away.

When it is considered that usually only the heads of departments in the wholesale houses are qualified men, and that it is quite impossible for the qualified men to supervise every vessel and packet sent out to the retailers, it becomes evident that the retail pharmacist, if he is to guarantee the quality of his drugs, must carefully test and examine every article upon arrival. It is, however, usual to find two objections to the undertaking of this work—we have not the skill, we have not the time. The want of skill is consequent upon the failure to realize the objects of pharmaceutical education; those who make this excuse have not grasped the fact "that one of the primary objects of our education is to enable us to know how to test our drugs;" they have looked upon education simply as a means of satisfying the examiners sufficiently for obtaining legal qualification, with the result that the knowledge acquired by them previous to presenting themselves for examination having been allowed to fall into disuse, they are then as other men, with the sole exception that they have a certificate that they are qualified to act as pharmacists. With regard to the second objection, I think if any desire to do the work really existed time would be found in which to do it.

It is to be hoped that there is no rashness manifested in saying that all pharmacists are not conscientious. We are strangely like other men. But what, sir, may be a venial sin in a grocer becomes an unpardonable crime in a pharmacist. To use an illustration of Mr. Maben's—a grocer may add a little sand to his sugar, and his customer be only prejudiced to the extent of a few pence; but the man who uses for the preparation of ipecacuanha wine the woody refuse left after powdering ipecacuanha root and produces a wine without a trace of emetine, is as guilty as the man who puts a blank cartridge into the pistol of one who is about to fight a deadly duel. What avails physiological and pharmacological research if medical men cannot rely upon the weapons with which they are to fight disease? Practical medicine cannot hope to advance unless the practitioner is sure he is using the same remedy that he used in his experimental work. Mr. Maben suggests that the Food and Drugs Adulteration Act should be administered more vigorously. It may be questioned whether this would answer the purpose. The average public analyst has but a slight acquaintance with drugs, and the relative importance of remedial agents is not understood by the local authorities. That the fittest men to undertake the supervision of drugs are pharmacists, cannot be gainsaid. This being so, and admitting that a considerable section of the trade will not, for one reason or another, trouble itself about the quality of the articles sold unless compelled to do so, the proper persons to enforce the standard of the Pharmacopœia are pharmacists as represented by the Pharmaceutical Council. To this end competently qualified pharmaceutical chemists should be appointed inspectors to visit and examine all drug-selling establishments. It should also be made possible for certain offences or for the repetition of those offences to expunge a man's name from the register.

I should be extremely glad if Mr. Maben would consent to open a public discussion of this matter at the next Conference. If these questions were brought forward there, an interest in the Conference proceedings would be begotten in the minds of many who at present are quite indifferent to this annual assembly. WM. KIRKBY.

GHATTI GUM.

Sir,—It is satisfactory to find that in their paper on "Indian Gums in Pharmacy Work," read before the Conference at Cardiff, Dr. S. Rideal and Mr. Youle so thoroughly endorse my high estimate of ghatti gum, and it is somewhat gratifying, after a certain amount of prejudice, to find that amongst pharmacists generally ghatti mucilage is steadily increasing in use and favour.

The apparently contradictory statements constantly occurring in reports and discussions relating to this gum are evidently due to the wide variations of commercial samples. After trials of supplies obtained through ordinary channels, some of which were far more satisfactory than others, I had the opportunity a short time ago of examining authentic and typical specimens of the exudation of *Anogeissus latifolia*, which is stated by Prebble to be the chief source of ghatti gum. This sample was kindly forwarded by Messrs. Bertie-Smith and Co., of Bombay, to whom also I am indebted for additional information relating to collection and exportation. The gum is colourless to faintly yellowish externally, slightly dull on the surface, fracture clear and glassy, quite free from internal cracks, hard and difficult to pulverise, in rounded masses varying from 25 to 35 grains in weight with a small proportion of vermiform pieces, slowly but completely soluble in three parts of cold water, forming a clear mucilage entirely free from taste and odour and substantially agreeing with characteristics as previously detailed.

Corroborative of the high opinion with which this gum is held wherever used may be quoted from 'Pharmacographia Indica,' Part II., p. 554:—"The finer qualities are well suited for use in pharmacy and for the preparation of emulsions it is unrivalled. As it possesses about double the viscosity of gum arabic one part of the gum should be used when two parts of the former are ordered."

Messrs. Bertie-Smith and Co. state in their communication that large quantities of gum similar to sample are being shipped to different parts of the world, and a fair amount to England, and also mention the following interesting detail:—"A fact we must tell you of importance in the trade in this gum is that immediately the monsoon sets in the business ceases, as the moisture causes the gum to stick together in a mass, and changes its colour from white to a dirty light brown. Hence from about June 15, when the monsoon bursts in Bombay, we are unable to do anything with orders for the gum until the tropical rains cease." A. MANDER.

ANALYSIS OF IPECACUANHA.

Sir,—I very much regret my unavoidable absence from the late meeting of the British Pharmaceutical Conference, especially as there are two points raised in the discussion upon the paper which I contributed, in conjunction with Mr. Whitby, which call for a reply.

Messrs. Dott and Moss find fault with the method we employed for the determination of starch, on the ground that the other carbohydrates and such bodies as glucosides would render the results too high.

I would point out, however, that before proceeding to the inversion of starch by dilute acid we removed sugars, dextrin, and mucilage by extraction with water, which liquid would also dissolve the small quantity of glucoside observed. Moreover, although not stated in the paper, the residue insoluble in water was washed with dilute soda, which would effectually remove any acid resins which might escape the solvent action of water only. This objection is, therefore, I think, removed, and although I admit that the amount of starch is larger than frequently occurs in ipecac., I do not consider it to be excessive.

Mr. Moss suggests that the amount of "pectic acid" found is too small; by this I presume he means "albumens," as he refers to its precipitation when heated. I feel that he must have been deceived by the bulkiness of such precipitate, these precipitated albumens commonly weighing far less than one would suppose judging from appearances only.

Finally, I would draw attention to the fact that our results are those obtained from the analysis of one sample of root, a fact which is, I fear, frequently lost sight of, or very inadequately allowed for, in discussions upon such communications as ours. The value of a single analysis such as this is chiefly as an indication of the direction in which to extend one's work, and it is my intention, time and other circumstances permitting, to follow this up by an examination of the more important constituents, and the estimation of the quantities of each which exist in several distinct samples. I feel then we shall have a satisfactory basis on which to work up the pharmaceutical side of the subject. R. CRIPPS.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Grierson, Hill, and Hodgkin.

A SIMPLE METHOD OF WASHING READILY-OXIDIZABLE PRECIPITATES.

BY J. A. FORRET.

Having occasion recently to prepare carbonate of iron for a special purpose, I noticed that the precipitate obtained by following the Pharmacopœia process for the preparation of the saccharated carbonate, became darker in colour each time the vessel was filled up with water; and if the washing was carried farther than directed in the Pharmacopœia, so as to eliminate all alkaline sulphate, the resulting carbonate was of a dirty greenish-brown colour.

As freshly precipitated ferrous carbonate is of a pale grey—almost white—colour, the above result points to atmospheric oxidation, probably by means of oxygen taken up while the vessel is being filled with water, and also during the stirring up of the precipitate; and with the view of obviating this, I devised the wash-bottle shown below, by means of which oxidation at this stage of the process is reduced to a minimum.

A wide-mouthed bottle of convenient size is fitted with a cork, carrying four glass tubes (A, B, C and D). The tube C is prolonged inside the bottle, and to the other end is attached a longer piece of glass tubing, by which the water is syphoned off, C being raised or lowered according to the depth of the precipitate. To the tubes A and B are attached short lengths of rubber tubing, and A is connected with a syphon dipping into a vessel of water (recently well boiled to ensure thorough deaëration) placed on a level above the wash-bottle. The remaining tube (D) is connected either with the gas supply or an apparatus for generating carbonic acid gas.

The apparatus is used as follows:—A convenient quantity of crystallized ferrous sulphate is placed in a muslin bag, and suspended in a wide-mouthed bottle containing a sufficient quantity of boiled water, and allowed to dissolve without shaking or stirring. Alkaline carbonate in slight excess (potassium bicarbonate I have found most convenient) is placed into the wash-bottle and the bottle corked. The tubes A and C are closed by means of pinch-cocks and a current of coal gas or carbonic anhydride passed through the bottle for a few minutes to displace atmospheric air. A sufficient quantity of boiled water is run into the bottle by the syphon attached to the tube A, and the carbonate dissolved by gentle agitation. When both salts are dissolved the ferrous sulphate solution is gradually added to that in the wash-bottle by the tube A, and the bottle filled up with water.

At this stage the ferrous carbonate is a flocculent greyish-white precipitate, and by placing the bottle in hot water for a few minutes the precipitate assumes a much denser consistence and rapidly falls to the bottom. The solution of potassium sulphate is now run off by means of the syphon C, and the bottle filled up with boiled water as before. A few minutes suffice for the settling of the precipitate, and the operation is repeated until the washings indicate but a trace of sulphate.

The entrance of atmospheric oxygen is prevented by causing a gentle current of gas to pass through the bottle while in use.

Carbonate of iron prepared by this means is of a pale grey colour, with just a tinge of green; and if the washed precipitate be treated as directed for the saccharated carbonate, the resulting preparation indicates a considerably higher percentage of ferrous carbonate than the average commercial sample of that article.

The apparatus would be suitable for washing other readily-oxidizable precipitates. With iron carbonate it is advantageous to have the alkaline carbonate in slight excess of what is necessary for complete decomposition of the iron sulphate; and a much lighter-coloured precipitate is obtained by adding the sulphate to the carbonate, than the carbonate to the sulphate.

SCIENTIFIC DREAMS OF THE PAST.*

BY ALBERT DE ROCHAS.

Many of the inventions which are the glory of our times were foreseen by certain dreamers, in whose imagination they received a kind of virtual existence. The electric telegraph is foreshadowed by Strada in some twenty verses of his 'Prolusiones academicæ,' which were published in Rome in 1617. To him it was a fancy, a simple wish:

> "O! utinam hæc ratio acribendi prodeat usu
> Cantior et citior properaret epistola!"

The manner in which he understood the instrument was reproduced by all the students of the time, notably by a Jesuit of Lorraine, Pêre Leurechon, in his 'Hilaria mathematica,' published in 1624. I quote a passage in which it is mentioned from the French translation published two years later at Pont à Mousson, under the title 'Récréations mathématiques,' by an author who signed himself Van Etten:—

"There are some who have intimated that absent

* Translated for the *Popular Science Monthly* from the *Revue Scientifique*. Reprinted from the *Pharmaceutical Era*.

persons might be able to converse by means of a magnet or some similar stone. For example, Claude being in Paris and John in Rome, if each had a needle rubbed on some stone the property of which was such that as one of the needles moved in Paris the other would move in Rome, it might be that Claude and John would both have a common alphabet, and that if they had agreed to speak from a distance every day at 6 o'clock in the evening, arranging that the needle should make three turns and a half as a signal that it was Claude and no other that wished to speak to John, then Claude, wishing to tell him that the king is in Paris (*le roy est á Paris*), will move his needle and stop it at L, then at E, and then at R, O, Y, and so on with the others. At the same time, John's needle, acting in correspondence with Claude's, will move and stop at the same letters, so that it will be easy for it to write and make understood what the other means." "The invention is very nice," Pêre Leurechon remarks, "but I do not believe there is a magnet in the world that has such virtues."

Phonography is thus described in the April number, 1632, of the 'Courier Veritable,' a little monthly publication in which novel fancies were frequently aired: "Captain Vosterloch has returned from his voyage to the southern lands which he started on two years and a half ago, by order of the States-General. He tells us among other things that in passing through a strait below Magellan's, he landed in a country where nature has furnished men with a kind of sponges which hold sounds and articulations as our sponges hold liquids. So, when they wish to dispatch a message to a distance, they speak to one of the sponges and then send it to their friends. They, receiving the sponges, take them up gently and press out the words that have been spoken into them, and learn by this admirable means all that their correspondents desire them to know."

Cyrano de Bergerac, in his 'Histoire comique des États et Empires de la Lune,' whose first edition is dated as early as 1650, is still more precise. He relates that the genius that guided him to our satellite gave him for his entertainment some of the books of the country. These books are enclosed in boxes. "On opening the box I found inside a concern of metal, something like one of our watches, full of curious springs and minute machinery. It was really a book, but a wonderful book that has no leaves or letters; a book for the understanding of which the eyes are of no use—only the ears are necessary. When anyone wishes to read he winds up the machine with its great number of nerves of all kinds, and turns the pointer to the chapter he wishes to hear, when there come out as if from the mouth of a man or of an instrument of music, the distinct and various sounds which serve the great Lunarians as the expression of language." A few pages before this, Cyrano speaks of transparent globes, that serve for lighting, in which a non-heating lamp has been placed.

We are next told about microbes: "Figure the universe as a great animal; the stars that are worlds as other great animals which serve as worlds to other people like us, our horses, etc., and that we in our turn are like worlds in respect to certain animals still incomparably smaller than we, as are certain worms, fleas, and flesh worms; that these are the earth to others still more imperceptible, and that just as we appear, each individual of us, a great world of these little people, it may be also that our flesh and our blood are only a tissue of little animals which maintain themselves, lend us motion by theirs and let themselves be led blindly by our will which serves them as a coachman, lead us in our turn, and produce altogether the action which we call life. Does not the itch prove what I am saying? Is the worm that causes it anything but one of these little animals which has deprived itself of civil society to constitute itself a tyrant of its country? That blister and that scab, of which you do not know the cause, have to come, either by the corruption of the enemies which these little giants have slain, or by the plague produced by the remnants of the food with which the disturbers have gorged themselves, and left in heaps of dead bodies on the field; or because the tyrant, after having driven from around himself his companions which were corking with their bodies the pores of ours, has given passage to the humour, which has become corrupt after having been ejected from the sphere of the circulation of our blood. For a further proof of this universal parasitism, you have only to consider how the blood runs to the spot where you are wounded. The doctors tell you that it is guided by Provident Nature, which desires to succour the debilitated parts, which would make us conclude that besides the soul and mind there is in us a third intellectual substance having its functions and organs apart. But for this reason I find it more probable to say that these little animals, feeling themselves attacked, send to their neighbours for aid, and they having come from all around, and the country being incapable of supporting so many people, they die of hunger, or are smothered by the pressure. This mortality takes place when the imposthume is ripe, for the corrupted flesh then becomes insensible, in testimony that the animals have been smothered, and that the bleeding which we order to divert the inflammation is because that, having lost much by the opening which these little animals tried to cork up, they refused to assist their allies because they were hardly able to take care of themselves."

Cyrano tried to go up to the moon by tying around his waist bottles full of dew, which, according to the opinion then received, was attracted by the sun. He was not able to rise so high, but after breaking a considerable number of bottles, he pretended almost to nullify the weight of his body, so that he could travel by long leaps, only grazing the earth, as many people fancy in their sleep they are doing. "He reached the moon by means of a machine which he does not describe, and found there another terrestrian who had raised himself up by the aid of a Montgolfer and parachute. He filled two large vessels with smoke, sealed them hermetically, and fastened them under his arms, the smoke, which tended to rise and could not penetrate the metal, immediately pushed the vessels up, and they carried the man with them. When he had risen to the moon, he promptly untied the vessels which he had bound as wings to his shoulders, and did it with such success that he had just reached the lunar air, four toises above the moon, when he took leave of his flippers. The elevation was still great enough for him to have been considerably hurt, if the wind had not inflated the voluminous folds of his robe, and gently sustained him till he set foot on the ground."

In 1760 another dreamer, Tiphaigne de la Roche, published under the title of 'Giphantie,' an anagram of his name, a curious little work in which photography is described—in the ultimate state to which it has been brought—with the reproduction of the same colours. Tiphaigne supposes himself transported to the palace of the elementary genii, the chief of whom told him: "You know that the rays of light, reflected from different bodies, form a picture and depict those bodies on all smooth surfaces, like the retina of the eye, water and ice. The elementary spirits have endeavoured to fix those transient images; they have composed a very subtle and viscous matter quick in drying and hardening, by means of which a picture is made in a wink. They wash a piece of cloth with this matter, and present it to the objects which they desire to depict. The first effect of the varnished cloth is that of a mirror, in which one can see all the bodies, near and distant, of which the light can bring the image. The cloth with its viscous coating holds the images, which the glass cannot do. The mirror represents the objects faithfully to you, but retains none; our cloths represent them no less faith-

fully, but keep them all. The impression of the images is made the instant the cloth receives them. It is taken away at once and put in a dark place; an hour later, the coating has dried, and you have a picture, all the more precious because no art can imitate the truthfulness of it, and time cannot damage it in any way. We take from the purest source, the body of light, the colours which painters extract from different materials, and which time never fails to change. The precision of the design, the variety of the expression, the touches of more or less strength, the gradation of the shades, the rules of perspective, are all abandoned to nature, which, with a sure course that is never false to itself, traces on our cloths the images which are imposed by her on our eyes, and cause us to question whether what we call realities are not other kinds of phantoms imposed upon our sight, hearing, touch, and all the senses at once. The elementary spirit then went into physical details; first, on the nature of the adhesive substance which intercepts and holds the rays; then on the difficulties met in preparing and using it; and, lastly, on the part played by light and the dried substance; three problems which I propose to the physicists of our time, and leave to their sagacity."

The function given by Tiphaigne to the elementary spirits suggests that that author had been initiated into the occult sciences, according to which all the substances in nature possess a proper life, a kind of mortal soul, defined by the term elemental, which directs their reciprocal actions.

"There is not a thing in the world, not a blade of grass, over which a spirit does not reign," says the Cabala of the Jews. "Their life has not an eternal principle as its centre; at their death all is at an end with them." According to Paracelsus, "All the elements have a soul and are living. They are not inferior to man, but they differ from him in not having an immortal soul. They are the powers of nature—that is, it is they that do what we usually attribute to nature. We may call them beings, but they are not the race of Adam." A similar doctrine is developed in Madame Blavatsky's 'Isis Unveiled.' The same method of conceiving of the production of physical phenomena has had defenders in the world of positive science, as in the doctrine of monads of Leibnitz; in the anatomical elements of Claude Bernard, who speaks of our bodies being composed of millions, milliards of minute beings or living individuals of different species, of which those of the same species unite to constitute our tissues, while the tissues join to constitute our organs, and all react upon one another with a harmonious concurrence for a common end,* and in Sir John Herschel, who wrote in the *Fortnightly Review*, in 1865, that all that has been attributed to atoms, their loves and hates, their attractions and repulsions, according to the primitive laws of their being, becomes intelligible only when we admit the presence of a mental quality in them. Modern scientific theories tend to assume the unity of matter, of a protyle, which forms all substances by different degrees of condensation. Some go still further, and assume that there is no matter in the ordinary sense of the word, but only force and energy. F. Hartman argues that we can change force into matter, and that is what takes place every instant in the human body, as well as in the vegetable and animal world, and we can change matter into force under like conditions. This etheric force, the base of all others, is what Lord Lytton describes in his romance, 'The Future Race,' as "vril." So these dreams are repeated—to receive, perhaps, possible verifications in future discoveries, and thus old follies may, as Beaumarchais says, in the 'Marriage of Figaro,' become wisdom, "and the fictions of the ancients be transformed into pretty little truths."

* *Revue des Deux Mondes*, September 1, 1864.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, SEPTEMBER 19, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

OUR EDUCATIONAL CONDITIONS.

WE are now rapidly approaching the end of the period during which it is generally possible to escape for a while from the trammels of business, and even the pharmacist manages to enjoy a more or less brief annual holiday. Those who have been fortunate in this respect are now returning to their duties, and indications are already afforded that active preparations are being made for entering upon the work of the ensuing Session. Our advertisement columns have for the last two or three weeks contained announcements relating to the reopening of the School of Pharmacy, the fiftieth session of which will commence on Thursday, the 1st October. Upon that day the laboratories devoted to instruction in practical chemistry will be opened and students will be able to enter upon their studies. During the next few days the courses of lectures on chemistry by Professor DUNSTAN and on botany by Professor GREEN will be commenced as well as the lectures and demonstrations on practical pharmacy by Mr. JOSEPH INCE and upon materia medica and histology by Mr. H. G. GREENISH. On the first Wednesday of the month the formal inauguration of the session will take place at the Evening Meeting, which will take place on the same day as the Council meeting. Upon that occasion the school prizes obtained during the previous session will be presented by the PRESIDENT of the Society to the successful students, and an inaugural address to the students of the forthcoming session will be delivered by Mr. GAINSFORD BRUCE, Q.C., the member of Parliament for the Holborn division. Everything has been arranged for the prosecution of the sessional work, and if there were in this country an established uniform system of pharmaceutical education, such as it has been the aim of the Pharmaceutical Society to bring into operation, there should be, in the course of another two weeks or thereabouts, something like a thousand students engaged in the task of preparing themselves for their future career in the practice of pharmacy, by attendance at lectures such as

those above mentioned and by practical work in a chemical laboratory and with the microscope. The number here mentioned is arrived at on the basis of the number of candidates presenting themselves for examination in order to obtain certificates of qualification to carry on business on their own account. Last year there were in England and Scotland 1165 candidates, and making allowance for those who may have gone up for examination more than once, the number assumed above cannot be far from correct. That would be the case if the requisite curriculum of study for a pharmaceutical student were compulsory, if, in short, it were a necessity that every candidate for the legal qualification to be secured by passing the Minor examination should, in addition to his technical training as an apprentice, have attended courses of lectures on chemistry, botany, materia medica, and pharmacy, and gone through a course of practical training in the ordinary operations of a chemical laboratory.

Under existing conditions, however, there is nothing like an approach to the desirable state of things above referred to. It may indeed safely be said that the total number of pharmaceutical students in Great Britain engaged in prosecuting such a course of study is never equal to more than a fraction of the number of those who pass the Minor examination and obtain their certificates of qualification to carry on business on their own account. Last year the number of persons who passed that examination was 529, and the number of students who attended all the courses of lectures at Bloomsbury Square and devoted any considerable length of time to laboratory work may certainly be put down as having been less than one hundred. It is evident, therefore, from these simple data that there is now a great deficiency of pharmaceutical education, and that the only hopeful prospect of improvement in this respect lies in making the curriculum of study compulsory. In making a comparison between the number of students attending the School at Bloomsbury Square and that of the persons registered as chemists and druggists it must not be concluded that all pharmaceutical students should necessarily go to London in order to pass through a suitable course of study. The assumption that such would be the effect of a compulsory curriculum is entirely unfounded, and the representation that the Council desires to make all future students come to Bloomsbury Square, is only a perverse device which the opponents of an educational system have had recourse to for want of better arguments to support them. On the contrary, the improvement of the educational facilities offered to pharmaceutical students in the provinces would be one of the first and most important consequences of the establishment of a compulsory curriculum. It is only on that basis that there can be any prospect of supporting provincial schools of pharmacy. The attempts that have been made in that direction are most laudable; but they have almost invariably failed because under the voluntary system there are not students enough to support the schools and the fees that can be obtained are too small to support competent teachers.

There are a few exceptions to the failure that has generally attended provincial schools, and we desire on this occasion to call attention especially to the case of Sheffield, where under peculiarly favourable conditions the local Pharmaceutical and Chemical Society has for several years carried on a School of Pharmacy with much success and the Council of the Pharmaceutical Society has assisted the work by grants of money. The new syllabus of this School has just come to hand, and we are pleased to mention that the seventh session will be opened on the 19th of next month, while the distribution of prizes to last year's students and the delivery of an inaugural address by Mr. Robert Hampson, the Treasurer of the Pharmaceutical Society, will take place on Wednesday the 15th October. In carrying out the educational work of the Sheffield School, the chief burden falls upon the two teachers, Mr. John Humphrey and Mr. J. H. Worrall. If it were not for their enthusiastic devotion to the furtherance of education, it would be impossible for the School to be kept going. But their enthusiasm has the effect, on the one hand, of bringing students to the school, and on the other it induces them to give their time and labour to the teaching upon terms which cannot be remunerative. They are entitled to all praise for this; but we must not lose sight of the fact that permanent success cannot be looked for under such conditions. For the continued success of a school of pharmacy the revenue from students must be sufficient for the adequate remuneration of the teachers. There must be a sufficient number of students and the fees to be paid must be adapted to the value of the instruction given. In the case of the Society's School there is a vast disproportion between the cost of its maintenance and the results, as measured by the number of students; but that disproportion cannot be avoided as matters now stand, and for the sake of the principle involved, the maintenance of the School by the Society is necessary at any cost. It would be impossible to support a number of provincial schools on the same footing without calling upon the members of the Society for an unreasonable pecuniary sacrifice, and it is only by the establishment of a compulsory pharmaceutical curriculum that provincial schools of pharmacy can be efficiently supported on business lines.

A legacy of £100 has been received under the will of the late Mr. Ralph Davison, of Holgate Hill, York, who was a member of the Society from the year 1845, and for many years held the position of Local Secretary.

British Pharmaceutical Conference.

MEETING AT CARDIFF.

Wednesday, August 19.

(*Continued from page* 220.)

The next paper read was a—

Note on a Proposed Method of Standardizing the Extracts of Nux Vomica and Opium.

BY MICHAEL CONROY, F.C.S.

Only the extracts of nux vomica and of opium are referred to in this note, because they are the only two solid extracts of the British Pharmacopœia that are made of a standard alkaloidal strength. As, however, the art of pharmacy is becoming daily more exact, it is quite possible that our next Pharmacopœia may contain several others, such as the extracts of belladonna, calabar bean, colchicum, henbane and hemlock. It is therefore of great importance that some method be adopted whereby standardized extracts may be kept of a uniform consistence instead of being more liquid or solid at one time than another.

It is, I think, generally admitted that the present mode of standardizing the extracts of nux vomica and opium is unsatisfactory. In the case of nux vomica we are directed to estimate the total alkaloid in one fluid ounce of the percolate. Having ascertained this we next take as much of the percolate as contains 131¼ grains of total alkaloid, and by distillation and evaporation reduce it to an exact weight of two ounces. This gives an extract containing 15 per cent. of total alkaloid, but which, as a rule, is far too thin for forming pills. Another important consideration is that an extract of this thin consistence, under certain conditions of storage, is very prone to dry up and so increase in alkaloidal strength as to become a source of danger.

The difficulty that presents itself is that the yields of alkaloid and extractive matter are not always proportionate. One parcel of nux vomica may be rich in alkaloid and poor in extractive matter, in which case we are bound to have a thin extract by our present method, whilst another parcel may be poor in alkaloid and rich in extractive, the result being a more solid extract, but in no case have I met with nux vomica yielding a sufficiently solid extract, when standardized to 15 per cent. of alkaloid. I quite recognize the difficulty of fixing an alkaloidal standard for this or for any other extract, and do not wish to infer that the standard has in this case been fixed too low. It is absolutely necessary in fixing a standard to be rather below than above the average, and in consideration of this I quite think that 15 per cent. total alkaloidal strength is a fair one for nux vomica extract.

In the case of extract of opium the morphine strength of 20 per cent. is undoubtedly too low, the consequence being that the extract is always too soft if fine opium has been used. I do not overlook the fact that the official opium when dried at 212° F. and powdered should contain about 10 per cent. of morphine, or, as stated in the official language, that "100 parts of such dry powdered opium shall yield not less than 9·5 parts, and not more than 10·5 parts of morphine." If genuine Asia Minor opium of this strength could be obtained, and bearing in mind that opium yields about 50 per cent. of extractive, there would be very little difficulty in producing a fairly good extract containing about 20 per cent of alkaloid. Such, however, is not the case. It is practically impossible to obtain genuine Asia Minor opium, the kind directed by the Pharmacopœia, of this low alkaloidal strength. Good Asia Minor opium when dried and powdered as directed yields from 13 to 15 per cent. of morphine by the official test, and I speak from considerable practical experience in opium assaying when I say that the standard of the dry powdered drug should be *at least* 12½ per cent., instead of 10 per. cent as now. Owing to the low standard fixed for this drug, all our official preparations of opium are 20 per cent. too weak, and our extract is not of a suitable consistence for forming pills.

Now bearing in mind that extracts keep better and are much better adapted for pill making, which after all is their chief use, when made of a good firm consistence, and seeing that it is necessary to take a low average alkaloidal standard, I would recommend the adoption of the following method with the view of keeping them up to a uniformly firm consistence.

Exhaust the drug as usual, but instead of evaporating to a certain weight, evaporate until the extract is of a suitable pilular consistence. Then test the alkaloidal strength and make up to the correct standard by the addition of glucose.

Glucose or starch sugar is not at present used in pharmacy, but it is largely used in confectionery and in the manufacture of liqueurs and cordials. There are several commercial varieties, but the one referred to here is the kind known as liquid glucose. It is a colourless, sweetish, transparent, semisolid body, without any special tendency to become dry or to absorb moisture when exposed to atmospheric influences. Adding to these qualities that it is quite innocuous, and that it blends well with these and other extracts with which I have experimented, I consider it a most suitable substance for the purpose.

Samples of extracts standardized as described are on the table for inspection, together with a sample of the glucose used.

Mr. Dott said it was practically impossible to get an opium which would yield an extract having the official percentage of morphia. The usual method of reducing opium by the addition of dried marc, or some such substance, of course would not affect the morphia strength of the extract. He thought the addition of glucose might be useful.

Mr. Short said he had made various experiments on nux vomica preparations and extracts, and he agreed with Mr. Conroy that in a large number of cases the extract when reduced to the strength of 15 per cent. of alkaloid was rather soft; on the other hand, with some other specimens, it was of a medium consistence at that strength, and if any higher standard were adopted it would be inconveniently hard. The only way he saw out of the difficulty was that proposed by Mr. Conroy, of adding something to an extract which would otherwise be too soft. There was a strong feeling against adding anything not contained in the drug itself in preparing an extract, but he could see no harm in adding a substance like glucose. It must be borne in mind that the tincture had to be made from the extract, and therefore something must be used which would be soluble in the alcohol of the tincture and glucose in the small quantity required, would be perfectly soluble in alcohol of the usual strength employed—4 of rectified spirit to 1 of water.

Mr. J. C. Umney said he had found a very convenient method of making the extract harder when too soft was to percolate the marc afterwards with very dilute alcohol and so get out more extractive, and harden the extract with that. Nothing was then introduced which did not actually exist in the drug.

Mr. J. Barclay suggested exhausting the opium first with cold water of all its alkaloid and then exhausting the marc with hot water, which took out a great deal of the extractive. The first extract having been assayed could be reduced in strength by the extractive matter made with the hot water.

Mr. Grose said this paper would be of great interest to retail pharmacists and pill makers. The consistence was not so important to his mind because

extract of nux vomica or opium was ordered in small quantities in pills, and it could be generally combined with something to make a firm pill; but if one had three grains extract of belladonna or hyoscyamus to put into a pill, a considerable quantity of excipient had to be added to make it of pilular consistence. He thought the wholesale houses, on whom many retail pharmacists had to depend, were much to blame in selling their customers so much water. Many of the extracts were far from being of a pilular consistence.

Mr. Moss thought Mr. Grose's remarks showed the advantage which the dispenser had over the manufacturer in dealing with extracts. He had arrived independently at the same method of making extract of nux vomica pretty uniform and at the same time of fairly good consistence as Mr. Umney. With regard to extract of opium, making it a little at a time, there was a difficulty in getting any single specimen of opium which would give an extract of the right strength, but by adjusting the proportions of good opium, rich in extractive, such as Malasian, and another kind which came from some other part of Asia Minor, which did not yield so much extractive and was also poor in morphia, you could, by assaying the opiums beforehand, arrive at a mixture which would yield an extract answering to the Pharmacopœia requirements. Of all the things proposed glucose appeared to be the least objectionable; it was so much of the nature of what was found in the drugs themselves that it appeared to be almost the natural article.

Mr. Burroughs suggested that it would be better to raise the standard of alkaloid.

Mr. Southall thought the suggestion just made a very good one. They wanted to harden the extract, not to soften it, which he thought would be the effect of adding glucose; and it was objectionable to add any foreign body at all.

The President pointed out that when the standard in the Pharmacopœia was fixed, opium was at a very high price, but now that it was much cheaper it might be as well to raise the standard. He saw objections to the use of glucose to bring down the extract to the Pharmacopœia standard, as the pills would probably lose their shape, and he should prefer for that reason to use the much-abused sugar of milk. In making extract of opium they wanted to free the drug from some of its constituents which were noxious, and he thought the use of hot water to dissolve out more of some inert substance would be very detrimental, as it also would dissolve out the narcotine, which was best left behind. The cold water extract was a better preparation, and the real object in having an aqueous extract was to be free from several constituents which were detrimental. With regard to nux vomica, the suggestion of Mr. Umney and Mr. Moss appeared to be about the best; viz., to use a somewhat weaker spirituous menstruum, one almost aqueous, for the purpose of getting more extractive, and upon evaporation would yield a solid substance suitable for diluting a too strong spirituous extract.

Mr. Conroy, in reply, said he had tried using a weaker menstruum for nux vomica, but did not find it very satisfactory, and thought the use of glucose far preferable. He was surprised at Mr. Barclay's remarks, for it was a most peculiar proceeding to exhaust the opium with hot water and then use the product to dilute the extract, into which it would introduce a lot of insoluble matter.

The next paper read was entitled—

Suggestions for the Assay of Aconite and its Preparations.

BY ALFRED H. ALLEN, F.I.C., F.C.S.

The importance attaching to the assay and standardizing of preparations of aconite is universally admitted, but the exceptional difficulties connected with the problem have hitherto prevented any satisfactory solution. That these difficulties are very great is unquestionable, and my proposals must be regarded rather in the light of suggestions, which may assist other workers in solving the problem, than as a claim to have succeeded in its solution. The extraction of the total alkaloids from aconite root can be effected with tolerable ease, and by the use of judiciously chosen methods they can be isolated fairly pure and without having undergone any material change. The recent paper, by Messrs. Farr and Wright (*Pharm. Journ.* [3], xxi., 1037), is a valuable contribution to this part of the subject; but, as is fully recognized by these chemists, the determination of the total alkaloids of an aconite preparation is in itself of limited value as a criterion of its activity. It is rather the first step in the process of assay, the potency of the preparation substantially depending on the results subsequently obtained.

Where the amount of material is sufficient, there is no doubt that it is very desirable to isolate the crystallizable alkaloid, and if this could be effected with an approach to quantitative accuracy, it would probably furnish the most reliable criterion of the physiological activity of the substance. In practice, however, very great difficulties attend such a method of examination. In the first place, there is always a danger that the maximum yield of crystals may not be obtained, and hence that the activity of the preparation will be seriously under-estimated. But apart from this source of error there exists the grave difficulty that the amount of substance which is commonly available, or can be conveniently submitted to examination, yields a quantity of total alkaloids far too small to render any method based on crystallization practically available.

Under these circumstances, I have, with the assistance of Mr. G. E. Scott-Smith, recently made some experiments to ascertain how far a method based on the saponification of the crystallizable alkaloids could be applied to the very small quantities of material isolated in an ordinary assay. That the saponification occurs with a near approach to quantitative accuracy was clearly established by C. R. Alder Wright, who also proposed to apply the reaction to the actual assay of aconite alkaloids ('Year-Book,' 1877, p. 463). Hence I have thought it unnecessary to repeat Wright's classical experiments, and have sought rather to adapt his researches to the particular object in question, namely, the examination of very small quantities of aconite alkaloids.

The following table represents the composition of the three principal saponifiable alkaloids of aconite, and shows the products of their saponification. The table is substantially founded on the researches of C. R. Alder Wright, but the number of atoms of hydrogen in the formulæ of aconitine and aconine has been increased in each case by two, in accordance with the recent researches of Dunstan and Ince, though it is still an open question whether their formulæ or those of Wright express the true composition of the alkaloids in question.

A method of assay based on the saponification of the crystallizable alkaloids has the great merit of distinguishing sharply between the three principal poisonous aconite bases, on the one hand, and the comparatively inactive products of their decomposition on the other. In fact, as it is generally accepted that aconine has only $\frac{1}{800}$ of the physiological activity of aconitine, and that japaconine and pseudaconine bear a similar relation to their respective parent alkaloids, it may be safely assumed that the activity of a mixture of aconite alkaloids is substantially represented by the proportion of saponifiable base present, and therefore if the latter can be ascertained with an approach to quantitative accuracy, a considerable advance will

Crystallizable Alkaloid.		Products of Saponification.					
		Acid Product.				Basic Product.	
Name.	Formula.	Name.	Formula.	Yield.	NaHO required.	Name.	Formula.
Aconitine (from *A. Napellus*) . . .	$C_{33}H_{45}NO_{12}$	Benzoic acid	$C_7H_6O_2$	18·92	6·20	Aconine	$C_{26}H_{41}NO_{11}$
Japaconitine (from *A. Fischeri, etc.*)	$C_{66}H_{88}N_2O_{21}$	Benzoic acid	$C_7H_6O_2$	19·60	6·43	Japaconine	$C_{26}H_{41}NO_{10}$
Pseudaconitine (from *A. ferox*) .	$C_{36}H_{49}NO_{12}$	Veratric acid (Dimethyl-protocatechuic acid)	$C_9H_{10}O_4$	26·49	5·82	Pseudaconine	$C_{27}H_{41}NO_9$

have been made towards the solution of the problem of the assay of aconite preparations.

As already stated, C. R. A. Wright's researches long ago established the quantitative accuracy with which the saponification of the aconite bases occurred. Thus the reaction of aconitine with caustic soda is expressed as follows :—

$$\underset{\text{Aconitine.}}{C_{33}H_{45}NO_{12}} + \underset{\text{Soda.}}{NaHO} = \underset{\text{Aconine.}}{C_{26}H_{41}NO_{11}} + \underset{\text{Sodium benzoate.}}{NaC_7H_5O_2}$$

The saponification of japaconitine and pseudaconitine may be expressed by similar equations, bearing in mind that the former alkaloid reacts with 2NaHO with formation of two molecules of sodium benzoate and two of japaconine.

Wright's saponification experiments were made on comparatively large quantities of alkaloids, but to be of practical value the method of assay must be available with a quantity of aconite bases not exceeding 50 milligrammes,* and should even be applicable with half that quantity, or less than $\frac{4}{10}$ of a grain. I may fairly claim to have achieved a certain amount of success in dealing with these small quantities, a success which is in great measure due to the use of two most valuable reagents, neither of which had come into use at the period of Wright's researches. I refer to methyl-orange and phenolphthalein, the value of which as indicators is even now far from being fully recognized. Methyl-orange is sensitive only to the stronger acids, but reacts with the weakest bases. Hence all the ordinary alkaloids may be titrated with accuracy by its aid. Phenolphthalein, on the other hand, is sensitive to the weakest acids, but is quite unacted on by the majority of the alkaloids ; atropine, homatropine, hyoscine and hyoscyamine being the most notable exceptions. Sulphate of quinine, hydrochloride of morphine, and hydrochloride of aniline are perfectly neutral to methyl-orange, but react with phenolphthalein just as if the acids were in a free state. As phenolphthalein is sensitive to carbonic acid, no sharp results can be obtained unless the standard alkali used in titrating be quite free from carbonate. This is best ensured by employing baryta water as the standard alkaline solution, and experience has convinced me that this reagent is at least twice as sensitive as the most carefully prepared caustic soda. Either hydrochloric or sulphuric acid is suitable as the standard acid; oxalic acid does not react well with methyl-orange. As very minute quantities of acid and alkali are in question, I have found it necessary to employ very dilute standard solutions. The water used for diluting them must be recently boiled, and rigidly neutral in reaction. The standard solutions I have adopted are of $\frac{1}{50}$ normal strength. Thus the hydrochloric acid contains $\frac{36{\cdot}5}{50}$ grammes of HCl per litre and the baryta $\frac{171}{2\times50}$ grammes of BaH_2O_2 per litre. Omitting any description of some preliminary experiments, the process we have found most successful for the analysis of small quantities of the aconite alkaloids is as follows :—A weight of 30 mgrms. of pure crystallized alkaloid, or about twice that quantity of the mixed alkaloids from aconite, is dissolved in about 15 c.c. of ether, and the solution placed in a small stoppered cylinder, together with 3 c.c. of water, containing a drop of a $\frac{1}{10}$ per cent. solution of methyl-orange and previously rendered sensibly pink by a minute addition of acid. Standard hydrochloric or sulphuric acid of $\frac{1}{50}$ normal strength ($\frac{36{\cdot}5}{50}$ of HCl or $\frac{49}{50}$ grammes of H_2SO_4 per litre) is then carefully added from an accurately divided burette, with vigorous agitation between each addition. The addition of acid is continued until the lower aqueous layer retains a red tint, even after thorough agitation with the ethereal stratum. Operating in this manner, the reaction is extremely delicate, for the brownish colour exhibited by the ethereal layer, when an impure alkaloid is titrated, in no way interferes, but presents a marked contrast to the colour of the aqueous liquid. The following factors may be used for calculating the amount of acid used to its equivalent of alkaloid :—

1 c.c. of $\frac{N}{50}$ acid	neutralizes	12·94	mgrms.	of	aconitine
,,	,,	10·86	,,		aconine
,,	,,	14·14	,,		pseudaconitine
,,	,,	10·46	,,		pseudaconine
,,	,,	12·44	,,		japaconitine
,,	,,	10·54	,,		japaconine

These figures are, of course, mere calculations, but it is worthy of note that by actual experiment 30 mgrms. of japaconitine was found to neutralize 2·40 c.c. of $\frac{N}{50}$ acid, which, according to the ratio HCl : $C_{66}H_{88}N_2O_{21} = 36{\cdot}5 : 1244$, would be equivalent to 59·7 mgrms. of alkaloid. A reference to C. R. A. Wright's paper at this point showed that japaconitine hydrobromide had the formula $C_{66}H_{88}N_2O_{21},2HBr$, and hence that the alkaloid represented by the acid used would be only one half the weight previously assumed. This corrected calculation gave a figure closely agreeing with the weight of aconitine taken.

The aqueous liquid containing the neutralized alkaloid was then separated from the ethereal layer (retaining the colouring matter) and treated with 20 c.c. of rectified spirit (neutral to phenolphthalein) and 3 c.c. of a solution of caustic soda in an equal weight of water. The liquid was then boiled for an hour in a flask under a reflux condenser, after which the alcohol was distilled off and the residual liquid acidulated with hydrochloric acid. The liberated benzoic acid was extracted by agitation with about 15 c.c. of ether, and the ethereal solution separated and washed with successive small quantities of water, until the washings showed their freedom from mineral acid by ceasing to redden litmus.

* When such small quantities are in question the gramme is inconveniently large as a unit of weight, and hence throughout the paper the results are expressed in milligrammes.

The ethereal liquid was then separated and transferred to a small cylinder of 25 c.c. capacity, about 5 c.c. of water faintly coloured with phenolphthalein added, and a $\frac{1}{50}$ normal baryta water dropped in till the aqueous layer acquired a pink colour, which was not destroyed by agitation with the ethereal stratum. From the measure of standard alkali consumed the amount of aromatic acid resulting from the saponification was calculated. 1 c.c. of $\frac{N}{50}$ baryta neutralizes 2·44 mgrms. of benzoic or 3·64 mgrms. of veratric acid. Although these acids have different combining weights, the volumes of alkali neutralized by equivalent proportions of them are, of course, identical, and hence no grave difference results in calculating the saponifiable alkaloid, whether benzoic or veratric acid has been produced by the saponification. Thus—

c.c.		mgrms.
1 $\frac{N}{50}$ baryta	represents	12·94 of aconitine saponified.
„ „	„	14·14 of pseudaconitine „
„ „	„	12·44 of japaconitine „

In some cases I have endeavoured to estimate the basic product of the saponification, but with less success than has attended the determination of small quantities of benzoic and veratric acids. The acid liquid from which the aromatic acid has been extracted by agitation with ether has been rendered alkaline by potassium bicarbonate, and shaken with ether. Aconine is said to be practically insoluble in ether under such circumstances, but as a matter of fact I have always obtained a considerable quantity in this manner and a very trifling additional quantity on subsequently agitating the liquid with chloroform. But there is reason to believe that aconine is not extracted perfectly by either of these solvents from a liquid rendered alkaline by potassium or sodium bicarbonate. It is probable that a more complete extraction might be effected by the use of caustic alkali. Pseudaconine is said to be readily soluble in ether, and conformably with this statement a full weight of the basic product of the saponification of crude pseudaconitine was obtained.

The following figures (Table A) show the results obtained on applying the foregoing process to samples of pure aconitine and japaconitine kindly supplied me by Mr. F. Ashley Rogers. The results from aconitine were not obtained by the analysis of three different samples, but represent the figures yielded by three separate analyses of the same sample of alkaloid, and hence show the variations to be expected with careful manipulation :—

Table A.

	Crystallized Aconitine from *A. Napellus*.			Japaconitine, (not quite pure).
	1.	2.	3.	
Weight taken, mgrms. . . .	30·0	30·0	30·0	30·0
$\frac{N}{50}$ acid for neutralization . .	—	2·31	2·40	2·40
= aconitine . .	—	29·9	31·0	29·8 (japaconitine)
$\frac{N}{50}$ baryta for neutralizing acid .	2·45	2·19	2·39	2·30
= benzoic acid .	5·9	5·3	5·8	5·6
= aconitine . .	31·6	28·3	30·9	28·5 (japaconitine)
Basic product: Extracted by ether . . .	—	—	20·5	—
Subsequently by chloroform . .	—	—	0·0	—

So far I have not had the opportunity of examining pure pseudaconitine by the same process, but the mixed alkaloids extracted by ether from a tincture of aconite kindly furnished me by Mr. R. A. Cripps, and prepared by him from roots of *Aconitum ferox* supplied by Messrs. Horner and Co., have yielded the following results :—Alkaloid taken, 76·7 mgrms.; by titration, 74·9 of alkaloid calculated as pseudaconitine. Saponified it required 3·90 c.c. of $\frac{N}{50}$ baryta, corresponding to 14·3 mgrms. of veratric acid, the weight actually extracted by ether being 13 mgrms. The baryta used represents 55·1 of pseudaconitine, leaving 21·6 of unsaponifiable alkaloid (pseudaconine). The basic product of saponification extractable by ether amounted to 66·5 mgrms., an additional 2·0 being extractable by chloroform. These residues required 4·91 c.c. of $\frac{N}{50}$ acid, corresponding to 51·4 of pseudaconine or 69·4 of pseudaconitine.

The foregoing experiments having indicated that the process in question was capable of affording very fair results, considering the very small quantity and the high combining weight of the substance employed, we examined by the same method some specimens of mixed aconite alkaloids extracted from the root by Messrs. Farr and Wright, and kindly sent me by the latter gentleman. The following results were obtained :—

Table B.

	A.	B.	C.	D.	E.	F.
Weight taken . . .	55·0	51·7	26·0	87·0	21·0	31·5
Aconitine by titration	67·0	66·7	29·4	—	28·0	—
Benzoic acid	5·2	4·0	—	8·4	—	4·8
= aconitine . . .	27·7	20·4	—	44·5	—	25·7
Basic product:						
By ether	38·0	—	—	—	—	—
By chloroform . .	2·0	—	—	—	—	—
By KHO and $CHCl_3$	4·0	—	—	—	—	—
Total, weighed . .	44·0	—	—	—	—	—
„ titrated . .	48·9	—	—	—	—	—
„ „ aconitine	58·2	—	—	—	—	—
Percentage of saponifiable alkaloid.	50·4	39·5	—	51·1	—	81·6

These results are somewhat erratic, so far as the basic products of saponification are concerned, probably in part owing to incomplete extraction and in part because of the further change aconine is known to suffer when heated with caustic alkali. But as the proportion of saponifiable or active alkaloid is deduced from the acid product, and this can be determined with facility and great accuracy, the immediate object of the research may be said to have been effected.

How far japaconitine and pseudaconitine may be considered equivalent to aconitine in physiological activity, I do not intend to discuss, but may say that the balance of evidence seems to show that the three alkaloids are approximately equally active when in a pure crystallized state.

So far I have regarded aconitine, japaconitine and pseudaconitine as practically the only alkaloids concerned in the physiological activity of preparations of aconite. I believe I am justified in this view, and that I might even have omitted pseudaconitine from consideration without materially affecting the practical bearing of the question. But I have no doubt it has been in the minds of some present that these three alkaloids are not the only saponifiable bases of the aconites. Thus, *lyaconitine*, the amorphous alkaloid of *Aconitum Lycoctonum*, also yields an acid and one or more bases on saponification (of which one, lycoctonine, readily crystallizes), but it is doubtful if the reaction can be expressed by any simple formula. *Picraconitine* was isolated by T. B. Groves from a parcel purchased in 1874 as roots of *Aconitum Napellus* of German growth (' Year-Book,' 1874, 510).

It is an amorphous, bitter, non-poisonous alkaloid, forming a crystallizable hydrochloride and nitrate, and was found by C. R. A. Wright to yield benzoic acid and a basic principle on saponification. Although picraconitine is well characterized, it does not appear ever to have been met with again, unless the imperfectly examined bitter alkaloid obtained by E. L. Cleaver from *Aconitum paniculatum* was identical therewith. At any rate, in the absence of further evidence of its occurrence, we may regard picraconitine as too rare a base to require consideration in devising a process for the assay of aconite. Besides, its unrecognized presence in a preparation would merely result in the saponification test indicating a greater proportion of physiologically active alkaloid than actually existed, so that the error would be on the right side.

But if it be a fair presumption that the physiological activity of a specimen of mixed aconite alkaloids may be gauged by the proportion of saponifiable base contained in it, there is some reason to doubt whether all specimens of pure crystallized aconitine from *Aconitum Napellus* have even approximately the same toxicity, to say nothing of possible differences in strength between these preparations and japaconite or pseudaconitine.

The first doubt on this point seems to have been raised at the Birmingham meeting of the Conference, when the late Mr. John Williams, in a paper on 'Crystallized Aconitine,' stated that the aconitine prepared by precipitating a solution of the nitrate by a large excess of nitric acid, in the manner proposed by Alder Wright, did not crystallize in the same well-defined and perfect forms as the original alkaloid. Mr. Williams's experience has since been confirmed by the late Mr. Edwin Richards, who in a paper written jointly with Mr. F. Ashley Rogers (*Chemist and Druggist*, February 7 and 14, 1891), states that further practice enabled them to effect the crystallization of the alkaloid recovered from the nitrate, which, however, they regard as permanently changed in its nature. The recovered alkaloid they call β-aconitine and attribute to it the melting-point 178°–180° C., as compared with 182°–184° (uncorrected) observed by them as the melting-point of the original crystallized alkaloid. Messrs. Richards and Rogers further attribute to the β-aconitine, or alkaloid recovered from the nitrate, a toxicity very materially greater than that of the original crystallized alkaloid, called by them α-aconitine.

At first sight it appears highly improbable that the mere conversion of aconitine into the nitrate and its recovery from that salt can have any notable effect on its crystalline habit, melting point, or toxicity. But the process in question does not merely consist in forming the nitrate and crystallising that salt. It involves the solution of the alkaloid in dilute nitric acid, and the precipitation of the nitrate from that solution by addition of an excess of moderately strong nitric acid, in which the salt is insoluble. But Alder Wright has pointed out that the aconite alkaloids, when treated with excess of dilute mineral acid, are very liable to lose the elements of water, with formation of the corresponding *apo-* or *anhydro-bases*. This occurs so readily with pseudaconitine that Wright was at first misled as to the formula of the alkaloid, owing to the substance analysed containing a considerable proportion of anhydro-pseudaconitine. He further states ('Year-Book,' 1878, p. 488) that "in consequence of this ready dehydration, it is difficult to isolate aconitine from *A. Napellus* roots, as the crystallized base is apt to be mixed with apo-aconitine, which closely resembles the parent alkaloid. . . The hydrobromide of apo-aconitine, however, appears to be more soluble in water than that of aconitine, so that by converting the mixture of bases into hydrobromides, crystallizing, and regenerating the alkaloid from the crystals, pure aconitine is obtained, the apo-aconitine remaining in the mother-liquors."

Apo-aconitine is stated by Wright to melt one or two degrees below the parent alkaloid, and to be obtained by the evaporation of its ethereal solution in small colourless crystals, which cohere and stick to the sides of the glass vessel in a characteristic manner. In physiological activity it appears to be "not inferior" to the parent alkaloid. It appears highly probable, therefore, that commercial crystallized aconitine and the nitrate sometimes contain considerable admixtures of apo- or anhydro-aconitine, and that this fact is the true explanation of the alteration in crystalline habit and melting-point observed by Richards and Rogers. But if the physiological activity is largely increased by the dehydration, it is eminently important to abandon any process of purification which involves such a change, or which does not include the elimination of the altered alkaloid. The statement of Richards and Rogers, that a very large increase in the toxic activity of crystallized aconitine is produced by the nitric acid treatment, requires the support of confirmatory testimony before it can be positively accepted as correct; but it is at least eminently suggestive, and if confirmed will go far to explain the conflicting and perplexing statements of various observers as to the relative potency of the several brands of commercial aconitine.

The PRESIDENT said the suggestions made in this paper were very ingenious, and might lead to a process which would be found satisfactory for titrating the alkaloidal strength of galenical preparations of aconite.

Mr. J. C. UMNEY having had the opportunity recently of working for some time on these alkaloids thought he might fairly make one or two remarks on this paper. In the first place, referring merely to alkaloids of *A. Napellus*, the process of saponification by an alkali and then titrating the benzoic acid was perfectly incorrect, for this reason. As had been pointed out by Dr. Wright and Mr. John Williams, in addition to the amorphous base aconine, the aconitine was associated in that plant with another base, which had subsequently been examined by Jürgens, and the results stated in a paper which had not, he believed, been translated into English, so that there were three bases really in *A. Napellus*. The base examined by Jürgens also by saponification yielded benzoic acid. The total amount of alkaloids was about ·07 per cent., and of these about ·02 to ·03 consisted of this other base, which was also saponifiable. The actual percentage of benzoic acid which it yielded on decomposition he did not remember, but the formula for the amorphous base with which it was associated was that of a smaller molecule than that of aconitine. During the past ten months he had been making experiments on these bases, but as they had been made in conjunction with Professor Dunstan in the Research Laboratory he did not feel at liberty to state what the results were. He had, however, had the opportunity of confirming exactly what Jürgens said about the association of this other base with aconitine, which yielded benzoic acid on splitting up either by alkalis or acids. The plants worked upon had been grown especially for the purpose by Mr. Holmes, and were carefully selected, so that there could be no doubt about the association of other bases from other roots, such as *A. lycoctonum*, which Mr. Allen had mentioned as yielding benzoic acid. This, therefore, would make a difference of possibly 50 per cent. in the estimation of the benzoic acid.

Mr. ALLEN asked how that occurred.

Mr. UMNEY said the aconitine was associated with another base which also yielded benzoic acid. The process described by Mr. Allen consisted in estimating the total amount of benzoic acid obtained by saponification from the alkaloidal constituents taken out of a certain

sample, calculating back into aconitine, and saying the alkaloidal yield was so much aconitine. But as that base was associated with another which yielded benzoic acid possibly to an equal extent, there would be an error of about 50 per cent. With regard to aconine he understood Mr. Allen to say that it was soluble in anhydrous ether, which was incorrect. The other base associated with aconitine in the plant which yielded benzoic acid was, he believed, an inert base; at any rate, he had taken a fair quantity of it without feeling any harm.

Mr. SHORT said Mr. Allen had mentioned that phenolphthalein, which he used as an indicator, was inactive towards a number of alkaloids; but morphine reacted in the opposite direction, as an acid, toward phenolphthalein, probably owing to its containing an hydroxyl group.

Mr. DOTT asked if there would not be a great difficulty in preserving the proper standard of the baryta water, if there were any access of carbonic acid. He knew that phenolphthalein and methyl-orange were employed for obtaining very delicate results, but understood they were interfered with by the presence of small quantities of unknown substances. He had noticed that rectified spirit required a certain amount of soda to be added to it before the characteristic colour was produced with phenolphthalein; was that in consequence of the rectified spirit containing some free acid?

The PRESIDENT said the thanks of the Conference were due to Mr. Allen for his interesting and suggestive paper, which would probably lead to some plan of standardizing these potent preparations, which were now often very indefinite.

Mr. ALLEN, in reply, said much of the spirit in commerce was distinctly acid, and would require the addition of several drops of alkali to it before it would cease to decolorise phenolphthalein. In all cases of titration it was necessary to start with the same conditions with which the experiment concluded. If there were to be a slight alkalinity in the end the operator must start with that, and make the reagents comply with the conditions to begin with. He had not the smallest doubt of the accuracy of phenolphthalein estimations; he was using it every day for all kinds of oil and fat analyses, and he had every confidence in it. As to methyl-orange, there were, no doubt, good and bad specimens; he had exchanged opinions with Mr. Dott about that before, but he had no doubt of its value as an indicator. Of course, baryta water was liable to change; but how much better it was to have a solution which, when it changed, showed it had done so, than one which absorbed CO_2 and gave no indication of it, like caustic soda. If you had clear baryta water you knew it was all right, and you could set it at the very moment you made the experiment, if necessary. It could be kept in a special apparatus into which carbonic acid was not allowed to enter, and drawn from it when required. But it was not necessary to have any complicated apparatus. The difficulty was in getting distilled water sufficiently pure, neutral, and free from carbonic acid to dilute a tolerably strong solution down to $\frac{1}{50}$, but those were points which a little skill in manipulation would readily overcome. A far more serious matter was the comment made by Mr. Umney on the benzoic acid titration process, and, therefore, on the whole saponification method originally suggested by Dr. Wright, and now worked out by him (Mr. Allen) for these small quantities, which was said to be absolutely valueless.

Mr. UMNEY said his remarks applied to *A. Napellus* only.

Mr. ALLEN said the reason given was, first, because there was a gummy base found by Groves.

Mr. UMNEY said the gummy base he had referred to was not found by Groves. The "picraconitine" which Mr. Groves found had never been found by anyone else, and by him only on one occasion. The gummy base he had referred to was found originally by Dr. Wright, who made a combustion of it, and confirmed subsequently by Williams and by Jürgens. Professor Dunstan referred to it in a paper recently read before the Chemical Society, and he (Mr. Umney) had subsequently investigated it with him.

Mr. ALLEN said they agreed, then, that Mr. Groves picraconitine had never been met with again, or, as he had said, it was of too rare occurrence to trouble about On the other hand, there was the gummy base said to have been described by Mr. Williams and Dr. Wright, which was subsequently obtained by Jürgens and now the subject of unpublished researches by Professor Dunstan and Mr. Umney. In reading very carefully Messrs. Dunstan and Ince's paper, he did not see any mention of it, and when you came to a gummy base which was not named or analysed, but only reserved for further investigation, you generally put it down in the category of mixtures or impure substances which were never heard of afterwards, or which the next investigator proved to be of indefinite character. If it had been isolated in quantity equal to that of the crystalline aconitine from *A. Napellus*, and at the same time was not poisonous, it was quite clear that it was a very serious and possibly a fatal objection to his process, always providing that it was saponifiable, which he did not think some of the investigators mentioned had stated it to be. But that was all in the future, and he rather protested against a paper, which after all was entitled "Suggestions," being condemned in that wholesale manner simply because of unpublished and uncriticized observations, which when they saw the light might possibly be found valuable, but which at present could not be dealt with. If papers were to be discussed on such a basis they would never make any advance at all. He should look forward with the greatest interest to the publication of these experiments, for he was quite sure they did not know anything like the whole about these aconite bases. The contradictory statements made as to the solubility of aconine in ether had caused him to look carefully into that subject. It was said not to be extractable by ether from aqueous liquids, but that was quite a different thing from being insoluble in anhydrous ether. It was a little doubtful if they knew what aconine was, notwithstanding Professor Dunstan's researches. He was a little shy about accepting as a chemical individual a substance which would not crystallize. But however that might be, there was no doubt whatever that if there had been isolated another gummy inactive base of definite composition which was saponifiable, and which yielded at least as much benzoic acid as aconitine, or more, though if it were of larger molecular weight than aconitine, as stated by Mr. Umney, he did not well see how that could be—perhaps Mr. Umney would make that clear afterwards.

Mr. UMNEY said his statement was that he could not give any results of his own work, as they were unpublished, but he had given the results of Jürgens and others which were published.

Mr. ALLEN said the results obtained by Jürgens were no doubt of the utmost importance, and they would all be glad to see them if ever they appeared in an available form. The present paper was simply intended to show what could be done in the direction of the determination of very small quantities of alkaloid and the products of their saponification; and many of the suggestions were really applicable to other alkaloids as well as to those of aconite. It did seem to him an extraordinary thing that the Pharmacopœia should prescribe the use of the English root, when it was almost unobtainable. Messrs. Farr and Wright had to go to the German root to prepare their

tincture, although according to the B.P. it had to be made from the English root. That was an anomaly which he thought ought to be put an end to.

The PRESIDENT said it was satisfactory to know that Professor Dunstan and his colleague had the matter under consideration, and the paper recently laid before the Chemical Society was only a preliminary instalment of what might be expected. They would all look forward with great interest to these important questions being settled. They had been reproached even by medical authorities because they did not know what the active constituents of aconite were, and that they were supplying an article under the name of aconitine which medical practitioners dare not administer internally as a medicine. Professor Dunstan and his colleague had so far defined the present pharmaceutical preparation, and there was very little doubt of what they did get from *A. Napellus*, and the further investigation of the other bye-products would be looked forward to with great interest. They were much indebted to Mr. Allen for his process for estimating the amount of the alkaloid which was probably the most active in *A. Napellus* and in the Pharmacopœia preparations; with modification it might be of service.

A vote of thanks to Mr. Allen was then passed.

The next paper read was entitled—

SOME NOTES ON OIL OF EUCALYPTUS AND EUCALYPTOL.

BY R. H. DAVIES, F.I.C., F.C.S., AND T. H. PEARMAIN.

Having recently been engaged in the examination of several specimens of oil of eucalyptus we have thought that the results would prove of interest to the Conference, and, though not affording the necessary data for a satisfactory answer to the "Blue List question 23," "Has not the time arrived for defining more exactly Ol. Eucalypti, B.P.?" might be of some assistance in that direction.

In all, some twenty-four samples of oil have been more or less completely examined. With the exception of three (numbers nine, ten and eleven) they may all be regarded as commercial specimens of the oil. The botanical sources of the first seven samples are stated on the representation of the manufacturer or his agent, numbers eight to eleven are duplicates from the Pharmaceutical Society's Museum, for which we are indebted to the courtesy of Mr. E. M. Holmes. Numbers twelve to nineteen are commercial specimens obtained in London during this year, and the remaining five are similar specimens that have been in stock for three years or more.

Number.	Reputed botanical source.	Geographical source.	Specific gravity.	Specific rotation $(\alpha)_D$.	Solubility of salicylic acid.	Phellandren reaction.	Solubility in rectified spirit.	Acidity as acetic acid.	Iodine absorption equivalent.
				Degrees.	Acid. Oil.		Oil. Spirit.	P.c.	P.c.
1	*E. Globulus*	S. Europe.	·9025	+18·09	1 reqrs. 6·1	Negative.	—	—	142·43
2	,,	,,	·910	− 3·91	1 ,, 4·7	,,	—	—	128·51
3	,,	,,	·910	− 0·27	—	—	—	—	71·83
4	*E. odorata*	Australia.	·9013	+17·7	1 ,, 6·1	,,	—	—	106·95
5	*E. oleosa*	,,	·9228	− 3·82	1 ,, 3·1	,,	5 in 1	0·04	41·1
6	,,	,,	·927	− 3·81	1 ,, 3·0	,,	—	—	—
7	,,	,,	·9221	− 4·69	—	—	—	—	—
8	*E. amygdalina*	,,	·8845	−40·2	1 ,, 11·6	Phellandren present.	—	—	133·73
9	*E. dumosa*	,,	·9196	+ 5·03	1 ,, 3·5	Negative.	—	—	79·64
10	*E. dealbata*	,,	·8848	+ 0·37	1 ,, 5·8	,,	—	—	155·99
11	*E. Baileyana*	,,	·8927		1 ,, 7·1	,,	—	—	168·72
12	Unknown.	,,	·8994	+13·10	1 ,, 3·9	,,	3 in 1	0·11	162·67
13	,,	,,	·8788	−43·22	1 ,, 7·6	Ph. present	2 ,, 1	0·09	162·77
14	,,	Unknown.	·912	+ 2·97	1 ,, 3·9	Negative.	5 ,, 1	0·09	101·48
15	,,	,,	·913	+ 4·52	1 ,, 3·5	,,	2 ,, 1	0·09	—
16	,,	Australia.	·8575	−64·72	1 ,, 14·9	Ph. present	Incompltly soluble.	0·03	—
17	,,	,,	·8595	−59·75	1 ,, 17·6	,,	,,	0·02	—
18	,,	Unknown.	·9065	+ 8·21	1 ,, 4·9	Negative.	2·3 in 1	0·14	—
19	*E. Globulus*	,,	·9174	+ 5·23	1 ,, 3·6	,,	2·5 ,, 1	0·02	—
20	Unknown.	,,	·8712	−61·3	1 ,, 12·6	Ph. present	Incompltly soluble.	0·07	192·89
21	,,	,,	·8754	−50·37	1 ,, 12·6	,,	,,	0·09	176·77
22	,,	,,	·9115	+ 0·49	1 ,, 8·3	Negative.	3 in 1	0·23	—
23	,,	Australia.	·916	+ 2·73	1 ,, 4·5	,,	2·5 ,, 1	0·20	—
24	,,	Unknown.	·910	−19·23	1 ,, 6	,,	5 ,, 1	0·12	—
Average of all the samples .			·9015	−12·15	1 to 7·6	—	—	·09	139·61
Lowest			·8575	−64·72	1 ,, 3·0	—	5 in 1	·02	41·10
Highest			·927	+18·09	1 ,, 17·6	—	5 ,, 50+	·23	192·89
Average of "heavy class" . .			·9125	+ 2·65	1 ,, 4·65	Ph. absent.	3·3 ,, 1	·11	101·75
Lowest ,,			·8994	−19·23	1 ,, 3·0	,,	5 ,, 1	·02	41·10
Highest ,,			·927	+18·09	1 ,, 8·3	,,	2 ,, 1	·23	162·67
Average of "light class" . .			·8721	−53·26	1 ,, 12·8	Ph. present	—	·06	177·47
Lowest ,,			·8575	−64·72	1 ,, 7·6	,,	2 ,, 1	·02	162·77
Highest ,,			·8848	−40·20	1 ,, 17·6	,,	5 ,, 50+	·09	192·89

Speaking broadly, these results confirm and emphasize the conclusion drawn by MacEwan and others as to the two well marked varieties of eucalyptus oil.

The first kind of oil has a sp. gr. of 0·900 to ·930, has but little rotation, remains liquid when subjected to the action of nitrous acid, showing absence of phellandren; whilst the second has a gravity ·885 or lower, a strong rotation to the left, and yields a solid mass when treated with nitrous acid, owing to the phellandren it contains.

It appears also that the heavier oils as a class dissolve salicylic acid more readily than the lighter, for in the former case, out of 16 specimens tested the amount of oil required to dissolve one part of acid varied from 8·3 parts to 3·0 parts, whilst in the latter the smallest weight of oil was 7·6 and the largest was 17·6. The average amount of oil required by the heavier was 4·8 parts, and of the lighter 12·8 for one part of the acid. We are not disposed to attach too much importance to this distinction, since it happens that the four lightest oils were not completely soluble in ten times their weight of rectified spirit, and this fact, taken conjointly with the unusually high rotation and the sparing solubility of salicylic acid, casts some suspicion on these commercial specimens as to their feedom from adulteration.

The acidity of the samples calculated as acetic acid varied from 0·02 to 0·23 per cent., being on the average 0·1 per cent. nearly. Age, as might be anticipated, affects this to some extent, the average for the five older oils being 0·14 per cent., and for nine more recent commercial specimens only 0·07 per cent.

The mode of working these tests we may briefly indicate here.

The specific gravity was taken at 60° Fah., water at 60° F. being unity.

The specific rotation was determined in a Laurent's polariscope, in 100 mm. tube.

In order to determine the solubility of salicylic acid in the oil, about 4 c.c. of the latter was shaken and allowed to stand in contact with an excess of powdered salicylic acid, the "physiologically pure" artificial acid being employed. After some hours standing the oil was filtered into a tared flask and weighed. This gave the weight of oil and dissolved acid (*a*). Spirit was now added, and the amount of acid present found by titration with volumetric solution of soda one-fifth normal strength, phenolphthalein being used as indicator. The amount of acid found being deducted from (*a*) gave the weight of the oil in which it had been dissolved.

The acidity was found by dissolving a known weight in neutral spirit and titrating with alkali.

The phellandren test was applied by dissolving 1 c.c. of the oil in 2 of glacial acetic acid, and adding 1½ c.c. of a saturated solution of nitrite of sodium, when the oil separates and rises to the surface, absorbing at the same time nearly all the nitrous anhydride set free the oily layer becoming solid when phellandren is present, and remaining liquid when this terpene is absent.

So far we are of opinion that the amygdalina oil is the only commercial eucalyptus oil that contains phellandren, and that this test is valuable for distinguishing the oil of this species.

This would seem also to be the only eucalyptus oil in commerce of so low a specific gravity. In a list of the characters of the oils from twelve species of eucalyptus (*Pharm. Journ.*, [3], ix., p. 430) the gravity of amygdalina oil is stated as ·881, a fair agreement with our result. The oil of *E. corymbosa* is stated to have the same gravity; the remaining ten vary from 899 to 940. This writer specially mentions as characteristic of amygdalina oil that it resinifies when exposed to air, a property we find possessed to a far greater extent by this than by any other oil examined by us.

In this connection we may be permitted to quote the relative yields of some oils given in von Mueller's 'Eucalyptographia' from 1000 lbs. leaves and twigs: *E. Globulus*, 120 ozs. *E. oleosa*, 200 ozs. *E. amygdalina*, 500 ozs. (*Pharm. Journ.*, [3], x., 1035).

On looking through the literature of the subject we could find very little as to the medicinal value of the several constituents of eucalyptus oil, nothing more in fact than a general statement, frequently repeated and nowhere denied, that "eucalyptol" was a valuable constituent, and a fairly general assumption that it was the active ingredient. The chemical character of eucalyptol, however, has undergone some change and development since Cloez named it in 1870 (*Pharm. Journ.*, [3], 1, ex *Répertoire de Pharmacie*), and the characters of the pure substance now recognized as identical with cajuputol and cineol are pretty definitely established.

Eucalyptol, it is now generally agreed, has no optical activity, boils at 176°–177° C., and crystallizes when cooled in a freezing mixture.

We concluded to attempt a rough estimation of the eucalyptol the oils of known origin contained by taking advantage of these three characters.

Fifty c.c. of each of seven oils were distilled, the receiver being changed when the thermometer indicated 170° C., 175°, 180°, 190° and 200°, the proportions of the several fractions being given in the following table:—

Fractional Distillation of the Oils.

Fraction Collected.	(1) *E. Globulus.*	(2) *E. Globulus.*	(3) *E. Globulus.*	(4) *E. odorata.*	(6) *E. oleosa.*	(8) *E. amygdalina.*	(9) *E. Dumosa.*
Below 170° C. (*a*) . . .	5·2 p. c.	42·6 p. c.	4·4 p. c.	12·8 p. c.	10·4 p. c.	5·2 p. c.	8·6 p. c.
Between 170°–175° (*b*) . .	38·2 ,,	28·8 ,,	20·0 ,,	29·6 ,,	38·0 ,,	33·0 ,,	41·4 ,,
,, 175°–180° (*c*) . .	21·0 ,,	9·8 ,,	18·0 ,,	26·6 ,,	27·4 ,,	22·6 ,,	22·4 ,,
,, 180°–190° (*d*) . .	17·0 ,,	7·4 ,,	20·2 ,,	15·6 ,,	12·4 ,,	15·0 ,,	12·8 ,,
,, 190°–200° (*e*) . .	5·8 ,,	3·8 ,,	8·8 ,,	7·2 ,,	4·8 ,,	5·8 ,,	5·0 ,,
Residuum	12·8 ,,	7·6 ,,	28·6 ,,	8·2 ,,	7·0 ,,	18·4 ,,	9·8 ,,

Table II.

	(1) *E. Globulus.*	(2) *E. Globulus.*	(3) *E. Globulus.*	(4) *E. odorata.*	(6) *E. oleosa.*	(8) *E. amygdalina.*	(9) *E. Dumosa*
Rotation of 100 mm.—							
(*b*) 170–175 fraction . .	+17°·63	− 2°·36	+4°·70	+16°·96	+1°·56	−43°·5	+7°·05
(*c*) 175–180 ,, . .	+16°·76	− 1°·70	+2°·66	+17°·0	+2°·01	−43°·06	+4°·5
Volume of (*b*) + (*c*) . . .	59·2 p. c.	38·6 p. c.	38·0 p. c.	56·2 p. c.	65·4 p. c.	55·6 p. c.	63·8 p. c.

The numbers above the botanical name are those corresponding to the oils in the first table. The distillation was carried above 200° C. only in the case of the amygdalina oil, which yielded 4·2 per cent. between 200° and 220°. The fractions (*b*) and (*c*) being assumed to contain the bulk if not the whole of the eucalyptol were examined in the polariscope with the results recorded in Table II.

These fractions were all placed in melting ice for some time, and then in a mixture of ice and salt, but no separation of crystals was observed in any of them. This negative result subsequent experience causes us to believe might not have occurred, at any rate in all cases, if the exposure to the freezing mixtures had been more prolonged and accompanied by brisk stirring.

From the volume and rotatory power of the distillate, *E. oleosa* and *E. Dumosa* appeared to be specially indicated as most suitable for attempting the preparation of a body having the characters ascribed to eucalyptol.

Accordingly 500 c.c. of the oleosa oil ((7) Table I) were carefully fractionated, the receiver being changed at 170° C. (*a*), 175° (*b*), 177° (*c*), 180° (*d*), and 200° (*e*). The two extreme fractions (*a*) and (*e*) were discarded. Fractions (*b*) and (*d*) were mixed and redistilled, the portion coming over between 174° and 177° being separately collected and mixed with (*c*). We now had 255 c.c. of almost colourless distillate of sp. gr. 917, and possessing rotation of 1°·65 to the left for the 100 mm. tube.

The rotation of the other fractions was found to be as follows, for 100 m.m.:—

Fraction boiling below 174° C., 1·16°.
" " between 177°—180° C., 4·0°.
" " " 180°—185° C., 4·16°.
" " " 185°—200° C., 9·0°.

Prolonged exposure to ice and salt caused crystallization in the larger fraction (174°—177° C.), when the thermometer fell to −10° C. and the liquid was briskly stirred; a small quantity in a test tube became solid after exposure to −14° C. Exposure to the same degrees of cold of all the remaining fractions did not cause any crystallization.

The bulk of this distillate was placed in a thin wide-mouth bottle and surrounded by ice and salt, and when sufficiently cooled (to −10° C.) some of the crystals formed in a smaller portion in a test tube were added, and crystallization of the bulk was thus induced. The whole was kept at this temperature for over an hour, and then the liquid portion was separated as far as possible by being drawn up into a wide tube, over the lower end of which muslin was tied. In this way a crust of fine white crystals was obtained, closely resembling menthol in appearance, from which it was possible to drain most of the remaining liquid oil before removing from the cold mixture. When removed they instantly commenced to melt, but the thermometer did not remain steady, it continually rose, the rise being slowest at about −6° C. (20 F.). The crystals had all disappeared when 0° C. was reached.

This is the nearest approach to eucalyptol that we have so far been able to obtain. The laboratory thermometer having stood at 70° F. when this operation was being conducted, the conditions were somewhat unfavourable for keeping up a sufficiently low temperature; better results may be expected in the winter.

The total amount of this product that had been crystallized was 120 grams, equal to 26 per cent. of the oil originally taken. Its specific gravity at 60° F. was 919·06. Specific rotation $[\alpha]_D$ −1·59°, observed rotation in 100 mm. tube 1·46°. It possessed the peculiar penetrating odour frequently described as ethereal to a greater extent than any other fraction. Its rotation was somewhat smaller than that (−1·65°) of the bulk before freezing, and it was more nearly colourless. We have no doubt, however, that the oil removed from the crystals, the "mother liquor," so to speak, contains a considerable proportion still that might be removed by a longer exposure and a lower temperature. This oil amounted to 116 grams, and was found to have a rotation per 100 mm. of −2·16°.

We thought it would be desirable to compare our product with the eucalyptol of commerce, and for this purpose obtained eight specimens from London houses. The points tested were, specific gravity, rotation, action of nitrous acid, result of cooling, percentage of iodine absorbed. The results obtained were as follows:—

Sample.	Specific gravity 60° F.	Observed rotation 100 mm. tube.	Specific rotation.	Nitrous acid test.	Result of cooling.	Iodine absorption.
(*a*) Pure eucalyptol . .	·9285	none	none	negative	hard solid	7·14 p. c.
(*b*) Eucalyptol (our own) .	·9190	−1°·46	−1°·59	"	solidified	22·15 "
(*c*) Eucalyptol	·9104	+7°·58	+8°·32	"	"	101·74 "
(*d*) "	·9137	+7°·15	+7°·83	"	"	105·35 "
(*e*) "	·9208	+4°·6	+5°·00	"	remd. liquid	90·48 "
(*f*) "	·9110	+10°·8	+11°·85	"	"	109·14 "
(*g*) "	·9070	+5°·8	+6°·39	"	slight crystallization	84·61 "
(*h*) "	·9205	+4°·43	+4°·81	"	remd. liquid	82·00 "
(*j*) "	·8832	−32°·05	−36°·26	phellandren present	"	153·72 "

In applying the nitrous acid test for the presence of phellandren it was observable that all the samples of eucalyptol became coloured bright green, with the exception of the "pure eucalyptol" and the sample made by us, the former of which remained colourless on standing, whilst our product subsequently developed a greenish tint. Eucalyptus oil always becomes decidedly green under this treatment, hence we suggest that the amount of coloration when performing this test will give some measure of the amount of matter other than eucalyptol in the sample.

On inspecting the table it will at once be seen that "pure eucalyptol" had the properties ascribed to this body, viz., no optical activity and that of solidifying on cooling. The solid so formed was firm, hard and white, altogether different in character from the mass yielded by any other sample. The amount of iodine absorbed (von Hübl's reaction) was smaller than in any other case, so small, in fact, as to make it almost certain that absolutely pure eucalyptol does not absorb iodine. The application of this test will therefore become useful as confirmatory of the degree of purity of a sample. In these three respects our manufacture corresponded more closely with the standard than did any of the other samples.

One sample (*j*) had evidently been made from *Euca-*

lyptus amygdalina oil. Its rotation was 36° to the left, and it yielded solid phellandren nitrite, showed no signs of crystallizing at −14° C., and had an iodine absorption equivalent of 153·7. Its specific gravity was, as might be expected, very low, 0·883. This was the only sample that showed any signs of resinifying on exposure for 24 hours.

The specific gravity of eucalyptol is variously stated by different writers. Watts' 'Dictionary' (2nd edition) indicates ·923 at 16°, apparently on Jahn's authority (*Pharm. Journ.*, [3], xv., 615). Schimmel states (*Pharm. Journ.*, [3], xx., 856) that the gravity is 930. At present it is not possible for us to settle this point. The "pure eucalyptol" examined had a gravity of ·9285, whilst ours was only ·919, and the heaviest other sample was ·9208. We hope to be able to satisfy ourselves on this point later on.

The PRESIDENT said there were great variations in the character of the oils met with in commerce; they varied especially in specific gravity, in the amount of phellandrin, and also in eucalyptol. There was also the important question whether eucalyptol was the medicinal agent to be looked to as the most active constituent, and a further one as to the botanical sources of the oils. All these questions had been dealt with in the paper, which seemed to favour the *E. oleosa* and *E. Dumosa* oil in preference to that from *E. Globulus* and *E. amygdalina*, the two sources mentioned in the Pharmacopœia. There was little doubt that the oil which contained most eucalyptol, and had the peculiar odour well marked, was most liked for use in inhalers and so on, as it had the most penetrating action. Some samples met with in commerce would be found almost useless for the purpose required.

Mr. PEARS said they were given to understand in the text-books that eucalyptol was obtained by passing hydrochloric acid through the liquid. Did Mr. Davies find that method satisfactory?

Mr. J. C. UMNEY asked if Mr. Davies had made any examination of the citronella scented eucalyptus oil, which it was stated became perfectly solid on the application of nitrous acid, and also to contain a large percentage of eucalyptol. He was not sure whether it was *E. dealbata.*

Mr. WELLCOME said his attention had been recently called to a considerable demand for the citronella eucalyptus oil, which seemed to be wanted for some special manufacturing purpose in this country, in which it was supposed to be substituted for citronella oil. He believed that at the present time large quantities of it were being shipped to Germany. Whether it was used to sophisticate oil of citronella he did not know, but thought it was mostly used by manufacturing perfumers.

Mr. BURROUGHS said the citronella variety had been found very efficacious in disguising the offensive odour of ichthyol when used in ointments.

Mr. MOSS said it was scarcely likely that the citronella scented eucalyptus would be used as an adulterant of citronella oil, as none of the latter was imported from or through Germany, but came direct from the East Indies. No doubt the oil might be used as a substitute for it in perfumery, soap-making, etc., but it did not come into the London market as citronella oil.

Mr. MACEWAN added that citronella oil cost at the rate of sixteenths of a penny per ounce, whilst citronella-scented oil of eucalyptus cost 4*s.* or 5*s.* a lb., so that there could be no question of using the one for the other. The point in which he considered this paper a very valuable addition to the literature of the subject was that it carried our knowledge as to the eucalyptol content of the oil a step further. All the figures regarding specific gravity, rotation, solubility of acid in the oil, solubility of the oil in spirit, or rather as he would put it, the solubility of spirit in the oil, were all to a certain extent of great importance, but that was nothing compared to the fact which was now definitely proved, that certain oils which were regarded as being of less value than *E. Globulus* oil did contain eucalyptol to a considerable extent, as much probably as *E. Globulus.* That was the important point to seize upon. They believed that the active properties of eucalyptus oil were due to eucalyptol, and here was an oil, the *E. oleosa*, which possessed these properties which the President had mentioned as making it preferable for inhalation—fine odour, great penetration, and so on—and that oil also contained eucalyptol to a sufficient extent to warrant its use in medicine. It was quite evident that the fractions having a rotatory power of between 170 and 180° could have little in common with eucalyptol, as that was an inactive body so far as its action on polarized light was concerned. He should like to mention that in the final stages of purification eucalyptol ought to be treated with caustic soda and dry calcium chloride; without that it was impossible to get rid of the resinous bodies, and obtain that definite neutrality which was desirable.

The PRESIDENT said the *E. citriodora*, which yielded a lemon-scented oil, was principally produced in Tasmania, and was used by perfumers and soap makers.

Mr. DAVIES said he had drawn hydrochloric acid gas through small quantities of the oil, but had not used that method in endeavouring to prepare eucalyptol, for one or two reasons. In the first place it had been stated, though he forgot where, that the eucalyptol obtained by decomposing the bi-hydrochloride, which was the molecular compound formed by passing hydrochloric acid gas into the oil, was to some extent decomposed in the subsequent process, and that it was not so pure as that obtained by the simple process of freezing. Whether that statement were true or not he was not in a position to say, since, so far, the freezing process was the only one that had been tried. He proposed, when the weather was a little more suitable, to try the effect of the hydrochloric acid, and indeed he should not rest satisfied with the eucalyptol he obtained until it had no specific rotation at any rate. It was very difficult to estimate the purity of the eucalyptol obtained; but the crystals were perfectly solid, and the amount of rotation was very considerable. 1·59° appeared a small amount, but remembering that these crystals only formed 50 per cent. of a solution which itself only had a rotation of 1·65, it was clear that it was a great deal to expect the whole of that rotation to disappear before pure eucalyptol was obtained. If the amount to be separated disappeared at the same rate as the oil had been disappearing from the crude product originally, there would be almost nothing left when the 1·59 had been reduced to no rotation at all. On that account it seemed to him there must be some truth in the statement that the article underwent a change by the formation of the hydrochloride and the subsequent decomposition. With regard to the citronella smelling oil, he regretted to say that he had had no opportunity of studying it excepting that afforded by the very small quantity sufficient to perform these few experiments. He had seen a statement that eucalyptol occurred in large quantity, and also phellandren, but this particular sample showed no evidence of phellandren at all on being tested with nitrous acid. There were certainly several eucalyptus oils having a citronella smell, and probably the one Mr. Umney referred to was a different species. Mr. McEwan had exactly hit the point of the paper. He did not desire to state definitely that eucalyptol was the active constituent; all he said was that they knew at present of no other, and that being the condition of knowledge,

until they were shown that some other constituents were of equal or possibly greater medicinal value, they were justified in looking for an oil which contained a reasonable proportion of that. Any oil that had a rotation to the left, as *E. amygdalina* oil had, clearly could not be an oil which was likely to satisfy those conditions. Some varieties of *Globulus* oil would seem to satisfy them more than others, but certainly the *E. dumosa* and *E. oleosa* oils seemed to contain eucalyptol in considerable quantity.

The Conference then adjourned for luncheon.

(*To be continued.*)

The British Association for the Advancement of Science.

ADDRESS TO THE BIOLOGICAL SECTION.

BY FRANCIS DARWIN, M.A., M.B., F.R.S., ETC.

(*Continued from page* 222.)

Müller's research gave weight to this union of geo- and heliotropic effects by showing a number of resemblances in the manner and form of the two curvatures. Again when it was found* that apheliotropic organs are influenced by light and darkness in precisely the same manner as positively heliotropic ones, it became clear that the mechanical explanation of De Candolle was untenable for negatively heliotropic organs. It might still no doubt be upheld for positively heliotropic organs, but as a matter of fact it was not so upheld. There was a tendency to unify our view of growth-curvatures, and the union of the two forms of heliotropism gave strength to the movement. Nor was this all; when it became clear that light did not produce heliotropic curvatures by direct mechanical effect it was natural to remember that gravitation has none either; we cannot point to any reason (except the crudest ones) why the lower side of a horizontal stem, or the upper side of a horizontal root, should grow the faster for the direct effects of gravitation. That being so, light and gravitation could be classed together as external agencies acting, not directly, but in some unknown indirect manner. I do not imply that such a result followed immediately, but that the line of research above alluded to helped in some degree to lead the way to a belief in growth-curvatures as phenomena of irritability.

When my father was writing our book, 'The Power of Movement in Plants' (1880), in which he adopted to the fullest extent a belief that growth-curvatures are phenomena of irritability, the only modern statement of such a view which he could find was in a passage by Sachs,† where he writes that "The living material of plants is internally differentiated in such a way that different parts are supplied with specific energies resembling those of the sensory-nerves (Sinnesnerven) of animals. Anisotropy in plants fulfils the same purpose as do sense perceptions in animals."

The idea of irritability as applied to growth curvatures is expressed with sufficient clearness in the 'Power of Movement.' Thus for the case of geotropism we wrote (p. 521): "Different parts or organs on the same plant, and the same part in different species, are thus excited to act in a widely different manner. We can see no reason why the attraction of gravity should directly modify the state of turgescence and subsequent growth of one part on the upper side and of another part on the lower side. We are therefore led to infer that both geotropic, apogeotropic, and diageotropic movements, the purpose of which we can generally understand, have been acquired for the advantage of the plant by the modification of the ever present movement of circumnutation. This, however, implies that gravitation produces some effect on the young tissues sufficient to serve as a guide to the plant." A similar view is given for heliotropism. It should be noted that the essence of the view, namely, that light and gravitation act as guides or landmarks by which the plant can direct itself, can be held without a belief in circumnutation.

In Pfeffer's admirable *Pflanzenphysiologie*, 1881, the conception of stimulus and reaction is fully given, and is applied, among other cases, to that of heliotropism and geotropism. Pfeffer states clearly, and without reserve or obscurity, the view that light and gravitation act as stimuli or releasing forces, in manners decided by the organization of the plant. Pfeffer seems to me to be the first writer who has treated the subject fully and consistently.

In Sachs' *Vorlesungen*, 1882, a view similar to that briefly sketched in his paper of 1879 is upheld. Geotropism and heliotropism are described as Reizerscheinungen, *i.e.*, phenomena of stimulation. The phenomena in question are described under the heading Anisotropy, a question which expresses, according to Sachs,* "the fact that different organs of a plant under the influence of the same external forces assume the most varied directions of growth." In another passage† he states that the anisotropy of the different organs "is nothing else than the expression of their different irritability to the influence of gravity [and] light, etc."

Vines,‡ who has recently (1886) summarized the evidence on growth curvatures, and whose researches on kindred subjects entitle his opinion to respect, accepts fully the theory that gravitation, light, etc., act as stimuli.

It is not necessary to trace the subject further, the views under discussion being now well recognized canons of vegetable physiology.

I cannot, however, omit to mention Pfeffer's§ brilliant researches on the chemotaxis (irritability to certain reagents) of low organisms, such as antherozoids and bacteria. To take a single instance, Pfeffer showed that the antherozoids in responding to the effect of malic acid follow precisely the same law that in animals correlates the strength of stimulus and amount of effect. This result, although it has no direct connection with growth curvatures, is nevertheless of the highest importance in connection with the general question of vegetable irritability.

Nor can I omit to mention the ingenious reasoning by which Noll‖ localized the seat of irritability in a vegetable cell. He points out how in acellular plants, such as Caulerpa or Derbesia, the flowing protoplasm may travel from positively geotropic root to apogeotropic stem, and he argues from this that the motile endoplasm cannot be the seat of specific irritability. The flowing plasma which is always changing its position with regard to external forces must be as fully incapacitated from responding to them as though the plant were turning on a klinostat. It follows from this that it must be the stationary ectoplasm which perceives external change. From a different point of view this is what we should expect—we should naturally suppose that the part which regulates the growth of the membrane, and therefore the curvature of the

* Schmitz, *Linnœa*, 1843; Müller-Thurgau (*Flora*, 1876); F. Darwin, Sachs' *Arbeiten*, 1880. The two latter researches were carried out under the direction of Sachs in his laboratory.

† Sachs (*Arbeiten*, ii., 1879, p. 282).

* P. 855.

† P. 859.

‡ 'Physiology of Plants.'

§ *Tübingen. Untersuchungen*, vol. i.

‖ Sachs, *Arbeiten*, vol. ii., p. 466.

cell, should be the irritable constituent of the cell contents.

In attempting to trace the history of the establishment of growth-curvatures as phenomena of irritability, I have been forced to confine myself to a slight sketch. I have found it impossible to give a full account of the course of research on the subject. I have given an account of some of the halting-places in the journey of thought, but not to the manner in which belief has travelled from stage to stage. Far greater knowledge than mine would be required to compile such an itinerary.

Mechanism.

The first step in advance of Hofmeister's views was the establishment that the curvatures under consideration are due to unequal growth, that is to say, to an excess of longitudinal growth on the convex than on concave side. It is not, however, easy to say how far Hofmeister had this idea, for it, in fact, depends on how we define "growth." Hofmeister knew, of course, that the convex side of a curved shoot was longer than it had been before the curvature occurred; this is a mathematical necessity. But he also made out the important point that the concave side increases in length during the curvature. These permanent elongations he must have known to be growth, but his attention was directed to what is, after all, the more important point, namely, *why* it was that unequal elongation took place.

Sachs, in his 'Experimental-Physiologie,' held that growth-curvatures are due to unequal growth. In his Text-Book (1874), English translation, 1882, p. 853, the author, referring to Hofmeister's work, says: "I pointed out that the growth of the under surface of an organ capable of curving upwards was accelerated, and that of the upper surface retarded; I did not at the time express an opinion as to whether these modifications of growth were due to an altered distribution of plastic material or to a change in the extensibility of the passive layers of tissue." Frank's already quoted paper made valuable contributions to the subject. He showed that the epidermic cells on the convex side of the root are longer than those on the concave side,—that is, they have grown more; he explained apogeotropic curvatures in precisely the same way. He showed, moreover, that the sharp curve close to the tip of a geotropic root, and the long, gradual curve of an apogeotropic shoot, are necessary consequences from the manner in which growth is distributed in these parts. He demonstrated that rectilinear growth and geotropic curvature require the same external conditions; that, for instance, a temperature low enough to check growth also puts a stop to geotropism.

The distribution of longitudinal growth which produces geotropism was afterwards studied by Sachs,* who thoroughly established the fact that the convex side grows faster, while the concave side grows slower, than if the organ had remained vertical and uncurved.

These facts are of interest in themselves, but they do not, any more than Frank's results, touch the root of the matter. Until we know something of the mechanics of rectilinear growth, we cannot expect to understand curves produced by growth. The next advance in our knowledge did in fact accompany advancing knowledge of rectilinear growth. It began to be established, through Sachs' work, that turgescence is a necessary condition of growth. A turgescent cell is one which is, as it were, over-filled with cell sap; its cell walls are stretched by the hydrostatic pressure existing within. In osmosis, which gives the force by which the cells are stretched, a force was at hand by which growth could be conceived to be caused. The first clear definition of turgor, and a statement of its importance for growth, occurs in Sachs' classical paper on growth.*

As soon as the importance of turgor in relation to growth was clearly put forward, it was natural that its equal importance with regard to growth-curvatures should come to the fore, and that increased growth on the convex side (leading to curvature) should be put down to increased internal cell pressure in those tissues. In the fourth edition of Sachs' 'Lehrbuch,' 1874, Eng. tr. 1882, p. 834, such a view is tentatively given, but the author saw very clearly that much more evidence was needed before anything like a conclusion as to the mechanism of movement could be arrived at. The difficulty which faced him was not a new one—in a slightly different form it had occurred to Hofmeister—the question, namely, whether the curvatures of acellular and multicellular organs depend on the same or on different causes. If one explanation is applicable to both, then we must give up as a primary cause any changes in the osmotic force of the cells. For no change in the pressure inside a cell will produce a curvature in that cell, whereas, in a multicellular organ, if in the cells in one longitudinal half an increase of osmotic substances takes place, so that the cell walls are subject to greater stretching force, curvature will take place.

On the other hand, if the cause of bending of acellular and multicellular organs is the same, we must believe that the curvature takes its origin in changes in the cell-walls. In an acellular organ, if the cell membranes yield symmetrically to internal pressure, growth will be in a straight line; if it yields asymmetrically it will curve. Thus, if the membrane along one side of a cell becomes more or less resisting than the rest of the membrane, a curvature will result.

If we are to apply strictly the same principle to acellular and multicellular organs, we must suppose that the whole organ curves, because each individual cell behaves like one of the above described free cells, the curvature of the whole resulting from the sum of the curves of the separate cells. This was Frank's view, and it also occurs in Sachs' Text-Book, 1874, Eng. trans., 1882, p. 842.

Are we bound to believe that the mechanism of acellular and multicellular curvatures is so strictly identical as Frank supposed? In the first place, it is not clear why there should be identity of mechanism in the movements of organs or plants of completely different types of structure. The upholders of the identity chiefly confine themselves to asseveration that a common explanation must apply to both cases. I believe that light may be thrown on the matter by considering turgescence, not in relation to growth, but in regard to stability of structure.

An acellular organ, such as the stalk of the sporangium of Mucor, owes its strength and stiffness to the tension between the cell contents and the elastic cell-wall, but it does not follow from this that in multicellular organs strength and stiffness are due to the sum of the strengths of its individual cells. Indeed, we know that it is not so; the strength of a multicellular organ depends on the tension between pith and cortex. It is, in fact, a model of the single cell; the pith represents the cell-sap, the cortex the cell-wall. Here, then, it is clear that the function performed by the cell-wall in one case is carried out by cortical tissues in the other. If this is the case for one function there is no reason why it should not hold good in another, viz., the machinery of movement.

If we hold this view that the cortex in one case is analogous with a simple membrane in the other, we shall not translate the unity of acellular and multicellular organs so strictly as did Frank. Indeed, we may fairly consider it harmonious with our knowledge

* *Arbeiten*, i., p. 193, June, 1871.

* *Arbeiten*, p. 104, Aug., 1878.

in other departments to find similar functions performed by morphologically different parts. The cortex of a geotropic shoot would thus be analogous with the membrane of a geotropic cell in regard to movement, just as we know that these parts are analogous in regard to stability.

In spite of the difficulties sketched above, one writer of the first rank, namely, H. de Vries, has upheld the view that growth curvatures in multicellular organs,* are due to increased cell-pressure on the convex side; the rise in hydrostatic pressure being put down to increase of osmotic substances in the cell-sap of the tissues in question. Such a theory flowed naturally from De Vries' interesting plasmolytic work.† He had shown that those sections of a turgescent shoot which were in most rapid growth show the greatest amount of shortening when turgescence is removed by plasmolysis. This was supposed to show that growth is proportional to the stretching or elongation of the cell-walls by turgor. Growth, according to this view, consists of two processes; (1) of a temporary elongation due to turgescence, and (2) of a fixing process by which the elongation is rendered permanent. De Vries assumed that where the elongation occurred, its amount must be proportional to the osmotic activity of the cell contents; thus neglecting the other factor in the problem, namely, the variability in the resistance of the membranes. He applied the plasmolytic method to growth curvatures, and made the same deductions. He found that a curved organ shows a flatter curve‡ after being plasmolysed. This, according to his previous argument, shows that the cell-sap on the convex is more powerfully osmotic than that on the concave side. This again leads to increased cell-stretching, and finally to increased growth.

The most serious objection to De Vries' views is that the convex half of a curving organ does *not* contain a greater amount of osmotically active substance.§ It must, however, be noted in the heliotropic and geotropic curvature of pulvini, there is an osmotic difference between the two halves,‖ so that, if the argument from uniformity is used against De Vries (in the matter of acellular and multicellular organs), it may fairly be used in his favour as regards the comparison of curvatures produced with and without pulvini.

It is not easy to determine the extent to which De Vries' views on the mechanics of growth curvature were accepted. The point, however, is of no great importance, for the current of conviction soon began to run in an opposite direction.¶

Sachs** had already pointed out that attention should be directed to changes in extensibility of cell-walls as an important factor in the problem.

Wiesner, in his 'Heliotropische Erscheinungen,'†† held that the curvature of multicellular organs is due both to an increase of osmotic force on the convex side, and to increased ductility‡‡ of the membranes of the same part. He repeated De Vries' plasmolytic experiments, and made out the curious fact that in many cases the curvature is increased instead of being diminished. He attributed the result to the concave tissues being more perfectly elastic than ductile convex tissues, so that when turgescence is removed the more elastic tissues shorten most, and by diminishing the length of the concave side, increase the curvature.

Strasburger, in his 'Zellhäute,' 1882, suggested that growth curvatures are due to increased ductility of the convex membranes, and gave a number of instances to prove that a change to a ductile condition does occur in other physiological processes, such as the stretching of the cellulose ring in Œdogonium to a uniform thin membrane, the branching of Cladophora, and the escape of sexual products in certain algæ.

We now pass on to the work of two observers, Wortmann and Noll, who have devoted special attention to mechanism of curvatures. Wortmann* started on the assumption, already several times mentioned, that the growth-curvature of acellular and multicellular organs must have a common cause. He began by testing Kohl's statement† that when the sporangiferous hypha of a Phycomyces curves apogeotropically or heliotropically, etc., there is a collection of protoplasm on the concave wall. Wortmann principally investigated the curvature discovered in Phycomyces by Errera,‡ which can be produced by contact. When the hypha is touched with a glass filament or with a platinum wire, or by allowing a speck of indian ink to dry on it, it curves over towards the touched side. The hypha is so highly sensitive to contact that it curves in from three to six minutes; it is clearly a growth-curvature, for it only occurs in the part of the hypha which is growing. In curvatures thus produced, as well as in apogeotropic and heliotropic curvatures the accumulation of protoplasm on the concave side is, according to Wortmann, clearly visible, and, what is more important, the membrane becomes thicker on the concave side, sometimes twice as thick as on the opposite side of the cell. In consequence of the unequal thickening of the membranes, the cell is supposed to yield asymmetrically cell-pressure, and the necessary consequence is that the cell grows into a curved form.

In applying the same method of investigation to multicellular parts, Wortmann followed Ciesielski,§ who noticed that in geotropically curved roots the cells of the concave (lower) side of the organ are much more densely filled with protoplasm than are the convex cells. Sachs‖ describes a similar state of things in the halms of grasses, and Kohl, again, in tendrils and the stems of climbing plants.

Wortmann first of all made sure that no redistribution of protoplasm could be observed in the *individual* cells of curving multicellular organs. If each cell behaved independently like a free cell, we might expect to find a collection of protoplasm on the concave wall of all the constituent cells of a curving shoot. But this is not the case. Nor at first could any microscopic differences be made out between the concave and convex tissues of a curving shoot. But when the stimulus was made to act for a long time differences were apparent. A young Phaseolus plant was placed so that the epicotyl was horizontal and was forced to grow in the horizontal direction by a thread attached to the end of the stem, passing over a pulley and fastened to a weight. Here the geotropic stimulus could continue to act for 24 to 36 hours, and under such conditions a marked change in the tissues was

* *Bot. Zeitung*, 1879, p. 835.
† *Ibid.*, 1877, p. 1.
‡ Frank made similar experiments, but failed to find any diminution of curvature.
§ Kraus, *Abhand. Nat. Gesell. zu Halle*, xv., 1882. See also a different proof by Wortmann, *Deutsch. Bot. Gesell.*, 1887, p. 459.
‖ Hilburg in Pfeffer's *Tubingen. Untersuch.*, vol. i., 1881, p. 31.
¶ An opportunity will occur later on for referring to some details of De Vries' work not yet noticed.
** *Lehrbuch*, ed. 4, Eng. tr., p. 835.
†† *Wiener Sitzungsb.*, vol. lxxxi., 1880, p. 7; also in the *Denkschriften*, 1882.
‡‡ Weinzierl, *Sitzungsb. Wien.*, 1877, showed that strips of epidermis taken off the convex side of heliotropically curved flower-stalks of tulip and hyacinth were about twice as extensible when stretched by a small weight, 7·5 grams, as approximately corresponding strips for the concave side.

* *Bot. Zeit.*, 1887, p. 785.
† *Bot. Hefte*, Marburg, Heft v. (I have not seen Kohl's paper).
‡ *Bot. Zeitung*, 1884.
§ Cohn's *Beiträge*, 1872, p. 1.
‖ *Vorlesungen*, p. 842.

visible. The cells of the cortex on the upper side became densely filled with protoplasm, while the lower cortical cells were relatively poor in protoplasmic contents. The same changes in the membranes occur as those noticed in Phycomyces, that is to say, the walls of the cortex on the upper side are very much thicker than those on the lower side.*

Since the walls of the cortical cells have become more resisting on the upper than on the lower side, then (assuming the osmotic expanding force to be the same in both cases) the growth will be quicker on the lower side, and the shoot will curve upwards. Wortmann states that his observations account for the fact that the convex side grows quicker, not merely than the concave, but than a normal unbent shoot. But he does not seem to have compared the thickness of the convex-cell walls with the normal, although he states that they are poorer in protoplasm than is usual, and from this it may, according to his views, be perhaps assumed that the membranes are abnormally thin.

Wortmann points out that his views account for two well-known features in growth curvatures, viz., the *latent period* and the *after-effect*. If a curvature can only occur when a difference in structure of cell-walls has arisen, it is certainly natural that some time should occur before the curvature is apparent. I do not lay much stress on this part of the subject, as I feel sure the whole question of latent period needs further investigation. With regard to after-effect it is true that Wortmann's views account for the continuance of curvature after the stimulus has ceased to act.

Wortmann attaches great importance to another point in his theory, which, could it be established, would be of the greatest interest, and would unite under a common point of view, not only acellular and multicellular organs, but also naked protoplasm, *e.g.*, the plasmodia of myxomycetes. The view in question was tentatively suggested by Sachs,† and mentioned by Pfeffer‡ in a similar spirit. The apogeotropic curvature of a phycomyces-hypha is supposed to be due to the unequal thickening of the membrane on the upper and lower sides, and this to be due to the migration of protoplasm from the lower to the upper side of the cell. In the same way in a multicellular organ the protoplasm is supposed to migrate from the lower cortex and pith to the upper cortex and pith, such migration being rendered possible by the now generally admitted intercellular protoplasmic communication. Thus the apogeotropism of a cell or a multicellular part would be due to the apogeotropism or tendency to migrate vertically upwards of the protoplasm. There are great difficulties in the way of accepting this attractive theory.

Noll§ states that when a curved phycomyces-hypha, in which protoplasm has accumulated in the upper (concave) side, is reversed so that the mass of protoplasm is below, it does not migrate upward again, as might be expected. Moreover he points out that in Nitella and in Bryopsis the circulating protoplasm continues in movement, and does not accumulate in any part of the cell. Lastly, there seems, as Noll points out, a difficulty in believing in the migration of protoplasm through the very minute pores by which the plasma strands pass from cell to cell. There seems much probability in Noll's view that the plasmic strands only serve for the passage of impulses or molecular changes, and that they consist of ectoplasm alone, not of the endoplasm which Wortmann describes as the migratory constituent of the cell.

Wortmann's theory has been criticised by Elfving.‖ The essence of Elfving's paper is that appearances similar to those described by Wortmann can be produced by curvatures not due to stimulation. Thus, when Phycomyces is made to grow against a glass plate it is mechanically forced to bend. Yet here, where there is no question of stimulation, the plasma collects along the concave side of the cell. Elfving concludes that the visible changes are the result and not the cause of the curvature. Elfving also produced curvature in Phaseolus by bending the apex of the plant towards its base and tying it in that position. Under these conditions the convex side of the shoot showed the changes described by Wortmann in geotropic plants. Here again Elfving gives reason to believe that the thickening of the cell-walls is a result, not of curvature, but of strain mechanically produced. When a plant is prevented from executing an apogeotropic movement it is clear that a longitudinal strain is put on the upper (concave) side. But the longitudinal strain in Elfving's plants is on the convex side. Therefore, if, as Elfving believes, the visible changes are due to strain, they should, as they do, occur on the convex side in his experiments, on the concave in Wortmann's.

Wortmann replied in the *Bot. Zeitung*, 1888, p. 469, and attempted to explain how Elfving's results might be explained and yet his own theory hold good. The reply is by no means so strong as the criticism, and it must be allowed that Elfving has seriously shaken Wortmann's argument.

Somewhat similar criticisms have been made by Noll.* In the acellular plants, Derbesia and Bryopsis, Noll studied growth-curvatures, and was quite unable to detect any thickening of the concave cell-walls, except when the curvatures were very sudden, and in these cases the result could equally well be produced by mechanical bending.

Noll further points out what is undoubtedly a fault in Wortmann's theory, namely, that he explains the retardation on the concave rather than acceleration on the convex side. This criticism is only partially just, for though Wortmann's description only shows a *relative* thinness of the walls on the convex side, yet it is clear he believed there to be an absolute diminution of resisting power on that side.

Noll's experiments with grass halms show clearly that acceleration of growth on the convex side is the primary change, rather than retardation along the concave half. When the halms are fixed in horizontal glass tubes, so that they are stimulated but unable to bend, the lower half of the pulvinus forms an irregular outgrowth, increasing radially since it is not able to increase longitudinally.

A similar argument may be drawn from Elfving's experiments. He found that the pulvini of grass-halms placed on the klinostat increase in length. This experiment shows incidentally that the klinostat does not remove but merely distribute equally the geotropic stimulus: also that geotropic stimulus leads to increased, not to diminished growth. The same thing is proved by the simple fact that a grass halm shows no growth in its pulvinus while it is vertical, so that when curvature begins (on its being placed horizontal) it must be due to acceleration on the convex, since there is no growth on the concave side in which retardation could occur. Noll's view is that the primary change is an increase in extensibility of the tissues on the convex side. This view he proceeded to test experimentally. A growing shoot was fixed in a vertical position, and a certain bending force was applied to make it curve out of the vertical, first to the right and then to the left. If the cortical tissues are, at the beginning of the experiment, equally resisting all round, it is clear that the excursions from the vertical

* Both protoplasmic change and thickening of cell-walls occur to some extent in the pith.

† *Lehrbuch*, 1874; English tr. 1882, p. 841.

‡ *Pflanzenphysiologie*, ii., p. 331.

§ Sachs' *Arbeiten*, 1888, p. 530.

‖ *Finska Vet. Soc. Förhand.* (Helsingfors), Bd. 30, 1888.

* Sachs' *Arbeiten*, 1888, p. 496.

to the right and left will be equal. As a matter of fact the excursions to the right and left were nearly the same, and the difference was applied as a correction to the subsequent result. The shoot was then placed horizontally until geotropic or other curvature was just beginning, when the above bending experiment was repeated. It was then found that when it was bent so that the lower side was made convex, the excursion was greater than it had been. In the few experiments given by Noll the excursion in the opposite direction (stretching of the concave side) was less than it had been, and he states that all the other experiments showed a similar result. The increased extensibility of the convex side is clearly the most striking part of the phenomenon, but I fail to see why Noll takes so little notice of the diminution in the extensibility of the concave side, which is only mentioned towards the end of his paper.* Yet such a diminution is a necessary factor in the mechanism of curvature. It should be noted that results like Noll's might be obtained under other conditions of growth-curvatures. Thus if De Vries' view were the true one and the curvature were due to difference in osmotic force on the convex and concave sides, the shoot would react differently in the two directions; for instance, the concave side would be the more easily compressed. Noll and Wortmann's explanations differ in this: the former lays the greater stress on the increased extensibility of the convex side, the latter on the diminution of that of the concave side. Again, Wortmann explains the difference in extensibility as due to differences in thickness of the cell walls. Noll gives no mechanical explanation, but assumes that the ectoplasm has the power of producing changes in the quality of the cell-wall in some unknown way.

(*To be continued.*)

Parliamentary and Law Proceedings.

The Use of Tinned Peas.

IMPORTANT DECISION.

Last Saturday Sheriff Birnie gave his decision in the case tried before him on the 3rd inst., in which Malcolm Campbell, fruiterer, Gordon Street, was charged, at the instance of Mr. Peter Fyfe, sanitary inspector, with having sold to Inspector Inglis one tin of green peas, which, on analysis by Dr. Clark, was found to contain ·005 per cent. of copper, which is equivalent to 1·4 grains of sulphate of copper per lb. of peas.

His Lordship said—By the third section of the Food and Drugs Act, 1875, "no person shall mix, colour, stain, or powder .... any article of food with any ingredient or material so as to render the article injurious to health with intent that the same may be sold in that state, and no person shall sell any such article." And in this complaint the respondent is accused of selling tinned peas coloured with sulphate of copper in breach of the Act. It is admitted that the peas were so coloured, and that the respondent knew it. It is right to state there was no concealment, the tablet bearing "a minute quantity of copper has been used by the manufacturer to improve the colour of the peas, but they are guaranteed not injurious." The analysis brought out 1·4 grains per lb. The respondent objected that what he sold was peas and water, whereas the analyst had analysed only the peas; but what is to be analysed under the Act is the "sample of food," and the peas were the sample of food, the water being drained off either before or after cooking. The only question therefore is, Were the peas rendered injurious to health? In England and in this country there have been a few convictions in the Police and Sheriff Courts for selling similar peas, but I am asked by both sides to consider the present case as the first in which the defence of non-injury to health has been matter of exhaustive inquiry. It is admitted, on the one hand, that sulphate of copper in large doses is a poison; and, on the other, that although used for greening peas for the last thirty-six years, and the trade has reached 20,000,000 tins per annum, for the most part coloured in this way, no case of serious injury has been substantiated. Ten witnesses were examined, all gentlemen of great eminence. Professors Charteris, Simpson and Dalziel and Dr. Russell think sulphate of copper, even in small quantities, is injurious, that a couple of table-spoonfuls of peas coloured as here might be so to young and delicate persons, and especially if repeated; that sulphate of copper is an accumulative poison, and that it would be unsafe to fix a minimum in articles of food. Professors Dougall, Glaister and Barlow and Drs. Slean and Macphee think 1·4 grain per pound of peas can hurt no one, and, with the exception of Dr. Barlow, that sulphate of copper is not accumulative. All admit that the sulphate combines with the legumen of the peas and forms albumenoid of copper, which is insoluble and does not enter the system; but Professor Charteris and the witnesses for the prosecution think it is again dissolved by the acids of the stomach—at all events to some extent—while Professor Dougall and the witnesses for the defence think that is not so. Dr. Russell says the insoluble parts are indigestible and so injurious. Professor Dougall admits they would, to some extent, be indigestible, but to an immaterial degree. Professor Simpson has met with cases of chronic copper poisoning. Professor Dougall has had 40,000 patients through his hands and has not met with a case. Professor Dalziel felt colic and slight diarrhœa after two doses of sulphate of copper, and Dr. Russell has felt bad effects from green peas coloured with it. The witnesses for the defence and their families have used the peas and found no bad effects. Dr. Clark was examined both for the prosecution and the defence. His opinion is that he does not think the Courts will convict in the meantime. Sulphate of copper is a medicine in doses of from ½ to 2 grains, and these may be repeated two or three times a day. Peas may be coloured by chlorophyll, but the respondent says it renders them unpalatable. In addition to the oral evidence, reference was made to several leading authorities. It is not disputed the early opinion was that the slightest mixture of copper was injurious, but it is said this opinion has gradually changed, and has now been reversed. In Guy and Ferrier's 'Forensic Medicine,' 1881, p. 497, it is said, "The use of copper utensils in cooking has often led to the production of poisonous salts and numerous cases of poisoning, some of which have ended fatally. .... The metal itself is not poisonous, but all its soluble salts, and notably salts resulting from contact with acid fruits are." When he comes to speak of quantities, however, he seems to minimize the danger (p. 503). Redmacher, he says, took 4 grains daily for eight months with no other effect than to create a ravenous appetite and a painless diarrhœa, and Toussint 3 to 7¼ grains morning and night for fourteen days, with no other symptom than a metallic taste, and after using various preparations of copper for six months he remained quite well. Phillips ('Materia Medica,' 1882, p. 538), says: "In the French preserved peas 0·31 to 0·56 grains has been found in each tin, and by some chemists, and even medical men, this quantity has been pronounced injurious. Vulpian, however, says that any copper compound contained is insoluble and harmless and no evidence exists to the contrary; and Gulippe, after the crucial test of eating them freely for some time, found no bad result. In a 4 lb. loaf of bread ·4 to 1·8 grains has been found, and the latter amount might

* Sachs' *Arbeiten*, p. 529.

become serious." Taylor ('Medical Jurisprudence,' 1883, p. 315) says: "In the making of preserved fruits and vegetable pickles the salts of copper (blue vitriol) are used. . . . . The quantity of copper in such articles may be sufficient to cause fatal effects, but serious symptoms of gastric irritation are sometimes produced, and in young persons these may assume an alarming character;" and at page 213, "the copper is liable to be precipitated by certain organic substances, *e.g.*, albumen, etc.; but some of these organic compounds are easily dissolved by acids or even by an excess of the solution of copper salt. A portion at least of the salt of copper is therefore commonly held dissolved." Blyth on Foods (1888), page 193, says:—"It will be noticed that men of considerable scientific reputation have expressed strong opinions on the subject. Nevertheless, the whole of the injurious action of coppered peas rests entirely on theory. . . . . If the copper should exist in a state of combination with some organic matter—for example, the legumen—so as to be insoluble in the digestive juices, although the fact of such insoluble compound would render the peas less nutritious, yet they would have no toxic action." Wood, 'Therapeutics,' 1888, page 463, says:—"The possibility of injury resulting from the use of such food (vegetables greened by copper) has been repeatedly investigated by French and Belgian commissioners, and the general verdict has been that no harm is produced." Professor Lehman, at the recent meeting of the Congress on hygiene, said: "It is not proved by one well-observed case that copper salts, that is to say, a quantity of 150·200 milligrams of copper having entered the organism of a healthy adult at one time can cause a disturbance in health worthy of any remark. During copious meals about 200 milligrams of copper can enter the body with preserves and bread without being noticed to any extent to the senses." Mestre, in his report to the Committee of Hygiene in France (March, 1890), shows that the sulphate of copper in tinned peas is equalled or exceeded in rye, wheat, corn, potatoes, and other natural foods. In France regreening of vegetables by sulphate of copper was prohibited in 1853, but after persistent struggles the prohibition was removed in 1889. On the other hand, in Germany colouring any food with copper was prohibited in 1887. It was suggested that there were reasons for these changes in both countries, apart from considerations of health, and whether this be so or not it may be fairly argued that little useful inference can in the circumstances be drawn from what has been done in either. It is therefore on the remaining evidence I must chiefly depend. Has it been proved by that evidence that 1·4 grains per lb. in a tin of peas is injurious? The oral evidence is conflicting. Did I think the first three authorities quoted intended to say that such a quantity was injurious, I should doubt if the contrary opinion was so confirmed as to entitle me to act on it, but I do not so read the passages referred to. Only one of the three refers to peas—Dr. Phillips—and he indicates that the opinions he mentions were not substantiated. Drs. Guy and Ferrier speak of copper vessels, and Dr. Taylor, or rather his editor, Dr. Stevenson, of fruits and pickles. The other writers are all of opinion that such a quantity in peas is not injurious, and adding to this the practical test that although 20,000,000 tins are used annually only one witness was brought forward to say he had been injured, it seems to me I am not warranted in convicting the respondent. The statement as to the amount consumed, and there being no proved injury, is not new, it was made by Blyth in 1888, and as far as appears has not been challenged, and if correct there is nothing in the remainder of the evidence to counterbalance it. It is not sufficient that the sulphate in large quantity may be poisonous, or in larger quantities, or in combination with other substances may be injurious, or that persons may have been injured without observing it or complaining. It is also of course insufficient that there may be persons with whom tinned peas do not agree. It is to be observed that there is not as in Germany an absolute prohibition of colouring matter because in certain circumstances it may be injurious to health, the food with which it is mixed must be rendered injurious. Some may think the former is the safer rule, but it is not our law. It was contended that the quantity may vary through design or carelessness, and that if allowed at all it will be difficult to check any excess, but I do not view this with alarm. A dangerous quantity has not been used hitherto, there is no inducement to use it, but the contrary, and prosecutions would follow were there cases of injurious excess. Beyond this the consideration is not a ground for convicting the respondent. He is only liable if he used a quantity injurious to health. There is only one other observation. Because 1·4 is harmless in peas, it does not follow it is so in all other vegetables, and still less in fruits.

Mr. Colquhoun, on behalf of the defendant, asked his Lordship to allow his client's expenses.

The Sheriff refused the application, remarking that the whole country was very much indebted to both sides for the manner in which the case had been gone into.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Analysis of Ipecacuanha.

Sir,—I observe in the current number of the Journal a letter from Mr. Cripps, in which he calls Messrs. Moss and Dott to account for finding fault with the method employed by him and his collaborateur, Mr. Whitby, for the determination of starch in the assay of ipecacuanha.

I may point out that other investigators have found starch in almost as large quantities. Pelletier, for instance, found 42 per cent. in the bark and 20 per cent. in the wood. The value of Pelletier's estimation is, however, discounted by the very large amount of emetine he found, which subsequent observers have failed to confirm. Reich, who is much quoted by Flückiger and Hanbury, found only 24 per cent. in the entire root, the bark yielding 30 per cent. and the wood about 7 per cent.

A good specimen of root is at least 80 per cent. bark, and thus the proportion of starch found by Mr. Cripps would correspond to more than half of the bark after the average proportion had been assigned to the wood. This consideration doubtless suggested that other sugar-yielding bodies had been estimated along with the starch. If the former were wholly removed in the treatment of the 10 grams with water for albumens, the process employed by Messrs. Cripps and Whitby would not be open to the objections which have been made to it.

I do not think Mr. Moss suggests that the amount of pectic acid found is too small, indeed, he says the quantity might be correct, but he expresses surprise that it should be found to weigh so little considering the show it makes when the first percolate is heated in the process of making vin. ipecac. B.P.

Why Mr. Cripps should presume that albumens are meant when pectic acid is distinctly spoken of is as curious as it is presumptive. Next time Mr. Cripps has the opportunity let him note the phenomenon referred to, and appreciate the difference between a *separation* of pectic acid and the jelly it produces, and the *precipitation* of albumens in making, say, extract of liquorice,

Peckham, S.E. Alexander Gunn.

Communications, Letters, etc., have been received from Messrs. Kemp and Co., L. Cottrill, G. Nind, A. W. Sikes, A. Kinninmont, F. MacRae, T. W. Peck.

ARISTOLOCHIA INDICA.

BY W. DYMOCK AND C. J. H. WARDEN.

This scandent shrub, common in thickets throughout the hotter parts of India, is described in the Rája Nirghanta under the name of *Rudra-jata*, "Rudra's locks." It bears numerous synonyms, among which may be noticed Arka-múla, "lightning root," Ishvari, "goddess," Sumanda, "pleasing," and Sudhy-upásya, "worthy of worship." The Portuguese settlers in India named it "raiz de cobra," on account of its supposed efficacy against the bite of that snake. The plant was first described by Van Rheede (*Hort. Mal.*, viii., 25), who gives the following account of its medicinal uses, as obtained by him from Brahmin Pundits in Malabar.* "The plant boiled in oil is applied as a liniment to snake-bites, and a decoction is given internally. It is also administered, rubbed to a paste with water, or in decoction in cold fevers, headache, flatulent distension and dysuria. As a lotion it relieves gouty pains, and the powder with pepper and hot water stops bloody fluxes."

Ainslie remarks (*Mat. Ind.*, ii., 298) that the root appears to be the "radix puloronica" of Rumphius, which is employed in Banda in decoction in diseases of the intestines, and also in intermittent fevers. He also notices its use by the Tamil doctors in the bowel complaints to which children are subject, in consequence of indigestion and teething. Loureiro (*Flor. Cochin-Chin.*, ii., p. 528), speaking of the plant, says: "Prodest in colica, cibi inappetentia, febribus intermittentibus, obstructionibus, hydrope." Fleming ('Catalogue of Indian Plants,' p. 8) notices its use in Upper India as an emmenagogue and antiarthritic. Dr. S. M. Shircore, of Moorshedabad, states that it is undoubtedly used to procure abortion (*Dict. Econ. Prod. Ind.*, i., p. 315). In the vernaculars the plant is best known as *Isharmúl* in Bengal, *Ichchuramúla* or *Ishvaravéru* in Madras, and *Sápsanda* in Bombay, a name often shortened into *Sápsan* or *Sápús*. All parts of the plant have an agreeable aromatic odour, which Rheede likens to that of fresh ginger. The drug, as found in the bazars, consists of a single long stem with the root attached, coiled up into a circular bundle. The thickest portion of the stem and root is from ¼ to ½ inch in diameter; on transverse section it shows a central, yellow woody column, made up of about ten wedge-shaped portions. The bark is thick and corky, of a light brown colour, marked with longitudinal ridges, and numerous small warty projections. The wedge-shaped woody columns are traversed by large vessels, the medullary rays are distinct and easily traced into the bark; in the latter, which consists of the usual layers, there is a circular zone of large yellow stony cells. The drug has a bitter terebinthinate and aromatic taste.

Chemical Examination.—The air-dried roots and stems were contused and digested for several days with warm 80 per cent. alcohol. The greater part of the alcohol from the resultant tincture was recovered by distillation, but the last traces could be separated by spontaneous evaporation with difficulty, owing to soft resinous matter separating and preventing evaporation. The extract, still containing alcohol, and which possessed a strong smell of the drug, was mixed with water and agitated with light petroleum ether. During agitation a dark, viscid, resinous mass separated, as well as a small amount of a bright yellow powder. The clear aqueous solution, after separation of the petroleum ether, was gently heated to expel alcohol, and the residue acidified with sulphuric acid and agitated with ether. After separation of the ether the aqueous solution was rendered alkaline and re-agitated, first with ether, then with chloroform, and lastly with amylic alcohol.

The dark resinous matter which separated on agitation with petroleum ether, was repeatedly agitated with ether, in which a portion was soluble. The ethereal extract was of the consistence of honey, had a taste and smell like that of a mixture of turpentine and peppermint, and was also bitter; in alcohol it was soluble with acid reaction; it was dissolved by ammonia, forming a dark, reddish-orange coloured solution, and was reprecipitated by acid in yellowish flocks. The residue, insoluble in ether, was soft when moist, and dark chocolate in colour; on drying at 100° C. it became brittle, and could be easily reduced by pressure between the fingers to a yellowish powder, which possessed neither taste nor odour; in alcohol it was soluble with acid reaction; in ammonia the greater part dissolved and was reprecipitated in yellow flocks by acids. The bright yellow powder was soluble in ether, and was left on spontaneous evaporation as a bright yellow varnish, destitute of crystalline structure. In warm water the greater part dissolved, forming a pale yellow solution, which became turbid on cooling, and which had a marked acid reaction. In alkalies it was soluble with deep orange coloration, and was reprecipitated by acids in pale yellow flocks; with ferric chloride it gave a dirty browish-red precipitate, with basic acetate of lead yellowish flocks, and with baryta water no precipitate, only a deep yellow coloration.

The light petroleum ether extract was soft and brownish in colour, and had a strong odour of turpentine; on gently heating it in a small retort a trace of a distillate was obtained which had a most powerful terebinthinate odour and taste.

The extract obtained by agitating the original aqueous acid solution with ether, was a bright yellow, transparent, soft, varnish-like mass, from which slowly separated a few small, yellowish nodules, which on microscopic examination were found to consist of bundles of rod-shaped crystals. The extract was soluble in alcohol with strong acid reaction, the solution exhibiting a well-marked greenish fluorescence, as did also an ethereal solution. The taste was very bitter, aromatic, and also somewhat terebinthinate. On treatment with ammonia the extract was partly dissolved, yielding a deep orange-red solution, which when agitated with ether, communicated a marked greenish fluorescence to it. On evaporating the ether a bright yellow, viscid, transparent extract was left, with a bitterish and strongly terebinthinate taste. In alcoholic solution the extract was neutral in reaction, the solution exhibiting marked fluorescence. The ammoniacal solution, after separation of the ether, was acidulated with sulphuric acid and

* There is ample evidence in Rheede's 'Hortus Malabaricus,' to show that the Pundits employed by him were Shenvi or Saraswat Brahmins from the southern Concan. The so-called Brahminical names of plants which he gives, are Concani and not Sanskrit, and there is still a considerable community of these Brahmins settled in Malabar.

reagitated with ether. On evaporation of the ether, a bright yellow, soft, varnish-like residue was left; on heating with water the greater part dissolved, forming a clear solution, which became turbid on cooling. With alkalies the extract gave a deep orange-red solution; with ferric chloride a dirty brownish-red precipitate; with basic lead acetate yellowish flocks were precipitated; with lime and baryta water a yellowish coloration, but no precipitates. After boiling with dilute sulphuric acid, Fehling's solution was reduced. The reactions of this acid were therefore similar to those of the *yellow powder*, which separated on agitation with petroleum ether.

The original solution, after addition of sulphuric acid, was rendered alkaline with ammonia and agitated with ether. On spontaneous evaporation of the ether, a yellow, soft, non-crystalline, transparent, varnish-like extractive was left. This was treated with a little dilute sulphuric acid, in which a portion only dissolved, and agitated with ether, which separated resinous matter. The ether was then separated and the aqueous solution rendered alkaline and agitated with ether. A yellow, non-crystalline extract was obtained, which was nearly wholly soluble in dilute sulphuric acid, and which afforded the following reactions. With ammonia a white precipitate soluble in excess; with caustic soda a similar precipitate only slightly soluble in excess; with platinic and auric chlorides, yellow precipitates; a marked yellow precipitate with Mayer's reagent, and with other alkaloidal reagents; with strong nitric acid, a yellowish coloration; with Fröhde's reagent a deep blue coloration in the cold, no alteration in tint on gently heating; after boiling with dilute sulphuric acid the liquid slightly reduced Fehling's solution.

After agitation with ether the liquid was agitated with chloroform, which separated an alkaloidal principle mixed with much colouring matter. The reactions were similar to those yielded by the principle extracted by ether.

Finally the liquid was agitated with amylic alcohol, the alcohol exhibiting a very marked greenish fluorescence. The amylic alcohol extract contained a large amount of resinous matter insoluble in dilute sulphuric acid; the acid solution afforded, however, very marked evidence of the presence of a principle reacting with alkaloidal reagents, the colour reactions being similar to those yielded by the principle separated by ether and chloroform. It would be premature for us to definitely state that the principles extracted by ether, chloroform, and amylic alcohol were either identical or different.

ON SOME DERIVATIVES OF BENZOIC SULPHINIDE (SACCHARINE OR BENZOYL SULPHONIC IMIDE), AND THE CHANGES CAUSED IN THEIR TASTE BY CHANGES IN COMPOSITION.*

BY R. DE ROODE.

The most characteristic property of parabromosulphinide is that it possesses two distinct tastes, a bitter and a sweet, and the corresponding chlorine compound has the same peculiarity in even a more marked degree. The author has therefore investigated the other para-halogen-sulphinides, and the substances from which they are made, and observed their effect upon the nerves of taste.

The starting point for their preparation was paradiazotoluene-orthosulphonic acid, which was converted into parafluortolueneorthosulphonic acid by heating with concentrated hydrofluoric acid in a platinum dish until the decomposition was complete, evaporating to a syrupy consistence, diluting with a large quantity of water, and neutralizing with barium carbonate (the calcium salt not being easily crystallizable). From the barium salt the potassium compound was obtained by treatment with potassium carbonate. This latter salt crystallizes from water in large glistening scales, containing two molecules of water of crystallization. The corresponding chlorine and bromine salts were prepared in a similar manner, potassium chlortoluenesulphonate crystallizing in light yellow needles containing no water, and the bromtoluenesulphonate in thin lustrous scales containing 1 mol. of water of crystallization. For the preparation of the iodo-salts the diazo compound was decomposed by hydriodic acid in presence of alcohol, the flask being kept cool; after the evolution of nitrogen had ceased the contents were warmed and the alcohol distilled off. The residue was diluted with a large quantity of water, neutralized with lead oxide and filtered hot. The lead salt, being insoluble, could not be easily freed from the excess of oxide, and was converted into the potassium salt, which crystallized from aqueous solution in transparent "whetstone-shaped" crystals containing 1 mol. of water and corresponding to the potassium salt of the β-iodotoluenesulphonic acid described by Glassner (*Berichte*, viii., 561). Accompanying the insoluble lead salt was another which was very soluble; it was not examined as such, but was converted into the potassium salt, and on analysis gave figures corresponding to potassium toluenesulphonate.

From these four potassium salts, the corresponding amides were prepared by the action of phosphorus pentachloride, followed by aqueous ammonia. The solutions were evaporated to dryness on the water-bath, alcohol added, and after treatment with animal charcoal crystallized out. With the exception of the iodo salt, all are easily soluble in hot water and alcohol, sparingly soluble in cold water. The melting-point of the fluorine salt is 155°, of the chlorine salt, 145°, and of the iodine salt, 185-187° (uncorrected). From these amides, the sulphinides (sulphonic imides) were prepared by oxidation with alkaline permanganate, the most successful method of working being found to be as follows: 20 grams of the amide and 8 grams of caustic potash were dissolved in 2 litres of water in a large flask, and placed on the water-bath. A concentrated solution of 35 grams of potassium permanganate was then added by degrees, the flask being kept hot until only a slight pink colour remained, an operation lasting about six or eight hours. A little alcohol was then added, and the liquid filtered and evaporated to about 75 c.c. While still hot, the sulphinide, together with some unaltered amide, was precipitated with strong hydrochloric acid; to separate them the mixed precipitate was boiled with water, neutralized with chalk, filtered and allowed to cool, the amide crystallizing out in long white needles. On further evaporation the calcium salt of the sulphinide was obtained. These all crystallize in radial groups of white needles, having the same tastes as the sulphinides themselves, and containing $7\frac{1}{2}$ molecules of water of crystallization. From these calcium salts the pure sulphinides were obtained by precipitation with strong hydrochloric acid.

Parafluorosulphinide, thus prepared, crystallizes from hot water in long white needles, which break up on drying into granules; from a dilute solution it may be obtained in small transparent rhombs. Its melting-

* From the *Amer. Chem. Journ.*, xiii., 217–232. Reprinted from the *Journ. of the Soc. of Chem. Ind.*, July.

point is 200–202° (uncorrected). Its taste is almost purely sweet, a slight bitter after-taste being perceptible. It is probably as sweet as benzoic sulphinide.

Parachlorosulphinide crystallizes in thin pearly scales, melting at 218°. It is slightly less soluble than the fluorine compound. It has both a sweet and a bitter taste, the latter being the more intense.

Parabromosulphinide also possesses both tastes, but in a less marked degree, and *para-iodosulphinide* has only a slight bitter taste. The latter crystallizes in fine white needles and melts at 230–232°. On boiling with dilute hydrochloric acid, *p*-chlorosulphinide is converted into the acid ammonium salt of *p*-chlororthosulphobenzoic acid, just as benzoic sulphinide is into that of orthosulphobenzoic acid.

With regard to the tastes of these halogen derivatives it is found difficult to describe the differences accurately; they have been tasted by several, the majority of whom agree with the author in his description. "It is, however, impossible to make accurate comparison between a sweet and a bitter taste as regards the relative intensity of the two."

THE LIQUORICE PLANT AS FOUND ON THE BANKS OF THE TIGRIS AND EUPHRATES.

In a report on the trade of Bussorah, Consul Chenevix-Trench says:—The great rivers of the Tigris and Euphrates, in the part where the liquorice root is found, flow through flat treeless prairies of uncultivated and nearly uninhabited land, capable with irrigation of producing any grain. For three months of the year hot winds blow, and the temperature reaches 104 degrees. For six months the climate is moderate and salubrious, and for three months bleak and wintry, the thermometer going down to 30 degrees at night. The liquorice plant is a small shrub, with light foliage, growing to about 3 feet high, invariably where its root can reach the water. It grows without any cultivation. No lands are leased for the purpose, and no objection is made to its being collected. It is found in abundance, from Ctesiphon, 20 miles from Baghdad, down to Kut-ul-Anara, 178 miles—the latter place being half-way between the ports of Bussorah and Baghdad. It grows on red earth soil, and also on light, almost sandy soil, where the wood is best—provided it has plenty of water, and the ground is not more than 50 yards from the actual river or stream. The one firm which works it in Baghdad is Messrs. Zerlendi and Essayie; and it is well known that the business is a prosperous one. The plant is dug up by Arab labour, which is, generally speaking, plentiful, and the men can be brought by boat to where the plant is growing. The labourers need superintendence. They are paid according to the quantity dug. The wood, after being once dug up and cut, grows again better afterwards. The time of collecting is, generally speaking, during the winter, but it is possible all the year round. The root when dug is full of water, and must be allowed to dry; this process takes the best part of a year, especially in hot weather. After it is dry, or during the process, it is sawn or cut into small pieces 6 inches to 1 foot long. The good and sound pieces are kept, and the rotten bits removed for firewood. A local tax of 10 per cent. is claimed by the Government, which may be taken in money or kind from roots cut from the Sultan's lands, and 20 per cent. from Government lands. It is then shipped in river native boats for Bussorah, where there is a wool hydraulic press. It is afterwards shipped in pressed bales to London, and again shipped from there to America, where it is used largely in the manufacture of tobacco. The trade is capable of expansion. The demand in America is great, and shipments are easily disposed of.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, SEPTEMBER 26, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

ANTISEPTIC FIELD DRESSINGS.

ATTACHED to the Report of the Army Medical Department for the year 1889 is an appendix containing some copious notes on the tenth International Medical Congress held at Berlin last year. A considerable portion of these notes relate to the first field dressings which are now adopted in every continental army, and refer to several matters of pharmaceutical interest. The fact that these dressings are now carried by each individual soldier is a proof of their being considered essential in time of war. One of the most important features of these dressings, as now employed, is that of being rendered antiseptic. As a general result of the discussions that have taken place on this subject within the last few years, it is now generally accepted that the plan of distributing dressing material throughout an army is advantageous. In European warfare, when the number of wounded is likely to be excessive, the supply of material in this way is invaluable, and in savage warfare circumstances may arise when no other dressing is available. But the material of the dressing must be strictly antiseptic and capable of retaining its antiseptic properties. It must also be carried in such a way that the soldier does not contaminate it, or interfere with it, except in the emergencies for which it is intended. The outside cover of the French, German, and Italian field dressings is of cotton cloth; that of the English dressing is parchment paper, cemented with sublimate paste. In the Austrian army the covering is a tin case. The inside covering is either waterproof cloth or metal foil. The antiseptic agent used by all nations, except the British, is corrosive sublimate (1 in 1000). The British dressing consists of carbolized tow, instead of sublimate gauze. The use of cotton cloth for the outside covering is considered an important improvement. It is not liable to stick like the wax cloth formerly used by the Germans or to burst open like parchment paper. For inside covering waterproof cloth is found superior to metal foil.

The materials employed on field service by the

German Medical Service are sublimate gauze, sublimate wool, and absorbent cotton wool. These are sterilized by steam, rendered antiseptic by impregnation with perchloride of mercury (1 in 1000), stained with fuchsin, and done up in compressed packages of regulation size and weight in a wrapping of red paper. The dressing material of the French Medical Service consists entirely of sublimate gauze and cotton wool. Absorbent tow, which used to be largely used in the French army, is now in course of being abandoned as unserviceable. The dressing material for the French army is impregnated with sublimate solution, but no colouring is used. At the meeting of the section where this subject was discussed turf moss was exhibited and strongly recommended as dressing material for wounds. It is largely used in Germany by BARDELEBEN, THIERSCH, MEHLHAUSEN, and other eminent surgeons. It is also used in the Bavarian army. It is a very absorbent antiseptic, and makes a soft even compress for a wound. It is also essentially a dressing that can be left without changing until a wound heals. These dressings of compressed moss are, however, scarcely suitable for field use in consequence of the time required for swelling up before they can be applied to a wound.

The tissue paper dressings of Dr. GRASSICH, of Fiume, is more expensive than others, and is described as having special advantages. Sir JOSEPH LISTER'S cyanide dressing is said to be proving a perfectly non-irritant antiseptic dressing, but is at present more costly than sublimate. Sal alembroth is too irritant to be used as a direct application to wounds. The antiseptic agents used on field service in the German army for irrigating lotions, instruments, etc., are perchloride of mercury solution, carbolic acid dissolved in 5 per cent. of alcohol, and iodoform in powder, carried in bottles and dredgers. A most important question for army medical officers is how to keep ligatures aseptic for use on field service. The method adopted by the German Red Cross Society is to wind sterilized silk round sterilized glass rods, which are then immersed in sterilized cotton wool in a nickel plated box. In using the ligature one of the rods is immersed in antiseptic solution. This method is, however, unsuited for the battle field. The plan usually adopted is to carry the ligatures, after having been sterilized, in bottles containing carbolized oil, sublimate solution, or alcohol.

POISONOUS WEED KILLERS.

THE *Gardeners' Chronicle*, in reporting a case of accidental poisoning by a weed-killing compound, remarks that it comes as a surprise, in view of the stringent regulations enforced in regard to the sale of poisons, that these excessively poisonous weed-killers can be purchased freely by anyone. No doubt this statement is made with a knowledge of the circumstances under which these dangerous preparations are being sold, and we have reason for believing that the matter should be inquired into by provincial representatives of the Society, in order to obtain the information requisite for putting a stop to improper sales. The Council of the Society has for some time past had its attention directed to this matter, and in a recent instance, where a prosecution was commenced, the proceedings were stopped by the payment of the penalty into court (see *ante*, p. 115). Properly these preparations come under the regulations applying to poisons in Part I. of the Schedule, and can only be sold lawfully by registered chemists and druggists to persons known to the vendors and with due registration of the sale. In the case referred to by the *Gardeners' Chronicle*, it appears from the account given that the death of the child was due rather to the negligent misuse of the poison than to its improper sale. But there can be no doubt that if the regulations applying to the sale of these preparations were properly observed and their sale by unqualified persons more effectually prevented, much good would be effected in impressing upon those who require to use them a knowledge of their dangerous characters and a sense of the necessity for caution in their use. But as we have already pointed out, it is in the first instance necessary that particulars of the irregular sale of these poisonous preparations should be obtained and placed at the disposal of the Council for the purpose of promoting the strict application of the Pharmacy Act in regard to it. This is one of a class of cases in which it is impossible to take action and incur the expenses attendant upon prosecutions without having a secure preparation made for doing so by those who are individually prejudiced by breaches of the Pharmacy Act, and would be in common with the whole trade benefited by its more stringent administration.

The Council of the Nottingham and Notts Chemists' Association has made arrangements for a complete three years' course of instruction for pharmaceutical students to be given at the University College, Nottingham. During the college session, commencing on October 5, instruction will be given in chemistry and materia medica. A course of twenty lectures will be given by Professor Clowes at 8 p.m. on Tuesday evenings, commencing on October 6. The fee for the course is one guinea, and each student will be entitled to three hours' laboratory practice each week. Associates in the employ of members of the Association will be admitted at the reduced fee of half a guinea. A similar course of twenty lectures on materia medica will be given by Mr. C. Haydon White, M.R.C.S., on Thursday evenings commencing on October 8, at a fee of fifteen shillings for the course.

* * *

The Durham College of Science at Newcastle-upon-Tyne is an educational institution which has for some time past rendered good service by furnishing opportunities for the scientific studies that are essentially requisite to pharmaceutical students. The North of England Pharmaceutical Association in the same town has taken advantage of this circumstance, and has established in connection with the College a School of Pharmacy, in which the teachers are Professor Phillips Bedson, D.Sc., Mr. M. C. Potter, M.A. F.L.S., and Mr. N. H. Martin, F.L.S. The subjects of Chemistry, Botany, and Materia Medica are thus efficiently provided for, and we have just received the syllabus of the sixth session of the School, which will

commence on the 6th of next month. The lectures are given in the lecture rooms of the College, and the practical work is carried out in the laboratories of that institution. Classes have been arranged for instruction in theoretical and practical Chemistry, Botany and Materia Medica at very moderate fees, and prizes are offered to students who attend three-fourths of the respective courses of lectures and present themselves for the class examinations to satisfy the lecturers as to their proficiency in the subjects. The Association gives in each subject a prize of books to the student who obtains a sufficient number of marks to warrant the examiner in recommending its award. To further assist students the library and museum of the Association are open in the day and evening to those who attend the classes, as well as to the members and associates of the body. In Newcastle, therefore, as well as in Sheffield and Nottingham, ample opportunities exist for chemists' apprentices and assistants to obtain thorough scientific instruction, which, in conjunction with their technical training, should enable them to present themselves for the qualifying examination with perfect confidence, and without the risk of failure.

* * *

In connection with the Dundee Chemists' Assistants and Apprentices' Association classes have been resumed for students. The botany class, under Mr. W. G. Smith, B.Sc., meets on Tuesday evenings in the rooms of the Association, and the materia medica and pharmacy class, under Mr. W. Mair, meets on Friday evenings. These classes are intended as a useful preparation for students who purpose attending a regularly organized course of study in a school of pharmacy.

* * *

It is pleasing to notice that one of the London newspapers, in commenting upon the article on "Pharmaceutical Ethics," endorses the argument put forward by Mr. Maben, by adopting the view that in regard to the purchase of any article standing on the border-line between a drug and a commodity of more common use, the public act upon the principle embodied in the statement, "Go to the chemist's and you will get it pure." Assuming that view to be correct, it establishes for the chemist a very great advantage over other classes of tradesmen, and it points very forcibly to the need that exists for the chemist in his own interest to be zealous to maintain the prestige attaching to him in popular estimation. Not only in the supply of drugs and medicines is it imperative for that purpose that the chemist should satisfy himself as to their quality and strength and take every opportunity of impressing upon his customers that those articles are supplied with his individual guarantee of their being what they should be, and that the members of his body are the only persons who have the ability and the right to give such a guarantee. The same principle should be observed as far as possible in all other transactions, and if the proper business of pharmacy has to be supplemented by adventitious branches of trade of a more or less incongruous character these should be carried on in such a manner that neither the individual chemist nor his *confrères* may lose the respect and recognition they are entitled to receive as specially qualified persons in whom confidence may safely be placed.

A corespondent sends the following advertisement as having recently appeared in the columns of a leading Glasgow newspaper: "Druggists.—Wanted young man or youth to keep doctor's shop for a week," and he asks whether it is to be regarded as a sign that the lowest depth has been reached or whether a still further development of "free trade" principles is to be expected from the second city in the Kingdom? Certainly it is not the only indication that in regard to medical as well as pharmaceutical ethics and politics Glasgow and the West of Scotland is "peculiar," and possibly the strange attitude which Glasgow chemists have assumed in regard to unqualified assistants and managers, as well as to "doctor's shops," may have some light thrown on it by such a condition of affairs as that to which the above advertisement appears to point.

* * *

Masonic chemists will probably be interested to learn that a project which has been for some time past in contemplation for the foundation of a lodge to which members of the medical profession will be more especially eligible has now been carried out, and that a warrant having been obtained for that purpose from the Grand Master, H.R.H. the Prince of Wales, the consecration of the Æsculapius Lodge will take place at the beginning of October. Both medicine and pharmacy will then be represented by special masonic lodges, and it may be hoped that the additional bond of association thus established between those engaged in the practice of these important arts will conduce to their mutual improvement as well as to agreeable intercourse.

* * *

We have received a letter from the widow of the late Mr. Cottrill, of Shepton Mallet, communicating her desire to get one of her sons into the Masonic School, and asking for advice as to the best means of securing votes in his favour at the election which will take place next April. No doubt many of Mr. Cottrill's old masonic friends will support the candidature of his son, and Mrs. Cottrill hopes that the members of the Galen Lodge may be especially disposed to help her in that respect. It must, however, be mentioned, that after securing the election of Mr. How last May upon the Royal Benevolent Institution, through the assistance rendered by Mr. W. D. Dugdale and the Dorsetshire masons, the Galen Lodge is under such obligations to repay the votes then borrowed for the benefit of Mr. How that it will be scarcely possible to trust to much assistance from that quarter at the next April election. However, we take this opportunity of mentioning the facts of the case, and of earnestly requesting those who have votes to dispose of for the several masonic charities to bear in mind that there is now a lodge specially connected with pharmacy through which such claims as those above mentioned can be put forward and supported. Very much depends upon the organized co-operation of voters in securing the election of candidates, and we therefore hope that all pharmaceutical masons will, if possible, bestow their votes upon candidates who can claim to be considered not only on masonic grounds, but also by reason of their connection with pharmacy.

British Pharmaceutical Conference.

MEETING AT CARDIFF.

(*Concluded from page* 239.)

On resuming, a paper was read on—

Cascara Sagrada and Extracts, with Special Reference to Question 8 on the Blue List.

BY JOHN MOSS, F.I.C., F.C.S.

This paper is presented as the result of an endeavour to furnish a reply to question No. 8 in the Blue List. No one is more conscious than the writer that it does not approach completeness, and it is only submitted in the hope that it may be regarded as an instalment which may receive additions on a future occasion or may provoke an instructive discussion now. Though there is nothing of interest, from a chemical point of view, it may prove of some little practical value to the pharmacist.

An attack has been commenced on the chemical part of the subject, but the results are not sufficiently definite for publication. The difficulties of separating a number of proximate plant constituents are only to be overcome by much time and more patience, especially when they consist mainly of resinous bodies which overlap in their characters and are liable to change under the very operations by which it is sought to isolate them. When the separation is effected it is intended to submit the principles to trial and observation under competent medical direction, and in this way it will be possible to furnish an answer to another part of the problem, viz., the relation of the bitter resin to the therapeutic activity.

Liquid Extract with Water.—The British Pharmacopœia directs that the liquid extract of cascara shall be prepared by boiling the coarsely-powdered bark in distilled water till it is exhausted, evaporating the decoction until it measures in fluid ounces three-fourths of the weight of bark in ounces, and when cold adding thereto a third of its volume of rectified spirit. The average specific gravity is 1·05. During concentration and towards the end of the operation the decoction lets fall resinous matter of two kinds, one firm even in the hot liquid and the other of a softer character. The hard resin comes down first. The decoction being removed from this deposit, the softer portion can, whilst still warm, be for the most part separated from the harder one.

The official dose of the *solid* extract of cascara is 2 to 8 grains. Three grains of the harder resin produce a distinctly aperient effect in sixteen hours. The same quantity of the soft resin is only gently laxative at the end of a similar period. No pain was observed with either. The weight of the resins together from 100 lbs. of bark varies somewhat, but averages 1 to 2 lbs.

A cask in which fifty gallons of the fluid extract, prepared as above from commercial spring-gathered 1889 bark (the separated resin was added to it and in great part was taken up on addition of the spirit), at the end of twelve months contained a firm deposit which, when thoroughly drained, weighed 7 lbs. 12 oz., equivalent to 1·6 per cent. This corresponds closely with the proportion deposited during evaporation of the decoction, as described in a preceding paragraph, and the two have doubtless much in common. The fluid extract withdrawn was brilliant to the last drop.

Three grains of the residue completely dissolved or melted in the saliva in five minutes, the latter portion not so readily, indicating the presence of at least two bodies of different solubility. It was fairly bitter, with the characteristic cascara flavour, and slightly astringent to the tongue. A distinct laxative action was exercised in sixteen hours.

The deposit lost on the water-bath 18·6 per cent. and of the dry extract so obtained 60·2 per cent. was dissolved by water. The solution filtered with difficulty and was dull and opalescent when cold, but became clear on heating. Water does not separate the components sharply, and of course it does not follow that what is soluble in water is also soluble in an aqueous solution of the constituents of the bark. The aqueous solution when evaporated gave a bright bitter extract drying to a deep brown varnish, slightly hygroscopic. It was feebly aperient or laxative in thirteen hours. The portion of the deposit not dissolved by water dried to a black cindery residue on the water-bath and was almost without taste. Three grains acted as a laxative in eighteen hours. In general characters it closely resembled the harder portion of the resins deposited from the original decoction during evaporation, as already described.

Proof spirit dissolves 93·2 per cent. of the dry cask deposit, but drops a portion on standing, so that when filtered the filtrate yields only 78 per cent. of dry residue. Rectified spirit (·838) dissolves 88·2 per cent. of the cask deposit, practically the same as proof spirit. The portion not dissolved by proof spirit was seen under the microscope to consist of degraded organized matter.

One ounce of ground bark which had been used for the official liquid extract was dried, and percolated with proof spirit till almost colourless. Evaporated, the resulting extract was yellowish brown and oily. It weighed 20·72 grains, equivalent to 4·73 per cent. Three grains taken in the mouth tasted somewhat bitter at first, afterwards acrid, and at the end of five minutes had not disintegrated and required to be swallowed in the mass. In three cases it was not merely ineffective as a laxative, but appeared to exercise a slight astringent action.

Liquid Extract with Proof Spirit.—Seven pounds of thin, spring-gathered 1890 bark were ground to number forty powder and exhausted by percolation with proof spirit. After recovery of the spirit, the residual thin extract was made up to seven fluid pounds by the addition of sufficient strong spirit to make the liquid equal to proof in strength of alcohol. The specific gravity was 1·025. A slight deposit has appeared after three months. In one instance 20 minims were very effective, producing slight pains in seven hours and full purging in fourteen and again in seventeen hours. In a different and less sensitive subject 30 minims produced analogous results. It is not improbable that a smaller dose in each case would have produced merely laxative effects, but further observations are obviously desirable.

Two ounces of the dried marc from the proof spirit liquid extract were boiled with water. The decoction was almost water white, with no tinge of yellow or brown, only dull; and when evaporated yielded mucilaginous residue weighing 48 grains (5·48 per cent.), which gave the reaction for starch with iodine and did not reduce Fehling's solution. It was inert.

The results of these experiments appear to point to the conclusions:—

1. *That an aqueous liquid extract does not represent the full activity of the bark.* Water extracts all the active constituents by boiling, but does not retain them when the decoction is concentrated. From this it follows:—

1*a*. *That an aqueous solid extract* would *represent the full activity of the bark.*

2. *That a proof-spirit liquid extract does represent the full activity of the bark.* This extract in the same doses as the official liquid extract produces slight passing discomfort, but no unpleasant effect.

The communication from Dr. James Jardine which follows (and I beg to express my thanks to him for making this report at the instance of a total stranger and solely in the interests of medicine) gives the results of an enquiry into the therapeutic action of

cascara collected in different years and seasons and localities.* Though not exhaustive it is extremely interesting, and tends to confirm the generally accepted views that bark from South Oregon is preferable to that from the northern parts of the same state, and that the older the bark the more benign is its action. In conclusion, a few explanatory references to Dr. Jardine's paper are necessary.

Liquid Extracts.—(*a*) Prepared from fine bold quills of thin bark, spring-gathered in 1888, sp. gr. 1·05.

(*b*) From thin bark, spring-gathered in 1889, sp. gr. 1·05.

(*c*) From medium thick bark, spring-gathered in 1890, sp. gr. 1·05.

(*d*) From a special bark kindly collected for me late in the summer of 1890 by Professor Searby on his own estate in Senora county, dried just enough to travel without sweating or moulding, and forwarded by express. This was the most beautiful and carefully prepared specimen of cascara I have seen, and was in small quills uniformly 9 inches long. Within fifty days of collection the liquid extract was ready. There was no separation during evaporation of the decoction. The preparation had a specific gravity of 1·067, was perfectly miscible with water and almost tasteless. After standing ten months it has acquired a bitter taste, and some loose deposit has appeared occupying about 10 per cent. of its bulk. Professor Searby writes, "I have used the same bark (gathered a little earlier) for the last two years with most excellent results. I have used Coos Bay bark and also some from Humboldt county, and so far as *medicinal effects* go, cannot tell the difference. I have never used any but what was gathered in the spring and early summer." Dr. Jardine's observations agree with this, so *it would appear that bark collected in late summer is not inferior to spring-gathered in any respect.*

Solid Extracts.—(*e*) Prepared by the official process from bark gathered in winter, 1888–9, in Northern Oregon. This bark and that referred to in (*f*) are fully described in my "Note on Cascara Sagrada" in the *Pharm. Journ.*, Feb. 16, 1889.

(*f*) From bark gathered in winter, 1888–9, in Southern Oregon.

(*g*) From commercial spring-gathered bark of 1889.

Dr. Jardine's observations indicate that there is no important difference between the commercial spring-gathered bark and that collected in winter. As was the case in 1889, winter-collected bark may only be looked for when great scarcity and demand hold out a prospect of adequate reward for exposure to the rigours of the season and the greater labour of cutting from the trees. It is, however, some satisfaction to know that winter-collected bark is not valueless. Barks from North Oregon must not, however, be judged too harshly from the unsatisfactory single specimen of winter bark reported upon. Properly collected and cured it may be valuable, but if so the inactivity of the present specimen indicates that it is liable to suffer from malign influences to which the specimen of southern bark has not been exposed.

The PRESIDENT said this paper was one of great interest, cascara having come largely into use in the last few years, in fact during the last ten years it might be said to have been more used than any other laxative.

Mr. KNIGHT said he did not know who was the originator of the official formula, but a more abominable specimen he never knew; probably it was some professor, for no one who knew anything about the business would suggest such a preparation. For some years they had prepared one which was a modification of the process in the U. S. Pharmacopœia, and had given every satisfaction; it was tolerably bright, and was elegant and efficient; it was a fluid extract. In the one there were elegance and efficiency combined, in the other there was neither, for it deposited in as many strata as were to be seen on the neighbouring coast line. With reference to an aqueous solid extract, although more extract could be got by boiling, he thought taking it weight for weight the aperient action would not be equal to that of the other. He might say that since they had discarded the Pharmacopœia process, they found that prescriptions which before had been stamped in all directions, now remained with them; in other words, when people found they got something bright, elegant and active, they were satisfied and went no further. He might, perhaps, be liable to prosecution for supplying an article not of the nature and quality required, but if the official form was decidedly objectionable, he thought most customers would prefer something else. The Pharmacopœia preparation induced the physician to order special preparations, such as "Ext. Casc. Sag. Fluid. (Jones)."

The PRESIDENT remarked that Mr. Moss reversed the solvents given in the Pharmacopœia, which ordered a weak spirit for the solid extract, and for the liquid extract repeated boiling with water, and afterwards concentration by evaporation. The probability was that a solid extract made with water would contain all the activity.

Mr. CONROY said he could quite bear out what Mr. Moss had said with reference to the preparation of the fluid extract of the Pharmacopœia, with especial reference to the amount of deposit left in the pan after the fluid extract was evaporated down and cooled. He did not at all like the process in the Pharmacopœia, but while it was there they ought to be loyal to it. At the same time it was a fact that the old fluid extract sold before the present form was made official was more active. A fluid extract prepared either with proof spirit or a menstruum of equal parts of rectified spirit and water was more active than the official preparation. They were much indebted to Mr. Moss for this introductory paper on a subject which, as given in the Conference "blue list," would almost form a study for a lifetime, and he hoped he would continue it.

Mr. BURROUGHS said he knew that an aqueous preparation formed by continuous infusion had been used largely, and gave great satisfaction.

A vote of thanks having been accorded to the author,

Mr. MOSS, in reply, said he hoped it would not take his lifetime to complete the paper and make it more useful. He had not tried spirit of the strength indicated by Mr. Conroy, but thought it might answer. He did not recommend or otherwise an aqueous solid extract; he merely stated that water did not retain everything in solution, and that proof spirit did exhaust the bark completely and retained nearly everything. The proof spirit liquid extract was no doubt much more active, and produced an equal effect in smaller doses than the watery extract.

Mr. BURROUGHS explained that the extract he referred to was a dry extract made by repeated boilings.

The next paper read was a note on—

CASTOR OIL WITH EXTRACT OF MALT.

BY S. M. BURROUGHS.

Castor oil has for many years been regarded as one of the most generally useful aperients, but its use has been considerably limited on account of its nauseous flavour. As many experiments have been made with a view of obviating this difficulty, the idea suggested

* The communication referred to, which was not read at the meeting, is not printed in this report, as the conclusions arrived at by Dr. Jardine are indicated sufficiently for the purposes of this Journal in the paper.—ED. PHARM. JOURN.

itself of employing extract of malt as a vehicle, as the extract has been found so useful in masking the taste of cod-liver oil and other medicines of a nauseating character which are objected to by so many people. The specimens presented are composed of equal quantities of oil and extract of malt. They have been submitted to many therapeutists and a general opinion has been expressed that the nauseous flavour of the oil is very little or not at all perceptible, and that no disagreeable taste is left in the mouth after the administration. One advantage in the employment of extract of malt for disguising the flavour of castor oil is in the fact that the extract is itself a mild aperient in large doses, and may be found a valuable aid in connection with the castor oil. The rationale is readily seen. The gum in the Mistura Olei Ricini tends to cause early decomposition of the preparation, whereas this mixture of castor oil appears to keep perfectly for an indefinite period. It will be observed that the mixture is light and clear. I am not yet able to say whether the oil is actually dissolved in the extract. It may be remarked, however, that upon adding to water the mixture becomes turbid and forms an emulsion. This combination is, I believe, well adapted for giving to children and fastidious persons, and thus assists in making the oil available to patients hitherto unable to take it.

For preparing the mixture, the mortar should be first warmed, and the extract of malt triturated in it until it becomes somewhat liquefied. The castor oil can then be added gradually during continuous trituration.

The PRESIDENT said the peculiarity of this mixture was the way in which the castor oil mixed with the extract of malt, forming a kind of emulsion, though it was so translucent that it hardly had the appearance of an ordinary emulsion.

Mr. GERRARD said the mixture seemed to have a very good flavour; he could distinctly taste the oil of almonds, which was an excellent oil for masking the unpleasant taste of castor or cod-liver oil. He did not think this was a solution, but an emulsion, and probably the reason the little particles of oil could not be seen in it was because the refractive angles of the oil and the extract were the same. There was no better test for a condition of perfect emulsification than that of dilution with water; if that produced a uniform product, which would stand for an hour or so without particles of oil floating on the top, it was a perfect emulsion.

Mr. DOTT thought it would be very interesting if the question could be cleared up whether this was a solution of the oil in the malt extract, or whether the uniform appearance was simply due to the index of refraction being the same in both cases. It ought not to be very difficult to determine.

Mr. KNIGHT said he presumed Mr. Burroughs intended equal volumes and not equal parts by weight, as the specific gravity of the malt extract far exceeded that of the oil.

Mr. BURROUGHS said the proportions were taken by measure. He did not assert that the mixture was a solution, and in the case in which he had mixed some with water at ten o'clock that morning the oil showed itself unmistakably at the top in the form of an emulsion.

Mr. MOSS thought the layer at the top of the glass was not pure oil, but an emulsion of oil and extract, comparable to cream on the top of milk, and suggested to the author that he should stir it up. This was done and all mixed again at once and showed the appearance of milk.

A vote of thanks was passed to Mr. Burroughs.

The next paper read was on—

THE OPIUM USED IN MEDICINE.

BY E. M. HOLMES, F.L.S.

It is a startling fact that India, which produces an immense quantity of opium, does not supply this country with the drug that is used in medicine. It would at the present moment be almost impossible to purchase in London a specimen of the Government monopoly opium, as supplied to the Chinese. Even the Malwa opium, which simply pays duty, but of which the cultivation is under no restriction, rarely appears in the London market (two chests only were exported to London during the year 1889–1890), and even then never enters the retail drug trade. The great bulk of the opium used in medicine throughout the world is produced in Asiatic and European Turkey.

Yet there is no reason why India instead of Turkey should not supply the whole world with medicinal opium. The chief differences between Indian and Turkish opium exist in the appearance, and in the relative percentage of morphia and narcotine contained in the crude drug.

The appearance of the Turkish opium is due to the fact that in Turkey the concrete juice is placed piece by piece on a poppy leaf, until a lump of varying size, usually from ½ lb. to 2 lb., is formed, which is then covered with another leaf and placed in the shade to dry; whilst the Indian opium is collected in a small scoop, emptied into an earthen vessel, often diluted with the washings of the scoop, and is brought home as a wet granular mass, which after draining is exposed to the air in the shade for three or four weeks, and subsequently undergoes a somewhat lengthy process, which is adopted in the Government manufactories to render it of uniform quality. As it contains on the average 30 per cent. of water, and a certain amount of fermentation takes place, it is not surprising that the percentage of morphia is lower than that of Turkish opium. This may, however, be partly due to the period at which the capsule is incised for opium,* or to the climate, etc.

But the percentage of morphia is not necessarily lower, for it has been shown that opium prepared from plants grown in the hilly districts of the Himalayas yields 50 per cent. more morphia than those grown in the plains.

The Chinese are so rapidly increasing the cultivation of opium in their own country, that in proportion as the taste for native opium grows with the people, Indian opium must decline in favour and the exports decrease unless another outlet for the drug is found.

"Consular reports from China show that in the northern and inland provinces Chinese opium is taking the place of the Indian drug. It is probable that the increased duties imposed under the Chefoo convention on foreign opium entering China have operated in favour of the consumption of the native drug. In 1889 the area under opium cultivation in the Ganges Valley was further reduced to 459,860 acres, as compared with 518,930 acres in the previous year, and 556,527 acres in 1885. The number of chests of opium imported into Bombay (chiefly from Malwa) was 9 p.c. less than in the preceding year. The decrease is also attributed to the increased poppy cultivation in China and the cheapness of the native drug there, and partly to the shortness of the Malwa opium crop."†

It appears probable, therefore, that the manufacture of an opium capable of competing with the Turkish

---

* M. Gastinel found that opium collected from the capsules immediately after the flowering, contained only 3 to 4 per cent. of morphia, but yielded 10 to 12 per cent. when collected from capsules nearly ripe.

† 'Blue Book,' No. 250, on "East India (Progress and Condition)," p. 86.

article in European and American markets might be worthy of the attention of the Indian Government. Even if the export of opium to India did not decline, the starting of a new or additional form of the old industry could hardly fail to be a benefit to that empire. Opium is largely used in all malarial countries, and as Africa becomes opened up to civilization, the demand for it must naturally increase; whilst on the other hand, if Turkey ever becomes the theatre of a European war, as it probably may, the supply of the medicinal drug will become unequal to the demand.

At the present time Australia is taxing imported opium with the view of encouraging the home manufacture of opium, but although the drug can be prepared of good quality it is doubtful whether the home-made article can ever compete in price with imported opium, labour being much more expensive there than in either India or Turkey.

It may be remarked further that the very finest opium produced in Turkey, that of Salonica, Malatia, and Tokat, is exported under the name of "shipping opium" to China and to the countries where Chinese coolies are largely employed, and there is therefore already a market in China for the Turkish as well as for the Indian opium.

For the industry to succeed in India, however, it should perhaps be pointed out that in the European drug market it is very necessary that the opium should resemble that of Turkey in appearance, and that the process should be studied in that country before the manufacture is attempted.

It may here be remarked that the British Pharmacopœia orders an opium yielding when dried not less than 9·5 and not more than 10·5 per cent. of morphia, whilst the dried Turkey opium of commerce usually contains 11–15 per cent. of that alkaloid. It is not, however, impossible for the poppy cultivator to provide such an article, for M. Aubergier, of Clermont Ferrand, who commenced the cultivation of opium in Auvergne in 1844, found that the percentage of morphia varies with the variety of poppy used, the purple one giving the best results, and that by mixing assayed samples he was able to produce an opium containing uniformly 10 per cent. of morphia. There is no apparent reason, therefore, why an opium conformable to the B.P. standard should not be prepared under English supervision in India. With less labour than the Government monopoly opium is now prepared, and with consequently less expense, it would be possible to prepare an opium in India which could successfully compete with medicinal opium in the drug markets of the world. The use of artificial heat, as employed by M. Aubergier, or of hot air in drying the opium, would lessen the time employed in its production and thus, perhaps, ensure an earlier market. With regard to the price at which opium can be prepared in India, although the market price is 10–15 rupees per lb. in Bombay, it is stated that the price given to cultivators by Government is approximately 3*s.* 6*d.* per lb., and the peasant is said to be fully remunerated at that price. The poppy seed, which yields 35 to 42 per cent. of fixed oil, is considered to yield a return about two-thirds the value of the opium, being used for culinary purposes like olive oil.

The PRESIDENT regretted that Mr. Holmes was not able to be present, but he presumed the sample sent was Malwa opium; it was rather hard and dry from being kept in the Museum, and probably in the natural condition would be moister. The likelihood of China importing less opium from India would probably at some future time have an important effect on the revenue of India, and Mr. Holmes looked forward to a market for Indian opium being found in Europe. In addition to this source there was also a small cultivation of opium in Egypt, but it was mostly used by the natives themselves. He saw it sold in the bazaars in Cairo in a form suitable for native consumption, much adulterated, and not at all dangerous, as it contained but a small percentage of morphia. It was not sold by recognized pharmacists but by native traders. Yet genuine Egyptian opium was of fair quality.

Mr. DOTT said the paper evidently had reference to the future rather than the present; for Indian opium would have to be much improved in quality before it could compete with that from Turkey or even from Persia. There might be some specially fine qualities produced; but ordinary Indian opium was a very inferior article, and any one who tried to prepare morphine from it would find it very unsuitable.

Mr. CONROY thought from the appearance of this sample that it would make a very nauseous tincture. In general character it looked very much like Persian opium, and that made a very unpleasant kind of tincture. He feared, therefore, it would not be suitable for galenical preparations. He was pleased to see that Mr. Holmes spoke of the morphia strength of the Asia Minor opium. In his short note read in the morning he alluded to the fact that according to his experience the alkaloidal strength was from 12 to 15, whilst Mr. Holmes gave it as 11 to 15. He thought that was an additional reason why the official strength should be raised.

The PRESIDENT suggested that at the price of 3*s.* 6*d.* a lb. it would probably pay the manufacturer to employ this opium even though there might be a difference in the mode of extraction of the morphine.

Mr. F. PASSMORE said the object of the paper was apparently not to argue in favour of using Indian opium as now produced, but that in view of a probable decline in the demand for this opium by the Chinese it might be worth while for the Indian Government to devote some attention to the improvement of the product, so as to render it suitable for English consumption in place of Turkey opium.

The PRESIDENT said he recently received a visit from a gentleman from India who wanted information as to the estimation of morphia in opium. He understood that at present the only method employed was the rough-and-ready one of solubility in water, and something more exact was required.

A vote of thanks was passed to Mr. Holmes.

The next paper read was a—

REPORT UPON MEDICATED LOZENGES, B.P.

BY FREDERICK DAVIS, B.SC.

The analyses connected with this report were commenced by me three years ago. Since that time I have at various periods continued my researches, and am now able to place before you the following results.

Samples were obtained from six of the leading manufacturers (*id est*, three London houses and three provincial). I have directed my observations chiefly to the following points, which for convenience I will take *seriatim*.

Firstly, the weight of each lozenge; secondly, the quality and nature of the gum employed; and thirdly, and the most important, the quantity of active ingredient contained in each lozenge.

I have found the lozenges of various makers to differ very materially in weight, and not only the lozenges of various makers, but lozenges in the same parcels varied to the extent of 2 grains; the appended table shows the *average* weights.

Secondly, the quality of the gum employed. In three out of the six samples no gum acacia was present at all, a substitute of either tragacanth or tragacanth and dextrin being employed. In two of the remaining three cases a mixture of acacia and tragacanth was employed; whilst in the remaining sample dextrin was substituted for a portion of the acacia.

Thirdly, quantity of active ingredient in each. By taking half a pound of lozenges and estimating the quantity of active ingredient the result was satisfactory in some few cases and very unsatisfactory in others, and when each individual lozenge was estimated a deficiency or excess of active ingredient became apparent.

I append a table showing the quantity of active ingredient by operating upon half a pound of the respective sample, and taking the average by division for each lozenge, and in the second column the quantity obtained from the largest lozenge found in the respective samples.

It will be observed the lozenges, as met with commercially, differ very considerably, not only in size and shape, but in strength. This is the more regretable because whilst the lozenge is a palatable and convenient method of administering unpleasant drugs, it should be none the less accurate in its composition. Such being the case, the remedy would appear to resolve itself into one of three courses, namely, for every pharmacist to prepare his own lozenges, each having a definite weight, or that the Pharmacopœia should state the exact weight of each lozenge, and not, as at present, that a certain mass be divided into a certain number of parts which may be either equal or unequal (it is true the Pharmacopœia directs the lozenges to contain definite quantities of active ingredient, but this in practice is evidently not the case owing to the unequal weights of the lozenges themselves), or, as the *Lancet* recommended some months since, that the lozenges be omitted from the Pharmacopœia altogether.

It is, perhaps, needless for me to add this short paper is not intended as an exhaustive report, but merely an indication of the state of things concerning the points at issue.

Table No. I.—Average Weight of each Lozenge in Grains.

Sample.	Acid benzoic.	Acid tannic.	Bismuth.	Catechu.	Fer. redact.	Ipecac.	Morphia.	Morphia et ipec.	Opium.	Chlorate potash.	Santonin.	Sodii bic.	Sulphur.
I.	17½	17½	27¼	16	17	17	16½	15½	14½	22	16	20½	17½
II.	17⅝	15¼	30	16½	18	17	16⅝	15	15¾	23	15½	20	17½
III.	17½	17½	30½	15½	18	16½	16½	15½	15¼	22½	17	21	20½
IV.	16½	16⅔	28⅔	15 7/16	17½	16½	17	17	15½	21¾	15½	22½	21
V.	16½	15½	27½	17¼	17 5/7	17	17½	16½	17	21¾	16½	21½	18¼
VI.	16¼	17	27⅝	15⅔	17¼	15	17½	15½	14½	22	15⅔	23	19½

Table No. II.

Sample.	Acid benzoic.		A. tannic.		Bismuth.		Catechu.		Fer. redact.		Ipecac.		Morphia.		Morphia et ipec.		Opium.		Chlorate potash.		Santonin.		Sodii bic.		Sulphur.	
	I.	II.	I.	II.	I.	II.	I.	II.	I.	II.	I.	II.	I.	II.	I.	II.	I.	II.	I.	II.	I.	II.	I.	II.	I.	II.
I.	½	⅔	½	⅗	1	1⅔	not estimated		1¼	1½	not estimated		1/40	1/35	1/45	1/36	1/7	1/5	6	6½	1	1¼	5	5¼	5	5⅝
II.	½	⅗	½	¾	2	2¾			1⅓	1⅔			1/44	1/40	1/47	1/35	1/5	1/4	5	5¾	1	1⅔	5	5¼	5¾	6¼
III.	½	¾	½	⅝	1⅝	1⅞		—	1	1¼		—	1/36	1/34	1/60	1/52	1/5	1/3	5	5⅔	1¼	1⅔	5½	5¾	5	5¼
IV.	½	⅝	½	¾	2	2¼			1	1⅝			1/48	1/40	1/36	1/33	1/5	1/4	5	5¾	1½	1⅓	6	6⅝	5½	5⅔
V.	½	⅔	½	⅔	1¾	2			1	1⅐			1/48	1/44	1/36	1/34	1/12	1/9	5½	5½	1	1⅙	5	5¼	5	5¼
VI.	½	12/17	½	6/7	1½	1⅝			1	1¼			1/36	1/33	1/48	1/35	1/5	1/5	6¼	6⅞	1	1⅓	5	5⅔	5	5⅔

The PRESIDENT said this report contained rather grave reflections on lozenge manufacturers. There was not much difficulty in lozenge-making, and he had made several small quantities experimentally, including several pounds of sulphur lozenges. He was surprised to find so much variation in the weights and in the amount of the medicament contained. Some ferrum redactum lozenges, which should contain 1 grain each, were found to contain 1¼ or 1⅓ grain, and in one there was as much as 1⅔ grain.

Mr. ATKINS said the Conference was much indebted to Mr. Davis for this paper, but it was quite possible that its importance might be exaggerated, especially by outsiders. The idea of the ordinary pharmacist making all his own B.P. lozenges was absolutely utopian. In some few establishments it might be possible, but the ordinary pharmacy of the country was of a very different character and there were certain mechanical differences in the preparation of lozenges which only those who had tried it could fully appreciate. But surely it was not necessary that these articles should be expunged from the Pharmacopœia. He offered no opinion as to their value as medicaments, but in these days of accuracy in the production of galenical preparations on a large scale and the improved modes in which machinery had been brought to bear, there could surely be no difficulty in the production of lozenges of average weight and of equally distributed medicinal strength. Directly the houses which enjoyed the confidence of the trade in this branch of manufacture had their attention called to these points he had no doubt they would take steps to remove the objections which had been pointed out.

Mr. STROTHER said Mr. Atkins had with one or two slight exceptions perfectly covered the ground. Manufacturers were in this difficulty, they would like to have the opinion of the Conference or of some body which had the confidence of the public as to the actual weight these lozenges should be. One maker, producing a morphia lozenge having the exact amount of the medicament required, would make it 12, 14 or 16 grs., whilst another manufacturer, who also made it accurately, but left out the gum, would make a much larger lozenge, thus placing the first firm in a most awkward position. It would be a great advantage therefore, if a standard weight were fixed for each lozenge. Again, in the case of compound sulphur lozenges, it was easy as possible to make them by employing heat, but in that case the lozenge was completely spoiled, and he feared that a great many were made in that way. If they were dried by wind, there was far more trouble and expense, and a higher price had to be charged,

but the lozenges were far more active. If all lozenges were made of a certain weight it would be very easy to test whether they were of the proper strength. If the gentleman who suggested that all the lozenges should be expunged would take a black draught and then a cascara and red currant lozenge he thought he would soon alter his mind.

Mr. BURROUGHS said the difficulty in drying had recently been obviated almost entirely by improvements in drying machines, consisting of blowers used in conjunction with hot-air boxes. The air might be heated by gas underneath the air passage, or by passing through a box in which there were steam-pipes. The hot air when brought over the moist material, dried it much more quickly than any wind, unless it were the hot wind of a desert.

Mr. KNIGHT, referring to the statement that some of the lozenges contained dextrin, said he believed only two or three houses used that substance. The lozenges were perhaps specially prepared for the stores.

Mr. J. C. UMNEY said he had recently had occasion to examine some carbolic acid lozenges which were stated to have been freshly prepared, but many of them contained only 0·6 grain instead of one grain of the acid. Of course it might be urged that this arose from the volatility of carbolic acid.

The PRESIDENT said the great difficulty in the manufacture of lozenges, even on a small scale, was the drying. It was necessary to begin with a low temperature and gradually increase it; pharmacists could hardly make lozenges unless they had a special drying apparatus. Nothing but good gum arabic should be used; neither dextrin nor Indian gum was admissible. The taste was not at all agreeable if tragacanth was used in any quantity. The thanks of the Conference were due to Mr. Davis for this paper, which would no doubt put lozenge-makers on the *qui vive*, and lead them to improve their manufacture.

A vote of thanks was agreed to.

The next paper read was a—

NOTE ON DISPENSING LIQUOR STRYCHNINE.

BY THOS. SHEPHEARD.

Some weeks since I had a prescription which caused me some anxiety, owing to the dangerous nature of the precipitate thrown down some time after its preparation.

The mixture contained an alkaline solution of arsenic, with solution of strychnine, as follows:—

℞ Liq. Fowleri,	
Liq. Strychninæ āā	℥iss.
Aq. Distillat. ad	ℨiv.

The fine acicular crystals thrown down led me to suspect that the excess of alkali in the Fowler's solution was the cause.

The addition of a few drops of diluted hydrochloric acid soon dissolved the crystals, which were then kept in solution.

If this note be read as a dispensing note at the coming Conference, it may be a means of preventing a serious mischief to other pharmacists.

The PRESIDENT, who read the foregoing note, said the Conference was indebted to the author for this practical contribution, which might be the means of preventing accidents.

The last paper read was on—

THE SOLVENT ACTION OF ALCOHOL OF DIFFERENT DEGREES OF STRENGTH ON SOME OF THE DRUGS USED IN MAKING PHARMACOPŒIAL TINCTURES.

BY E. H. FARR AND R. WRIGHT,

Pharmaceutical Chemists.

NOTE V.—ON TINCTURE OF HENBANE.

Since the publication of our notes on tincture menstrua, read at the last meeting of the Conference, the subject has been more fully investigated, and papers on conium, colchicum, aconite and jaborandi have been published in the *Pharmaceutical Journal*. The purpose of the present note is to place on record the results obtained in working upon henbane leaves.

Our experiments upon the subject have been conducted upon similar lines to those already recorded in connection with the drugs above-mentioned. The object in view has been three-fold, viz.:—

1. To ascertain the menstruum best adapted for securing perfect exhaustion of the drug.
2. To find by the best methods of estimation available, the average alkaloidal content of carefully prepared tinctures of the drug.
3. To ascertain by experiment what process will yield a tincture containing the maximum amount of alkaloid and extractive.

Twelve specimens of henbane leaves, obtained from different sources, were operated upon. Of these ten were the produce of the second year's biennial, and two that of the annual, plant.

From each specimen of drug a series of tinctures was prepared by the B.P. process with alcohol of 80, 70, 60, 50 and 40 per cent. strength (by volume).

The tinctures as thus prepared varied exceedingly in colour, the stronger menstrua yielding a rich chlorophyll-green coloured tincture, while those prepared with the 50 and 40 per cent. menstrua were distinctly brown in colour and contained only a small proportion of green colouring matter. All, however, exhibited in a marked degree the characteristic odour of the plant, and in each case there was remarked a tendency to throw down a deposit, which was most abundant in the tinctures prepared with the weaker menstrua.

For the estimation of the alkaloid in the tinctures several processes were tried, two or three of which gave exactly concordant results.

The following was ultimately adopted for the alkaloidal estimations, on account of certain advantages presented in working.

100 c.c. of the tincture to be estimated was introduced into a porcelain dish and evaporated over a water bath, water being added towards the end and evaporation continued until all the spirit was expelled. The residual liquor was allowed to cool, 1 c.c. semi-normal sulphuric acid added, and the solution filtered through cotton wool into a separating funnel. The dish was rinsed with 10 c.c. of chloroform and the rinsings added to the contents of the funnel. After separation the chloroform layer was drawn off and the alkaloidal solution washed with two or three successive portions of chloroform, until all chlorophyll was removed.

The mixed chloroformic solutions were then well shaken with three successive 5 c.c. of acidulated water, which after separation were removed and added to the original solution. The latter was then rendered alkaline by the addition of 2 c.c. B.P. liquor ammoniæ, and shaken with two successive 15 c.c. chloroform. The chloroformic alkaloidal solutions were drawn off and evaporated, and the residue dried over a water-bath until the weight was constant.

As the resulting product from two or three drugs was not free from colour, it was treated with dilute acid, the residue dried, and the weight deducted from the first result. As in the case of tincture of jaborandi, it was found necessary to get rid of the muci-

Table I.—Showing Quantitative Results of Estimation of Tincture of Henbane.

No. of sample.	Amount of alkaloid in grams from 100 c.c. tincture.					Amount of extractive in grams from 100 c.c. tincture.				
	80 p. c. tincture.	70 p. c. tincture.	60 p. c. tincture.	50 p. c. tincture.	40 p. c. tincture.	80 p. c. tincture.	70 p. c. tincture.	60 p. c. tincture.	50 p. c. tincture.	40 p. c. tincture.
1	·006	·008	·008	·006	·008	3·02	3·22	3·58	3·66	3·44
2	·011	·011	·0105	·010	·010	3·98	4·60	4·94	5·26	5·26
3	·015	·015	·0135	·0145	·015	3·12	3·52	3·84	3·88	3·78
4	·009	·010	·009	·009	·0105	2·44	2·64	3·02	3·22	2·98
5	·0095	·010	·0095	·010	·010	1·98	2·48	2·78	2·92	2·98
6	·014	013	·0145	·013	·013	3·30	3·78	4·12	4·30	4·26
7	·011	·0095	·011	·010	·010	3·08	3·58	3·82	4·06	3·60
8	·009	·010	·009	·0095	·009	3·10	3·50	3·50	3·68	3·40
9	·012	·012	·012	·013	·013	3·42	3·68	3·72	3·84	3·50
10	·011	·011	·012	·011	·011	2·70	3·10	3·42	3·48	3.18
11	·009	·008	·009	·008	·008	2·14	2·54	2·76	2·94	3·12
12	.008	·0085	·008	·0085	·008	2·56	2·73	2·82	2·97	3·24
Average . .	·0104	·0105	·0103	·0102	·0104	2·90	3·28	3·52	3·68	3·56
Root . . .	·0085	·0098	·0098	·0108	·0108	·946	1·08	1·24	1·46	1·51

The above results represent the mean of two estimations in each case.
The series of tinctures marked Nos. 11 and 12 were made from the leaves of the annual plant.

Table II.—Showing Results obtained on Mixing the Samples of Tincture (1) *with Water, and* (2) *with* 90 *per cent. Alcohol.*

No	Result when 1 vol. of tincture is mixed with 3 vols. alcohol.					Result when 1 vol. of tincture is mixed with 2 vols. water.				
	80 per cent. tincture.	70 per cent. tincture.	60 per cent. tincture.	50 per cent. tincture.	40 per cent. tincture.	80 per cent. tincture.	70 per cent. tincture.	60 per cent. tincture.	50 per cent. tincture.	40 per cent. tincture.
1	Clear, sl. flo. ppt.	Opal., then clear with sl. flo. ppt.	Cloudy, then clear with b'lky fl. ppt.	Clo., then clear with b'lky fl. ppt.	Cloudy, then clear with b'lky fl. ppt.	Turbid. then turbid, with green waxy ppt.	Turbid, then cloudy, with green waxy ppt.	Turbid, then turbid with slight waxy ppt.	Cloudy, then cloudy, with slight dep.	Opalescent, then opal., with slight floc. ppt.
2	Clear, sl. flo. ppt.	Clo., then opalescent sl. flo. ppt.	Cloudy, then opal. with floc. ppt.	Turbid, then opal. with floc. ppt.	Turbid, then clear with b'lky fl. ppt.	Turbid, then cloudy with green deposit.	Turbid, then cloudy, with green dep.	Turbid, then cloudy, with slight waxy dep.	Turbid, then turbid, with slight green dep.	Turbid, then turbid, with very sl. floc. dep.
3	Clear, sl. flo. ppt.	Ft. opal., then clear with sl. flo. ppt.	Clo., then clear with floc. ppt.	Clo , then clear with floc. ppt.	Cloudy, then clear with floc. ppt.	Turbid, no deposit.	Turbid, very slight dep.	Turbid, very sl. dep.	Cloudy, slight dep.	Opalescent, then clear, with slight floc. ppt.
4	Clear, very sl. flo. ppt.	Sl. opal., then clear with sl. flo. ppt.	Cloudy, then cl. with mucil. dep.	Opaq., then clear with mucil. dep.	Opaq., then clear with mucil. dep.	Turbid, no deposit.	Turbid, no dep.	Turbid, no dep.	Turbid, then opal., with grey ppt.	Cloudy, then clear, with grey ppt.
5	Clear, very sl. flo. ppt.	Opaq., then clear with sl. mucil. deposit.	Opaq., then clear with mucil. dep.	Opaq., then clear with mucil. dep.	Oqaque, then cl. with mucil. dep.	Cloudy, no deposit.	Cloudy opalescent, with sep. of resin	Opalescent, then turbld, with sep. of resin.	Slight opalescent. then cldy.	Clear.
6	Clear, very sl. flo. ppt.	Cloudy, then clear with mucil. dep.	Clo., then clear with mucil. dep.	Cloudy, then clear with mucil. dep	Turbid, then opal. with mucil. deposit.	Turbid, then cloudy with green dep.	Turbid, then opalescent, with green dep.	Turbid, then cloudy, with sep. of resin and chlorophyll.	Turbid, no dep.	Cloudy, then clear, with floc. ppt.
7	Clear, very sl. flo. ppt.	Opal., then clear with sl. flo. ppt.	Clo., then clear with floc. ppt.	Cloudy, then clear with b'lky fl. ppt.	Cloudy, then clear with b'lky fl. ppt.	Turbid, then turbid with green waxy ppt.	Turbid, then turbid, with waxy ppt.	Turbid, then cloudy, with green waxy ppt.	Cloudy. then cldy. with green dep.	Cloudy opalescent, opalescent with slight green ppt.
8	Clear, and remains so.	Very faint opalescence, then cl. with sl. flo. ppt.	Clo. opal., then slight floc. ppt.	Cloudy, then floc. ppt.	Cloudy, then cl. with floc. ppt.	Turbid, then turbid with green waxy ppt.	Turbid, cloudy with green waxy ppt.	Cloudy, cloudy with slight green dep.	Cloudy, opalescent, with green dep.	Cloudy opalescent, cloudy, with faint green dep.
9	Clear, very sl. flo. ppt.	Opal., then clear with mucil. ppt.	Clo., then clear with mucil. ppt.	Cloud., then cl. with mucil. dep.	Turbid, then opal. with mucil. deposit.	Turbid, then cloudy, with green dep.	Turbid, then opal., with green dep.	Turbid, then cloudy, with green separation.	Turbid, cloudy with green ppt.	Cloudy, then clear, with fl. ppt.
10	Clear, ft. flo. ppt.	Opal., then cl. with sl. flo. ppt.	Opal., then clear with floc. ppt.	Cloudy, then clear with floc. ppt.	Cloudy, then cloudy with floc. ppt.	Turbid, then cloudy, with waxy ppt.	Turbid, then cloudy, with waxy ppt.	Turbid, then cloudy, with waxy ppt.	Cloudy, then cl. with sl. ppt.	Cloudy, then cloudy, with sl. ppt
11	Clear, no ppt.	Clear, faint floc. ppt.	Opal., slight floc. ppt.	Cloudy, then clear with floc. ppt.	Cloudy, then clear with floc. ppt.	Milky opalescent, no dep	Milky opalescent, no dep.	Cloudy, opalescent, no dep.	Cloudy, opalescent no dep.	Opalescent, no dep.
12	Clear, sl. gel. ppt.	Clear, slight gel. ppt.	Opal., slight gel. ppt.	Cloudy, then gel. ppt.	Cloudy, then gelat. ppt.	Milky opalescent, no dep.	Milky opalescent, no dep.	Cloudy, opalescent, no dep.	Cloudy. opalescent, no dep.	Cloudy opalescent, no dep.

Table III.—Showing Results of Experiments on Process for Making Tincture.

	Alkaloid per cent.				Extractive per cent.			
	By simple maceration.	By double maceration.	By B.P. process.	By continuous percolation.	By simple maceration.	By double maceration.	By B.P. process.	By continuous percolation.
No. 1. .	·0135	·014	·014	·016	3·68	4·08	4·22	4·66
No. 2. .	·012	·013	·113	·013	3·20	3·34	3·74	3·92

laginous matter present in the 40, 50, and 60 per cent. tinctures by means of strong alcohol, before proceeding with the estimation of these tinctures. The results are given in Table I.

The amount of extractive was ascertained by evaporating 10 c.c. of the tincture and heating the residue at 100° C. until the weight was constant. From this the required percentage was calculated.

The behaviour of the tinctures on admixture (1) with water and (2) with 90 per cent. alcohol was noted, and the results are stated in Table II. The results there recorded show the appearance presented immediately after mixing the liquids and also after standing twelve hours.

In addition to the tinctures of commercial samples of henbane leaves we also prepared, for the sake of comparison, with a 60 per cent. mentruum (1) a tincture of the fresh seeds, (2) a tincture of recently dried fresh leaves, and (3) a tincture of the dried cortical portion of the root, the proportion of ingredients being the same as in the B.P. tincture. The estimation of alkaloid in these tinctures showed the following results:—

1. Tincture from the seeds 100 c.c. = ·015 gr. alkaloid.
2. Tincture from the leaves 100 c.c. = ·013 „ „
3. Tincture from root-bark 100 c.c. = ·020 „ „

A complete set of tinctures was also made from another sample of dried fresh root, obtained in June. The same proportion of root was used and the alkaloid and extractive in each tincture estimated. The results are appended to Table I.

From the results shown in Table I. it is evident that perfect exhaustion of the drug may be effected by the use of either a strong or dilute alcohol, the results coming out very closely concordant. This is probably due to the small amount of alkaloid present in the leaves.

In fixing upon a 50 per cent. menstruum for use in our experiments upon the process to be followed in making the tincture, we have relied mainly upon the acknowledged fact that it is desirable to exclude chlorophyll from a tincture where this can be accomplished without any loss of medicinal activity; and partly also upon the fact that this preparation is largely employed in the treatment of a class of diseases in which the presence of mucilaginous matters would seem to be of service.

It will be seen on reference to Table I. that the percentage amount of extractive yielded by tinctures prepared with this menstruum is higher than that yielded by the tinctures prepared with other menstrua.

The average amount of alkaloid contained in the tinctures is about ·01 per cent., and as it is desirable that a standard of alkaloidal strength should be fixed for the tincture, we are prepared to recommend that the above percentage should be taken as the standard.

For the purpose of our experiments upon alternative processes, two good samples of the leaves were selected and treated by the following processes with a 50 per cent. menstruum:—

1. An ounce of the leaves in No. 20 powder was macerated for seven days with frequent agitation. The fluid portion was then strained off and the marc submitted to pressure. The amount of menstruum required to make the volume up to 8 fluid ounces was then poured over the marc, which was again submitted to pressure and the expressed liquids mixed and made up to 8 fluid ounces and the whole filtered.

2. An ounce of the leaves in No. 20 powder was macerated with 4 ounces of menstruum for forty-eight hours and the fluid portion separated by pressure. The marc was then macerated with the remainder of the menstruum for twenty-four hours and the tincture again expressed. The expressed liquids were then mixed and enough spirit poured on the marc to make up the total volume, after the final expression, to 8 fluid ounces.

3. The B.P. process, maceration and percolation, displacing the last portion of the spirit.

4. An ounce of the leaves in No. 20 powder was moistened with 2 fluid drachms of menstruum and packed in a conical percolator, menstruum was then added and percolation allowed to continue continuously, but slowly, until 8 fluid ounces of percolate had been collected.

The tinctures thus prepared were estimated, with the results shown in Table III.

From the results obtained it is evident that the whole, or practically the whole, of the alkaloid is extracted by each of the processes, while the greatest amount of extractive matter is taken out by the process of continuous percolation.

The PRESIDENT said this was a continuation of the authors' researches on tinctures of the B.P. containing certain definite alkaloids. It was very desirable that those which were very active, like preparations of opium, nux vomica, belladonna, henbane and so on, should be of uniform strength. The aim of the authors was to ascertain the most suitable strength of spirit in each case and the best process of working by percolation, percolation and maceration, or maceration only. They recommended a spirit of 50 per cent. strength, or about proof spirit, still to be used for henbane. It was just on the border line whether a spirit of that strength would hold the chlorophyll of the henbane leaf in solution or not; for a tincture so made and exposed to light deposited a great deal. He had sometimes thought it might be an advantage to use a somewhat stronger spirit, but they went on the other line and suggested that it might be advisable to leave out the chlorophyll and get more mucilaginous matter present in the tincture. Perhaps they were right, as this preparation was generally used in diseases in which the presence of mucilage would probably be an advantage.

Mr. PETER MACEWAN said there could be no question that Messrs. Farr and Wright were doing one of the best pieces of work which had been done in pharmacy of late years, but it was a question whether the Conference was at present prepared to discuss all that they had done during the year. He would suggest that next year, if their work was completed, they might present a *résumé* of all the papers, and there might then be a general expression of opinion upon it; after which the Pharmacopœia authorities might see their way to adopt some of the conclusions arrived at.

Mr. GERRARD supported the suggestion that weaker spirit should be used in the exhaustion of henbane, as he knew it was efficient. It had been the practice

of many pharmacists to consider that a tincture of a bright green colour which gave a certain turbidity to water was the best, but such characteristics were really no evidence that it was a good preparation. The turbidity might simply show that it contained a little excess of chlorophyll, which was precipitated on dilution. By using a weaker spirit a tincture was produced which remained bright on dilution; and for his own part he should prefer a tincture so made to one which gave an unsightly precipitate.

The PRESIDENT moved a vote of thanks to the authors, which brought the discussion of the papers to a close.

The Bell and Hills' Fund.

The PRESIDENT said one of the official duties devolving upon him was the presentation of books to the town where the Conference met from the Bell and Hills' Fund, which was founded by Mr. T. H. Hills in memory of Jacob Bell, and yielded about £10 annually. Unfortunately, Mr. Hills was a great invalid at the present time, but for many years he took an active part in the Conference meetings. The books would be deposited in the Free Library, where they could be consulted by all the chemists in the district, as, unfortunately, there was as yet no society or association of chemists in the town which could take charge of them. Having read the titles of the ten volumes he formally presented them to Mr. Munday.

Mr. MUNDAY thanked the President for the gift, which he said would be a memento of the visit of the Conference. The chemists of Cardiff and the district had not hitherto had a local association, but this meeting had brought them together a good deal, and he ventured to state that before long a local association would be formed. They thought it would be far better to place these books in the Free Library, where they could always be available, rather than to keep them in some room where they might meet only occasionally, and where they would be difficult of access. It was their intention to augment the number of books by degrees, and by the time the Conference again visited Cardiff he hoped they would have a good library.

Mr. BALLINGER, Librarian, formally accepted the charge of the books, but left it to Mr. Peter Price, Chairman of the General Committee and the Rev. Mr. Winks, Chairman of the Books Sub-Committee, to say anything which might be necessary.

Mr. PRICE said his duty was simply to accept very cordially the custody of the books, until such time as the chemists had an institution of their own in which to place them, and to promise to take every care of them. The only condition he was compelled to impose was, that they should be open to the inspection of any one who wished to see them; though he did not imagine there would be much demand for them, except on the part of chemists and their pupils and assistants.

The Rev. Mr. WINKS added a few words, expressing the hope that these books would form the nucleus of a large library, which would be of great advantage to the chemists of the neighbourhood.

The PRESIDENT said he at once accepted the condition named by Mr. Price.

Mr. MUNDAY said the books would be placed in the Reference Library, and it was not intended that they should be removed.

The Formulary Committee.

Mr. SOUTHALL proposed the re-appointment of the Formulary Committee for the ensuing year. The gentlemen composing it had done good work in the past, and would no doubt continue to do so.

Mr. GERRARD seconded the motion. Before this Committee was appointed many of them were often travelling in different paths in endeavouring to arrive at the same end; and necessarily they sometimes went astray. Thanks to the Committee their path was being made plain, to the comfort and convenience of everybody.

The motion was carried unanimously.

The PRESIDENT said the Committee had not done much during the past year, but what little had been done he hoped had been done well and that it met with the approval of their colleagues of the Conference and of medical men.

The names of the members of the Committee are, Mr. W. Martindale (Chairman), Mr. W. A. H. Naylor (Secretary) and Messrs. A. C. Abraham, T. Greenish, T. B. Groves, T. Maben, N. H. Martin, F. Ransom, R. Reynolds, C. Symes and R. Wright.

Place of Meeting for 1892.

Mr. PETER BOA said he had been deputed by a very representative meeting of the chemists of Edinburgh, also including a number of other gentlemen closely connected with pharmacy and science, such as Professor Crum Brown, Professor T. R. Fraser, Dr. Ralph Stockman and Dr. J. E. T. Aitchison, C.I.E., to give a very cordial invitation to the Conference to meet in Edinburgh in 1892. As there was some uncertainty about the exact date at which the British Association would meet next year he was instructed to say that whatever date would suit the Conference would be made convenient by the Committee. He thought Edinburgh would form a pleasing contrast to Cardiff, where everything almost was new, including the new dock, which they were told was the finest in the world. In Edinburgh nearly everything was ancient, but they could show a new bridge, which also was the finest structure of the kind in the world.

Mr. MASON asked what time the British Association would meet next year.

The PRESIDENT said he believed towards the end of September, but it was not definitely fixed.

Mr. DOTT cordially supported the invitation from Edinburgh, as to the merits of which Mr. Boa had not expatiated in such detail as was usual on these occasions, probably because the attractions of Edinburgh were so well known. Probably towards the end of September would be found the most convenient time.

Mr. NAYLOR moved that the invitation so cordially presented on behalf of their Scotch friends be as cordially accepted.

Mr. MASON, in seconding the motion, said the previous meeting of the Conference in Edinburgh had been a red-letter day to him, and he should look forward with much pleasure to another visit to the modern Athens.

The motion was carried unanimously.

Mr. PAYNE said it had been discussed on more than one occasion whether it was advisable that the Conference should always follow the British Association, and it seemed to him this was a very opportune time for considering the question again. He would suggest, therefore, that at the next meeting of the Conference the question should be thoroughly discussed.

Mr. MASON remarked that the British Association followed the Conference.

The PRESIDENT said the question raised by Mr. Payne was informally discussed last year, but in the absence of any general expression of opinion, either by members personally or in the press, it was not considered advisable to change. Next year a larger meeting might be looked for, and it might be well then to discuss the subject.

Mr. PAYNE said he would give notice of the following motion for next year:—

> "That in future the Conference do not meet in the same town or at the same time as the British Association."

The PRESIDENT said he had been endeavouring to ascertain the feeling amongst members of the Executive and others, old members of the Committee, on this

subject, and he thought the general desire was that the present system should be continued. There were advantages and disadvantages on each side, which it would take a long time to dismiss, but he saw no objection to putting down the motion for consideration next year.

Mr. MASON suggested that the motion as read was rather strongly worded, and that possibly Mr. Payne might somewhat modify it if he were allowed to send it in later.

Dr. RIDEAL said it would be open to amendment when it was brought on.

Mr. PAYNE said he wished the question thoroughly debated, and thought it better to bring forward a definite resolution. If any amendment were proposed which met the views of the members generally he should be ready to accept it; but in the meantime he thought it had better remain as it was.

Election of Officers.

Mr. NAYLOR (Hon. Sec.) read the following list of officers submitted by the Executive:—

President—E. C. C. Stanford, F.I.C., F.C.S., Dalmuir.

Vice-Presidents—M. Carteighe, London; W. Gilmour, Edinburgh; Dr. Thresh, Chelmsford; and J. R. Young, Edinburgh.

Treasurer—R. H. Davies, London.

Hon. General Secretaries—W. A. H. Naylor, London; and F. Ransom, Hitchin.

Members of Committee—D. B. Dott, Edinburgh; A. W. Gerrard, London; Professor Green, London; Alfred Coleman, Cardiff; J. Hodgkin, London; E. M. Holmes, London; W. Kirkby, Manchester; J. Munday, Cardiff; and J. L. Ewing, Edinburgh.

Auditors—D. Anthony, Cardiff; and Thomas Thompson, Edinburgh.

Hon. Local Secretary—Peter Boa, Edinburgh.

Mr. MASON said it was not usual to make any comments on this part of the business, and he felt some delicacy in saying anything, but he must express the disappointment, which he was sure would be shared by many others, at not seeing Mr. Martindale's name again put down for President.

The PRESIDENT thanked Mr. Mason for the suggestion and his friends for the way in which they had received it; but there were several considerations which rendered it desirable that another President should be chosen for the Edinburgh meeting. Mr. Stanford was not only resident in Scotland, but was one of the founders of the Conference, and in its earlier days took great interest in its meetings. He had that *suaviter in modo* which was so agreeable to all, and he was quite sure that in him the Conference would have a thoroughly worthy and efficient President.

Mr. PAYNE said he desired to move an amendment. For the last two years there had been an omission, which he believed was unintentional, from the Executive Committee of any gentleman from the country he represented. He was sure there was no intention to boycott them, and he would therefore move as an amendment that the name of Mr. W. F. Wells, Dublin, a gentleman who frequently attended the Conference, should be added to the Executive.

Mr. MACEWAN said Ireland had a magnificent representative in the person of Mr. Carteighe, the first Vice-President.

The PRESIDENT thought it would be somewhat irregular to press the amendment. He was quite sure there was no intention to do injustice to Ireland, and up to two years ago there had always been a representative from the sister island; probably it was an oversight. But the list was now complete, and it would be rather invidious to strike out one of the names already selected. If Mr. Payne would withdraw the amendment, he was sure next year the omission would be repaired.

Mr. PAYNE said he should have much pleasure in withdrawing the amendment after such conciliatory assurances from the President.

The list of officers was then agreed to unanimously.

Votes of Thanks.

Mr. HODGKIN moved—

"That the cordial thanks of the non-resident members of the British Pharmaceutical Conference be given to the local Committee, especially to Mr. Coleman, Mr. Munday, Alderman Yorath, and Mr. Anthony, for their kindness in carrying out the arrangements connected with the visit of the Conference to Cardiff."

He was sure this resolution expressed the feelings of all who had profited by the arrangements already made, and who hoped to enjoy still more the splendid excursion which had been arranged for the following day.

Mr. J. C. UMNEY seconded the motion very cordially, and it was at once put and carried unanimously.

Mr. COLEMAN, in responding, said he was very grateful to them all for their kind vote of thanks, and he hoped the Local Committee had not been altogether unsuccessful in their efforts to please. But there were two reasons why he wished to respond briefly on this occasion. In the first place he was reminded that their labours and duties were by no means ended, and bearing in mind some little difficulties they had met with on the previous evening, it would be as well to remember the proverb, "Never halloa until you are out of the wood." In the second place he was anxious to start the party for Caerphilly Castle, where they anticipated a pleasant evening would be spent. He trusted they would enjoy themselves, and when they left Cardiff would carry away with them pleasant recollections of the town and of its inhabitants.

Mr. MUNDAY (Chairman of the Local Committee) also thanked the Conference for the appreciation it had shown of the Committee's endeavours. The work had been a very pleasurable one, and he should look forward with delight to the time when a second visit would be paid to Cardiff.

Mr. CONROY moved a vote of thanks to the Mayor and Corporation of Cardiff for their kindness in allowing the use of the Assembly Rooms at the Town Hall for the purpose of the Conversazione on Monday evening.

Mr. R. H. DAVIES seconded the motion, which was carried unanimously.

Mr. MOSS moved a similar vote of thanks to Principal V. Jones and Council of the University College of South Wales and Monmouthshire, for granting the use of the lecture theatre for the purpose of the Conference. It would be difficult to find a room better suited for the purpose, and he moved the resolution most heartily. He might express a friendly hope that the projected extension of the University might soon be an accomplished fact, and that in view of the local association of pharmacists at which Mr. Munday had hinted being established, it might be found practicable to make arrangements in connection with the College, to facilitate the formation and growth of such a society.

Mr. PAYNE seconded the motion, which was endorsed by the President, and carried unanimously.

Mr. ATKINS said the reign of the President had now come to a conclusion for the present, but the remarks of Mr. Mason would not be forgotten, and they would probably see Mr. Martindale in the same position on some future occasion. He had now to propose a hearty vote of thanks to him for his services, and he only regretted that time did not allow of his enlarging upon it. The resolution was—

"That the hearty thanks of the Conference be accorded to the President for the ability and courtesy with which he has discharged the duties of that office, and conducted the business of the meeting."

As to either the ability or the courtesy of the President it was not necessary to say a word. He was *facile princeps* amongst pharmacists and his courtesy and urbanity were equally marked.

Mr. T. TYRER, in seconding the motion, emphatically endorsed all that had been said by the mover. His conduct of the meetings and his apposite remarks during the discussion of the papers, had been all that could be desired, and succeeding Presidents could not do better than take him for an example.

The motion was carried by acclamation.

The PRESIDENT, in responding, thanked the members very heartily for their kindness and assured them he was very conscious of his own deficiencies; but he had done his best, and was glad to find he had not altogether failed.

The British Association for the Advancement of Science.

ADDRESS TO THE BIOLOGICAL SECTION.

BY FRANCIS DARWIN, M.A., M.B., F.R.S., ETC.

(*Concluded from page* 243.)

In the early stages of curvature, a phenomenon takes place to which Noll attaches great importance as supporting his view. When a curved organ is plasmolysed, it suffers a diminution of curvature, as De Vries showed, but Noll* has proved that in the early stages of curvature a contrary movement occurs, that is to say, the curvature is increased. This seems to show that the yielding of the convex side is owing to a ductility, which prevents its holding its own against the more perfect elasticity of the concave side. But this is only the beginning of the phenomenon; as the plasmolysing agent continues to act, a reverse movement takes place, the well-known flattening of the curvature described by De Vries. It is to me incomprehensible how in a given condition of cell-walls these results can occur in different stages of plasmolysis. I can understand one occurring when the curvature is recent, and the other, the flattening of the curve, occurring when the ductile convex parts have reacquired elasticity. The fact undoubtedly is as Noll describes it: his explanation seems to me inadequate.

We have now seen that the most acceptable theory of the machinery of these curvatures is in its main features akin to Hofmeister's, the power of elongation supplying the motive force, while the varying extensibility of the membranes determines the nature and direction of the bend.

The question now arises: Is it possible by these means to account for all the facts that must be explained. Taking the theory for which there is most to be said on experimental grounds—viz., Noll's—it will be noted that it is essentially connected with the doctrine of growth by apposition. The question, therefore, whether the apposition theory is sufficient to account for the phenomena of ordinary growth, may be applied *mutatis mutandis* to growth curvature. This doctrine in its original purity absolutely requires turgescence to account for the elongation of growth. The older layers, separated from the ectoplasm by the younger layers of cell-wall, can *only* be elongated by traction. Growth by intussusception does not absolutely require this force; the theory that the micellæ are separated by traction, and thus allow intercalation of fresh micellæ, is a view for which Sachs is chiefly responsible.

Since surface-growth by apposition is absolutely dependent on the traction exercised by cell-pressure, it is a fair question, how far growth is influenced by forcible elongation. Baranetzky* states that when a plant is subject to traction, as by even a small weight attached to the free end, the rate of growth is lowered. Ambronn,† as Zimmermann points out in the same connection, found no increased elongation of collenchyma when stretched for some days by means of a weight. A greater difficulty is that growth may be absolutely and at once stopped by placing the growing organ in an atmosphere free from oxygen.‡ Such treatment apparently does not diminish turgescence, yet growth stops. If the cell-walls are increasing in length by mechanical stretching, and if the turgor is not interfered with, increase in length ought to continue. The same thing applies to curvatures. Wortmann has shown§ that in an atmosphere of pure hydrogen a geotropic curvature which has begun in ordinary air cannot continue; in other words, after-effect ceases. This seems to me inexplicable on Noll's or Wortmann's theories; the convex side has become more extensible than the concave, turgescence, as far as we know, continues, yet no after-effect is observed. The same result may be gathered from Askenasy's‖ interesting experiments on the growth of roots. He showed that lowering the temperature has an almost instantaneous inhibitive effect on growth. Thus maize roots (at a temperature of 26·6°) growing at the rate of thirty-three divisions of the micrometer per hour, were placed in water at 5°, and absolutely no growth occurred during the following ten minutes, in which the thermometer rose to 6·5. This result is all the more valuable because we know from Askenasy's¶ other results that the turgor, as estimated by plasmolytic shortening, is about the same whether the root is in full growth or not growing at all. This is not conclusive, for if the growing cell-walls were ductile they might shorten but little although under great pressure, whereas the non-growing cells might shorten a good deal, owing to their more perfect elasticity;** therefore, Askenasy's plasmolytic results are not in this particular connection of great importance, except as showing that the non-growing roots were certainly to some extent turgescent.

There are other facts which make it extremely difficult to understand how surface-growth can depend on cell pressure. Nägeli†† pointed out that the growth of cylindrical cells which elongate enormously without bulging outwards laterally, is not explicable by simple internal pressure. An internodal cell of Nitella increases to 2,000 times its original length, while it only becomes ten times as wide as it was at first. The filaments of Spirogyra become very long, and keep their orignal width. Nägeli found that in Spirogyra the shortening produced by plasmolysis was practi-

* The similar results obtained by Wiesner are noticed above.

* *Mém. Acad. St. Pet.*, v., vol xxvii., p. 20.
† Pringsheim's *Jahrb.*, xii.
‡ Wieler, *Pfeffer's Untersuch.*, Bd. i., p. 189.
§ *Bot. Zeit.*, 1884, p. 705.
‖ *Deutsch. Bot. Ges.*, 1890, p. 61. This paper contains an excellent discussion on the mechanics of growth, to which I am much indebted.
¶ *Loc. cit.*, p. 71.
** Wiesner (*Sitz. Wien. Akad.*, 1884, vol. lxxxix.–xc., Abth. i., p. 223) showed that under certain conditions decapitated roots grow much more quickly than normal ones, yet the amount of plasmolytic shortening is less. Decapitated: growth, 79 per cent.; plasmolytic shortening, 8 per cent.; normal: growth, 39 per cent.; shortening, 13 per cent.
†† *Stärkekörner*, p. 279.

cally the same in the longitudinal and in the transverse direction. He therefore concluded that the growth of Spirogya cannot be accounted for by the cell-wall being differently extensible along different axes. But it must once more be pointed out that this type of plasmolytic experiment has not the force which Nägeli ascribes to it. If the cell-wall stretched like putty in one direction and like india-rubber in the other, there might be no plasmolytic shortening in the line of greatest growth. Nevertheless, in spite of this flaw in Nägeli's argument, great elongation in a single direction remains a problem for those who believe in surface-growth by apposition.

The point of special interest is that differences in extensibility in different directions cannot be supposed to exist in a homogeneous membrane. If *any* purely physical characters can explain the facts, they must be architectural characters. That is to say, we must be able to appeal to remarkable structural differences along different axes if we are to explain the facts. Such structural differences do, of course, exist, but whether they are sufficient to account for the phenomena is a different question. Strasburger* supposes that the elasticity of a cell-wall depends on the last-formed layers, and as in these the microsomes are seen arranging themselves in lines or patterns, we have a heterogeneity of structure which may or may not be sufficient.

We have now seen that it is difficult to believe, although it is not inconceivable, that the extending force of cell-turgor, combined with differences in extensibility of the membranes (depending on structural characters), may account for the phenomena of rectilinear growth. But, even if we allow that this is so, how are we to apply the same explanation to growth-curvatures? How are we to account for the rapid changes in extensibility necessary to produce geotropic or heliotropic curvatures? The influences which Strasburger and Noll suppose to act on the cell-walls and render them ductile cannot account for extensibility in one direction only. Nor does Wortmann's theory, that difference in extensibility depends on difference in thickness, meet the case completely. What we need is an increase in longitudinal, not in general extensibility. I presume that these writers might say that the excess in longitudinal extensibility is always present whether general extensibility is greater or less. In the meanwhile we must pass on to more recent researches on surface-growth by apposition.

In Strasburger's later work, 'Histologische Beiträge,' 1889, his views on growth have undergone considerable modification. The study of certain epidermic cells, of the folds in membrane, and the repetition of Krabbe's work on certain bast fibres, have convinced him that apposition does not account for all forms of growth. Krabbe† showed that in full-grown sclerenchyma (*e.g.* in Oleander) local widenings occur without any such amount of thinning in the membrane as would occur if the bulging were due to stretching. The only possible explanation seems to be that there is a migration of new material into the cell-wall. Such intussusception might be, as Nägeli supposed, a flow of fluid out of which new micellæ crystallize; but it is now established that cellulose arises as a modification of protoplasm, so that it would harmonize with our knowledge of the origin of cellulose if we assume that intussusception was preceded by a wandering of protoplasm into the cell-wall. Such a state of things would render possible the regulation of longitudinal growth in the case of Nitella and Spirogyra, already alluded to, as well as in growth curvatures. This view might also harmonize with Wiesner's theory that the cell-wall contains protoplasm as long as it continues to grow.*

For the sake of brevity I content myself with the above examples: I think it will be allowed that there is a focussing of speculation from many sides in favour of "active" surface-growth—or, what is, perhaps, a better way of putting it, in favour of a belief that the extension of cell membranes depends on physiological rather than physical properties, that it is in some way under the immediate control of the protoplasm. We may take our choice between Wiesner's wall protoplasm (dermatoplasm), protoplasmic intussusception as conceived by Strasburger, or the action of the ectoplasm in the manner suggested by Vines,† who supposes that the crucial point is a change in the motility of the protoplasm, not of the cell membrane. The latter theory would undoubtedly meet the difficulties—if we could believe that so yielding a substance as protoplasm could resist the force of turgor.

The great difficulty is, as it seems to me, that since *e.g.* in Caulerpa, surface-growth is clearly due to stretching, as Noll has demonstrated, and since in osmotic cell-pressure a stretching force does exist, it cannot be doubted that turgor, and ordinary physical extensibility are conditions of the problem. This remains true in spite of Klebs'‡ curious observations on the growth of plasmolysed algæ, or in spite of the fact that pollen tubes may grow without turgor, in spite of the same being perhaps true of young cells filled with protoplasm.§ In the face of all these facts osmotic pressure in the cell must remain a *vera causa* tending to surface-growth.

If we accept some form of "active" surface-growth, we must deal with turgor in another way, although to do so may require a violent exercise of the imagination. Are we to believe, for instance, that the function of turgescence is the attaining of mechanical strength? If we hold that cell-walls increase in area independently of turgor we shall be forced to invent a hypothesis such as the following—which I am far from intending to uphold. It is possible to imagine that the function of the force of turgor is merely to spread out the growing membrane to its full extent, and, as it were, to make the most of it. Turgor would in this respect play the part occupied by the frame used in embroidery, making it easier to carry on the work satisfactorily, but not being absolutely necessary. When mechanical strength is gained by turgor (as in mucor), instead of by brute strength of material, as in a tree-trunk, a great economy in cellulose is effected. If turgor played our hypothetical part of smoothing out the membrane and insuring that it shall occupy as large a space as possible, it would effect the same kind of economy.

It is not necessary to inquire how far this hypothesis accords with our knowledge of cell mechanics. It is only put forth as an example of the difficulties in which we land if we seek for a new function for turgor. We are, indeed, surrounded by difficulties; for, though the theories which are classed together as protoplasmic have much in their favour, they, too, lead us into an *impasse*.

Circumnutation.

I shall conclude by saying a few words about the theory of growth-curvatures put forward in the 'Power

* *Zellhäute*, p. 194.
† Pringsheim's *Jahrb.*, xviii.

* *Sitz. Wien. Akad.*, 1886, vol. xciii., p. 17.
† Sachs' *Arbeiten*, 1878, and *Physiology*, 1886. See also Gardiner, on protoplasmic contractility, in the 'Annals of Botany,' i., p. 366. Pfeffer has, I think, shown that Vine's and Gardiner's theories assume the existence of too great strength in the ectoplasm. See Pfeffer in *Abhandl. der k. Sachs. Gesellsch.*, xvi., 1890, p. 329.
‡ *Tubingen. Untersuchungen*, ii., p. 489.
§ See Noll, *Würzburg. Arbeiten*, iii., p. 530.

of Movement in Plants.' I can here do no more than discuss the relation of circumnutation to curvature, which is the thesis of the book in question, without attempting to enter the arena with regard to the many objections which have been raised to other parts of our work.

A distinguished botanist, Professor Wiesner, of Vienna, published in 1881 a book, 'Das Bewegungsvermögen der Pflanzen,' entirely devoted to a criticism of the 'Power of Movement.'* It is founded on a long series of experiments, and is written throughout in a spirit of fairness and candour which gives it value, apart from its scientific excellence, as a model of scientific criticism. The words written on the title-page of the copy presented to my father are characteristic of the tone of the book: "In getreuer Opposition, aber in unwandelbarer Verehrung." A letter printed among my father's correspondence shows how warmly he appreciated his opponent's attack both as to matter and manner. Wiesner's opposition is far-reaching, and includes the chief theoretical conclusion of the book, namely, that movements such as heliotropism and geotropism are modifications of circumnutation. Neither will he allow that this revolving nutation is the widely-spread phenomenon we held it to be. According to Wiesner, many parts of plants which do not circumnutate are capable of curving geotropically, etc.; he is, therefore, perfectly justified, from his own point of view, in refusing to believe that such curvatures are derivations from circumnutation. He points out that our method of observing circumnutation is inaccurate, inasmuch as the movement is recorded in oblique projection. This we were aware of, and I cannot but think that Wiesner has unintentionally exaggerated its inaccuracy; and that, if used with reasonable discretion, it cannot lead to anything like such faulty records as in the supposititious cases given by our critic. However this may be, Wiesner's results are perhaps more trustworthy than ours, and should receive the most careful consideration.

Wiesner's conclusions, taken from his own summaries, are as follows:—

The movement described as circumnutation is not a widespread phenomenon in plants. Stems, leaves and acellular fungi are to be found which grow in a perfectly straight line. Some roots grow for considerable periods of time without deviating from the vertical. When circumnutation does occur, it cannot be considered to have the significance given to it in the 'Power of Movement.' The movements observed by Wiesner are explained by him in three different ways.

1. As the expression of a certain irregularity in growth depending on the want of absolute symmetry in structure, and on the fact that the component cells of the organs have not absolutely similar powers of growth.

2. As the expression of opposing growth-tendencies. Thus certain organs have inherent tendencies to curve in definite planes—for instance, the bending of the hypoctyl in the plane of the cotyledons. Wiesner believes that such tendencies, when combined with others—heliotropic, geotropic, etc.—lead to alternate bendings in opposite directions, according as one or other of the components is temporarily the stronger.

3. Wiesner allows that circumnutation does exist in some cases. This last class he considers a small one; he states, indeed, that "nearly all, especially the clearly perceptible circumnutations," are combined movements belonging to the second of the above categories.

Although I have perhaps no right to such an opinion without repeating Wiesner's work, yet I must confess that I cannot give up the belief that circumnutation is a widely-spread phenomenon, even though it may not be so general as we supposed. If, then, circumnutation is of any importance we are forced to ask what is its relation to growth-curvatures. It was considered by my father to be "the basis or groundwork for the acquirement, according to the requirements of the plant, of the most diversified movements."* He also wrote:† "A considerable difficulty in the way of evolution is in part removed, for it might be asked how did all these diversified movements . . . . first arise? As the case stands, we know that there is always movement in progress, and its amplitude, direction, or both, have only to be modified for the good of the plant in relation to internal or external stimuli."

Those who have no belief in the importance of circumnutation, and who hold that movements may have arisen without any such basis, may doubtless be justified in their position. I quite agree that movement *might* be developed without circumnutation having anything to do with the matter. But in seeking the origin of growth-curvatures it is surely rational to look for a widely-spread movement existing in varying degrees. This, as I believe, we have in circumnutation: and here comes in what seems to me to be characteristic of the evolution of a quality such as movement. In the evolution of structure, each individual represents merely a single one of the units on which selection acts. But an individual which executes a number of movements (which may be purposeless) supplies in itself the material out of which various adapted movements may arise. I do not wish to imply that tentative movements are of the same order of importance as variations, but they are undoubtedly of importance as indication of variability.

The problem may be taken back a stage further; we may ask why circumnutation should exist. In the 'Power of Movement' (p. 546) we wrote: "Why every part of a plant whilst it is growing, and in some cases after growth has ceased, should have its cells rendered more turgescent and its cell-walls more extensile first on one side then on another . . . . is not known. It would appear as if the changes in the cells required periods of rest." Such periods of comparative rest are fairly harmonious with any theory of growth; it is quite conceivable by intussusceptionists and appositionists alike that the two stages of elongation and fixation should go on alternately,‡ but this would not necessarily lead to circumnutation. It might simply result in a confused struggle of cells, in some of which extension, in others elongation, was in the ascendant; but such a plan would be an awkward arrangement, since each cell would hinder or be hindered by its neighbour. Perfection of growth could only be attained when groups of contiguous cells agreeed to work together in gangs, that is, to pass through similar stages of growth synchronously. Then, if the different gangs were in harmony, each cell would have fair play, elongation would proceed equally all round, and the result would be circumnutation.§

Whether or no any such origin of circumnutation as is here sketched may be conceived, there can be no doubt that it had its origin in the laws of growth apart from its possible utilization as a basis for growth-curvature.

It is, however, possible to look at it from a somewhat different point of view, namely, in connection with

* 'Power of Movement,' p. 8.

* 'Power of Movement,' p. 3.

† *Loc. cit.*, p. 4.

‡ Strasburger, *Histolog. Beiträge*, p. 195, speaks of the pause that must occur after the formation of a cellulose lamella. Hofmeister, *Wurttemburg. Jahreshefte*, 1874, describes the growth in length of Spirogyra as made up of short intervals of rapid growth alternating with long pauses of slow growth.

§ I purposely omit the circumnutation of pulvini.

what Vöchting has called *rectipetality*.* He made out the fact that when an organ has been allowed to curve geotropically, heliotropically, etc., and is then removed from further stimulation by being placed on the klinostat, it becomes straight again. This fact suggested to Vöchting his conception of rectipetality, a regulating power leading to growth in a straight line. It may be objected that such a power is nothing more than the heredity, which moulds the embryo into the likeness of its parent, and by a similar power insists that the shoot or root shall take on the straight form necessary to its specific character. But the two cases are not identical. The essence of rectipetality is the power of recovering from disturbance caused by external circumstances. When an organ has been growing more quickly on one side than another, the regulating power reverses this state of things and brings the curving organ back towards the starting point. We have no means of knowing how this regulating power acts in undisturbed growth. It is possible to imagine a type of irritability which would insure growth being absolutely straight, but it is far more easy to conceive growth as normally made up of slight departures from a straight line, constantly corrected. In drawing a line with a pencil, or in walking towards a given point, we execute an approximately straight line by series of corrections. If we may judge in such a matter by our own experience, it is far more conceivable that the plant should perceive the fact that it is not growing absolutely straight and correct itself, than that it should have a mysterious power of growing as if its free end were guided by an external force along a straight-edge. The essence of the matter is this: we know from experiments that a power exists of correcting excessive unilateral growth artificially produced; it is not probable that normal growth is similarly kept in an approximately straight line by a series of aberrations and corrections? If this is so, circumnutation and rectipetality would be different aspects of the same thing.

This would have one interesting corollary: if we fix our attention on the regulating power instead of on the visible departures from the straight line, it is clear that we can imagine an irritability to internal growth-changes existing in varying intensities. With great irritability very small departures from the straight line would be corrected. With a lower irritability the aberration would be greater before they are corrected. In one case the visible movement of circumnutation would be very small, in the other case large, but the two processes would be the same. The small irregular lateral curvatures which Wiesner allows to exist would therefore be practically of the same value as regular circumnutation, which he considers comparatively rare.

The relation between rectipetality and circumnutation may be exemplified by an illustration which I have sometimes made use of in lecturing on this point. A skilful bicycle-rider runs very straight, the deviations from the desired course are comparatively small; whereas a beginner "wobbles" or deviates much. But the deviations are of the same nature; both are symptoms of the regulating power of the rider.

We may carry the analogy one step further; just as growth curvature is the continuance or exaggeration of a nutation in a definite direction, so when the rider curves in his course he does so by wilful exaggeration of a "wobble."

It may be said that circumnutation is here reduced to the rank of an accidental deviation from a right line. But this does not seem necessarily the case. A bicycle cannot be ridden at all unless it can "wobble," as every rider knows who has allowed his wheel to run into a frozen rut. In the same way it is possible that some degree of circumnutation is correlated with growth in the manner suggested above, owing to the need of regular pauses in growth. Rectipetality would thus be a power by which irregularities, inherent in growth, are reduced to order and made subservient to rectilinear growth. Circumnutation would be the outward and visible sign of the process.

I feel that some apology is due from me to my hearers for the introduction of so much speculative matter. It may, however, have one good result, for it shows how difficult is the problem of growth-curvature, and how much room there still is for work in this field of research.

* *Die Bewegung der Blüthen und Früchte*, 1882.

Provincial Transactions.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

A Council meeting was held at the Mason College, Edmund Street, Birmingham, on Tuesday afternoon, September 15, to elect officers and make arrangements for the coming session.

The following officers were elected to serve for the ensuing year: — President, Mr. A. Southall, F.C.S.; Vice-Presidents, Mr. C. Thompson, Mr. J. T. Barrett; Secretary, Mr. F. H. Alcock; Treasurer, Mr. C. J. Arblaster; Librarian, Mr. G. E. Perry; Auditors, Mr. S. Dewson, Mr. J. Poole; the remainder of the Council being composed of Messrs. Barlow, Chapman, Crooke, Ferriday, Gibbs, Howes, Jones, Prosser, Thonger, Barclay, Wyley, Hinds, Owen, Hutton, Selleck, J. O. Morris, G. Morris, J. F. Gibson.

Amongst the business transacted it was decided to have a new catalogue of the library prepared and issued to the members; that no students' classes be held this year; that a committee be appointed to arrange for the inaugural meeting and annual address to be held as usual in October next; and that a letter of condolence be sent to Mr. Councillor Barclay, on the death of his wife. Thanks to the officers of the past session concluded the business.

ABERDEEN AND NORTH OF SCOTLAND SOCIETY OF CHEMISTS AND DRUGGISTS.

At the September meeting of the Aberdeen and North of Scotland Society of Chemists and Druggists, the Curator, Mr. D. Ritchie, reported the receipt of a large assortment of botanical specimens from Messrs. Langton, Hicks Bros. and Co., and also a valuable set of the alkaloids, etc., of cinchona bark from Messrs. Howards and Sons; and he moved that the Secretary be instructed to send a hearty vote of thanks to these firms for their handsome contributions. He further wished it to be known that he would be pleased to receive and acknowledge any specimens sent him for the Society's Museum.

LEICESTER CHEMISTS' ASSOCIATION.

The first of a series of "smoking concerts" in connection with the Leicester Chemists' Association was held on the 17th instant, and is reported to have been an unqualified success, more than sixty members and friends having been present.

Parliamentary and Law Proceedings.

Supposed Poisoning by Medicine in a Workhouse Infirmary.

An inquest was held on Wednesday by Mr. Alfred Hodgkinson, at the Shoreditch Infirmary, as to the

death of Eliza Burley, fifty-nine, late an inmate at Shoreditch Workhouse. The evidence showed that on Saturday evening she asked the assistant matron for a dose of medicine, and this was given to her out of a bottle she had previously received medicine from, and which had been refilled. An hour afterwards she complained of a burning sensation in her throat and chest. The assistant matron and the doctor were immediately in attendance, but death took place before the doctor could reach the woman.

Dr. Frederick Laing Norris, assistant medical officer, stated that he had made a *post-mortem* examination, and found that death was due to heart disease, accelerated by the deceased taking aconite. The prescription on the bottle was as follows: 2 drachms diluted hydrochloric acid, 1½ drachms tincture of nux vomica, and chloroform water 10 ounces; dose, two tablespoonfuls to be taken every three hours. Witness had tested the medicine of which the deceased took a dose, and found it to answer the test for aconite and strychnine. Witness had also examined the dispensing bottle in the dispensary, which was labelled "nux vomica," and found it to contain aconite, which it should not have done. The contents of the bottle produced, labelled "nux vomica," did not look like that drug, and an experienced dispenser ought to have detected the difference. Several other inmates had similar symptoms to the deceased, but were now well.

Joseph Lowe, acting as dispenser while Mr. Lane, the permanent dispenser, was away on his holidays, stated that he was a fully qualified chemist and druggist. He frequently used nux vomica in dispensing the prescriptions; but he could not remember making up the bottle produced. If he did so, the contents of the bottle also produced and labelled "nux vomica" would have been used. He had had no occasion to refill the dispensing bottle from the stock bottle, and did not know the particular spot where the stock bottles of tincture of aconite and nux vomica were kept, as he had had no reason to use them. He had an old inmate to fill up the medicine bottles with water, and he and the doctors would have access to the dispensary. Witness considered the light in the dispensary bad in the day time.

By the Clerk to the Guardians: He had used the nux vomica during the week, but no complaints were made about the medicine until Sunday to witness.

The Clerk remarked that he wished to show that the foreign drug must have got into the nux vomica on Saturday.

The inquiry was adjourned for an analysis to be made of the contents of the bottle, etc.—*Standard.*

Death from Drinking a Weed-killing Compound.

On Saturday, the 12th inst., an inquest was held at Cirencester by Mr. Deputy-Coroner Smith on the body of H. L. Smith, aged about two years, who died on the previous Wednesday. The father of the boy, the Superintendent of the Cemetery, had been using a preparation called the "Luda," for the purpose of destroying the weeds on the walks. He had measured out the liquid with a jug, and left the jug turned upside down, which the child afterwards placed to his mouth. The fluid was thick, and would adhere to the rim of the jug, and although only a small quantity could have been swallowed, the child died within eight hours.—*Gardeners' Chronicle.*

Pharmacist.—See an article in the *British Medical Journal* for March 7 last, p. 520, and some comments upon it in the *Pharmaceutical Journal* for March 14, p. 837, and June 6, p. 1120. Further information might be obtained from the agents for the specialty.

W. H. Fowler.—Very little; considerably under 1 per cent.

Obituary.

Notice has been received of the death of the following:—

On the 25th of August, Mr. James Mullock, Chemist and Druggist, formerly of Shocklach, Cheshire. Aged 74 years.

On the 7th of September, Mr. William Harvey, Chemist and Druggist, Ford Street, Derby. Aged 63 years.

On the 8th of September, Mr. Alfred Walker, Chemist and Druggist, Waters Green, Macclesfield. Aged 54 years.

On the 9th of September, Mr. Henry George Mumbray, Pharmaceutical Chemist, Higher Crumpsall, near Manchester. Aged 70 years. Mr. Mumbray was a member of the Pharmaceutical Society from 1870 to 1887. In 1889 he was elected an annuitant on the Benevolent Fund.

On the 13th of September, Mr. James Adamson, Chemist and Druggist, Crouch End, London. Aged 55 years.

On the 14th of September, Mr. Frederick Phipps, Chemist and Druggist, Westgate Road, Newcastle-on-Tyne. Aged 35 years.

On the 16th of September, Mr. John Hartley, Chemist and Druggist, Church Road, Lytham, formerly of Bradford, Yorkshire. Aged 36 years. Mr. Hartley was an Associate in Business of the Pharmaceutical Society.

On the 16th of September, Mr. Jesse Crossley, Chemist and Druggist, Shelf Moor, near Halifax. Aged 60 years.

On the 16th of September, Mr. Joseph Coles, Chemist and Druggist, Alcester. Aged 36 years.

On the 16th of September, Mr. William Ward, Chemist and Druggist, late of Waingate, Sheffield. Aged 70 years.

On the 21st of September, Mr. William Marmaduke Walkinton, Chemist and Druggist, Whateley Road, Handsworth, Birmingham. Aged 48 years.

Correspondence.

Extracts of Nux Vomica and Opium.

Sir,—In reference to Mr. Conroy's paper, reported in the *Pharmaceutical Journal* of September 19, I should like to ask him upon what grounds he objects to the method of procedure suggested by Messrs. Umney and Moss for reducing the alkaloidal strength of extract of nux vomica. This plan was originally proposed by me soon after the issue of the 1885 Pharmacopœia (*vide Pharm. Journ.*, Jan. 16, 1886, p. 618), since which time I have not had occasion to abandon it as unsatisfactory. It is true there is a little difficulty in the alkaloidal separation, owing to the nature of the extractive matter removed by the weak spirit, but this difficulty is by no means insuperable. Although I quite agree with Mr. Conroy that it is advisable to raise the B.P. standard of opium to 12½ or even 13 per cent., and its preparations to a corresponding degree, yet I would point out that so far as the extract is concerned any kind of opium may be employed provided the resulting preparation contains the official proportion of morphine. It would probably be much more convenient, however, to use only Asia Minor opium of greater strength and raise the standard of extract to about 24 per cent. morphine.

R. A. Cripps.

T. W. Peck.—An answer to your question will be found on p. 263.

A. E. Beard.—Probably the dry rot, *Merulius lacrymans*, but the specimen arrived in a condition unfit for exact determination.

Cæsar is recommended to consult a solicitor.

Communications, Letters, etc., have been received from Messrs. Alcock, Bellamy, Gamble, Humphrey, McWalter.

"THE MONTH."

Anacardic Acid as Hair Dye.

The pigmentary properties of the viscous liquid secreted under the pericarp of the cashew nut (*Anacardium occidentalis*) has long been known, and the liquid has been stated to yield a good indelible stamping ink. According to Herr Gawalowski (*Zeit. öst Apot.-Ver.*, Sept. 10, p. 485), the ammonium salt of anacardic acid ($C_{22}H_{32}O_{31}$), one of the constituents of the liquid, can be advantageously used as a means of darkening the hair. For this purpose the hair is first moistened with an aqueous solution of the salt and afterwards combed with a comb that has been dipped in a solution of ferrous sulphate, or the ammonium anacardate may be applied in a pomade or oil, and instead of the solution of ferrous sulphate an oleate of iron may be employed. It is stated that after a short exposure to the air the hair so treated assumes a more or less dark colour, which is tolerably persistent, but nothing is said as to the exact tint. It is obvious that anacardic acid used for this purpose must be quite free from the acrid cardol that accompanies it in the nut. Herr Gawalowski directs that it should be prepared by treating the residue from the evaporation of an ethereal extract of the crushed pericarp with water as long as the washings showed traces of tannic acid, then dissolving it in 15 to 20 parts of alcohol, shaking the solution vigorously with freshly precipitated lead hydrate, filtering and washing the precipitate with alcohol and decomposing the lead salt so obtained with freshly prepared sulphide of ammonium and filtering. Upon strongly cooling the filtrate, which contains the ammonium salt of anacardic acid and excess of ammonium sulphide, and treating it with sulphuric acid, the acid separates at once as a soft mass, which after being pressed between filter paper is dissolved in ammonia and then remains soluble in water. According to Dymock (*Veg. Mat. Med. W. Ind.*, p. 199), a tar obtained in roasting the nuts, and largely used in India for tarring wood, contains about 90 per cent. of anacardic acid and 10 per cent. of cardol.

Evolution of Antipyretics: Phenocoll.

In Mr. Martindale's address to the British Pharmaceutical Conference at Cardiff reference was made to the production and modification of compounds by the chemist to meet the requirements of the therapeutist. A good illustration of this is to be found in an account that has been published (*Pharm. Zeit.*, Sept. 12, p. 585) respecting the evolution of one of the most recently introduced compounds, which, although perhaps written with some perception of the power of advertisement, is at least *ben trovato*. Every reader is familiar with the fact that although during the last few years a multitude of so-called "synthetic" compounds have been put forward as antipyretics, only comparatively few have maintained a place in the materia medica, those most generally in use at the present time being antifebrin or acetanilide, antipyrin, and phenacetin. Even these, however, do not include the ideal antipyretic, for it has been objected that whilst antipyrin is liable to produce unpleasant bye-effects, and phenacetin is too insoluble, antifebrin combines in itself both disadvantages. The problem appeared therefore to be the production of a compound that should unite the best properties of antipyrin and phenacetin. The comparative innocuousness of phenacetin is believed to be dependent, not upon its insolubility, but upon the presence of the oxyethyl group. Hence the suggestion that the toxicity of antipyrin might be diminished, without affecting its solubility, by the introduction into it of an oxyethyl or some similar group. The results of experiments in this direction have not yet been reported, but it is stated that one obstacle to the future of such antipyrin derivatives would be their costliness. As to phenacetin, the simplest method of rendering it soluble, whilst retaining its antipyretic and non-toxic properties, seemed to be to introduce into the nucleus an acid-forming radicle, such as a sulpho or carboxyl group. It will be remembered that phenacetin is systematically known as p-acetphenetidin; that is to say, acetanilide or phenylacetamide in which an oxyethyl group has replaced the hydrogen of the CH group in the position para to the amide group. The replacement by carboxyl of the hydrogen of one of the remaining four CH groups may therefore be represented thus:—

$$C_6H_4\begin{cases}OC_2H_5\\NH-OC\cdot CH_3\end{cases}$$

Phenacetin.

$$C_6H_3\begin{cases}OC_2H_5\\COOH\\NH-OC\cdot CH_3\end{cases}$$

Phenacetin-carboxylic Acid.

The easily soluble salts of both the carboxylic and sulphonic acids proved, however, to be almost inactive. An attempt was then made to attain the object by introducing an acid group into the acetyl residue in the side chain, forming the corresponding ethoxyanilic acid, but this also had the effect of almost completely abolishing the antipyretic property—

$$C_6H_4\begin{cases}OC_2H_5\\NH-OC-CH_2-CH_3-COOH\end{cases}$$

Ethoxysuccinanilic Acid.

A similar result was observed with ethoxyphenylglycin, a product of the reaction between p-phenetidin and chloracetic acid—

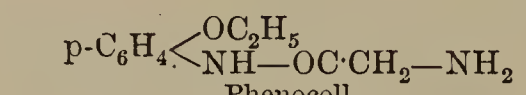
$$C_6H_4\begin{cases}OC_2H_5\\NH-CH_2COOH\end{cases}$$

Ethoxyphenylglycin.

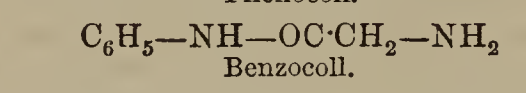
It was then determined to try the effect of introducing a salt-forming amido group. But as *a priori* it seemed undesirable to introduce such a group into the nucleus, or otherwise by meddling with the oxyethyl group to disturb the portion of the compound exercising the characteristic phenacetin physiological action, there remained available for the purpose only the acetyl residue in the original acetylamido group. Aromatic derivatives of this kind, having the general formula—

$$R\cdot NH-OC-CH_2-NH_2,$$

had not hitherto been prepared. That difficulty, however, was overcome, and the product, amidoacetylphenetidin, or "phenocoll," is claimed to retain the antipyretic and non-poisonous properties of phenacetin, and to produce anodyne effects in a higher degree, whilst its ready solubility is said to favour its ready absorption and consequent prompter action, rendering it peculiarly suitable for local injection. In confirmation of the assumption as to the physiological importance of the characteristic phenacetin group, it is stated that benzocoll, which differs from phenocoll only in not containing the oxyethyl group, possesses besides the antipyretic also the toxic properties of acetanilide.



Phenocoll.



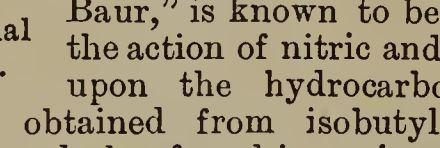
Benzocoll.

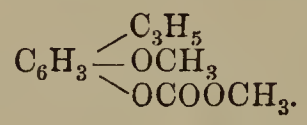
Phenocoll is stated to form readily crystallizable salts. Besides the hydrochloride, referred to in a former note (May 2, p. 977), there have been prepared the acetate, which is soluble in $2\frac{1}{2}$ parts of water and suitable for subcutaneous injection, besides being milder in taste than the hydrochloride; the carbonate, which is nearly tasteless, and, though not so soluble in water, is readily dissolved by weak acids; and the salicylate, which is described as tasting sweetish and not disagreeably, and combining the therapeutic properties of phenocoll and salicylic acid.

Tests for Phenocoll Compounds.

In view of the possibility of some of the above-mentioned phenocoll compounds coming into use it may be useful to put on record one or two tests for their purity. It is stated (*Pharm. Zeit.*, Sept. 19, p. 586) that half a gram of phenocoll hydrochloride should dissolve clear in about 15 c.c. of water, and that the solution should not turn ordinary litmus paper blue. Solution of ferric chloride should produce in the phenocoll hydrochloride solution only the faint yellowish colour of iron salts, but not a red coloration even upon warming. Heated to 60° C. and treated with a few drops of solution of sodium carbonate, the aqueous solution should not give off the odour of ammonia; with a few drops of caustic soda solution the phenocoll base should be thrown down as a white crystalline mass. Burnt on platinum phenocoll hydrochloride leaves no residue. For the acetate the same tests apply, except that the aqueous solution is faintly alkaline and the behaviour with ferric chloride is not the same. The free base melted under water and allowed to cool solidifies in crystals; it is also precipitated from a dilute aqueous solution by sodium chloride in long silky needles. Melted with caustic soda ammonia and phenetidin are formed, and when an aqueous solution is boiled with a few drops of hydrochloric acid for a few minutes it shows faintly the reactions of phenacetin treated similarly.

New Phenol Derivatives.

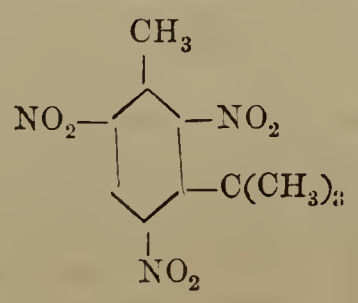
A patent has been taken out in Germany for a process for preparing from essential oils and other similar substances a series of odourless, tasteless, neutral compounds, which do not attack the mucous membrane, and are expected to find an application in medicine (*Pharm. Centralh.*, Sept. 24, p. 553). The process consists in subjecting the hydroxyl-containing constituents (phenols) or their salts to the action of an ester or amide of chlorformic acid ($Cl{\cdot}COOH$) and thus converting them into what are designated by the patentee the corresponding "carbonates (carbonic acid esters)" and "carbamates (carbamic acid esters)." It is affirmed that these compounds, when introduced into the organism, where it is said they are rapidly absorbed, split up into carbonic acid or ammonia, as the case may be, and the active hydroxyl compound, after the manner of salol, thereby avoiding any toxic action. Applying the idea to other compounds, instead of the methyl salicylate of wintergreen oil, ethyl salicylate has been converted into carbonate, the product being represented by the formula  . Instead of guaiacol or creosol, the official creosote has been taken, the product being a mixture of carbonates varying in its physical properties with the composition of the creosote used. Further, the process has been extended to the conversion of hydroxyl-containing compounds into alkyl carbonates, as for instance, eugenol into methylcarbonate of eugenol.



Besides the corresponding ethyl carbonate of eugenol, there are described the methyl and ethyl carbonates of guaiacol, creosol, carvacrol, oil of gaultheria, and ethyl salicylate. The compounds are said to be liquid at ordinary temperatures and therefore more suitable for injections than the solid carbonates and carbamates. But it has been pertinently remarked that if it is seriously expected that all these compounds will come into use in medicine dispensers will do well to take up the study of mnemonics.

Artificial Musk.

The crystalline substance now met with in commerce under the name "artificial musk," or "musk Baur," is known to be the product of the action of nitric and sulphuric acids upon the hydrocarbon meta-butyltoluene, obtained from isobutyl bromide and toluene, and also found in resin spirit. Its composition is that of a trinitro derivative of butyltoluene $C_6H(CH_3)(C_4H_9)(NO_2)_3$, but according to the most recent publication of Baur (*Berichte*, xxiv., 2832) the butyltoluene prepared as above, though yielding isophthalic acid on oxidation and therefore a meta-derivative, does not contain the isobutyl group $\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CH-CH_2-$, as might be expected from its mode of formation. As in many syntheses of hydrocarbons effected by Friedel and Craft's method with aluminium chloride, a molecular rearrangement appears to occur, and the resulting product is a tertiary butyl derivative $C_6H_4(CH_3)C(CH_3)_3$, identical with that prepared from tertiary butylchloride $C(CH_3)_3Cl$ and toluene. The mono and di-nitro compounds have also been prepared and are described as oils of peculiar disagreeable odour, not at all suggestive of musk. The tri-nitro product (artificial musk) crystallizes from alcohol in yellowish white needles that melt at 96–97° C.; it is insoluble in water, easily soluble in alcohol, ether, petroleum ether, benzene and chloroform, and slightly volatile with water vapour. It forms an unstable compound of two molecules of trinitrobutyltoluene with one molecule of naphthalene, which is decomposed into its components on distillation. From the stability of the nitro groups towards alkalies, ammonia and aniline it is thought that they stand in the meta position to one another, and artificial musk may be therefore represented by the constitutional formula—



A great number of homologues and isomerides have been prepared, but though many possess a musk-like odour, none have so great a technical value as the above. It has therefore been found advisable to carefully purify the butyltoluene for technical purposes.

Scopolamine and Commercial Hyoscine.

About eighteen months since Professor Ernst Schmidt reported (*Pharm. Journ.*, [3], xx., 890) that a crystalline substance separated from the root of *Scopolia atropoides*, and supposed to be crystallized hyoscine, was a hitherto unrecognized alkaloid, and that it appeared to be present in some commercial samples of hyoscine salts. At the recent meeting of German Naturalists and Physicians he gave some further particulars of this alkaloid, which has been provisionally named "scopolamine" (*Apot.-Zeit.*, Sept. 26, p. 522). The hydrobromide occurs in beautiful glassy crystals, 3 cm. long and 2 cm. broad, and from the results of analyses of the hydrobromide, hydrochloride, hydriodide, sulphate, a highly characteristic gold salt, as well as of the free base, the composition of scopolamine is represented by the formula $C_{17}H_{21}NO_4$. According to this it would contain two atoms of oxygen in the molecule more than apoatropine, and the atropamine recently discovered by Dr. Hesse (*Pharm. Journ.*, [3], xxi., 162). Scopolamine appears to contain a hydroxyl group, as it yields a monoacetyl derivative; towards nitrous acid it behaves as a tertiary base. By boiling with baryta water it is split up into atropic acid and a crystalline base, melting at 110° C., which has a composition represented by the formula $C_9H_8O_2$. Professor Schmidt made the important announcement that the "hyoscinum hydrobromicum" at present met with in commerce consists essentially of scopolamine hydrobromide. Scopolamine is said to have also been obtained in small quantity from belladonna root and from stramonium seeds. Further, the mydriatic basic substance separated by Professor Schmidt from one sample of *Duboisia myoporoides* consisted essentially of scopolamine, but that obtained from a sample of the leaves from another source was essentially hyoscyamine.

Hydrastine and Narcotine.

At the same meeting Professor Schmidt stated that in the oxidation by means of potassium permanganate in alkaline solution of the compound $C_{20}H_{18}O_7$, resulting from the decomposition of hydrastine methyliodide, there had resulted, besides hemipinic acid and other bye-products, a lactone represented by the formula—

$$C_6H_2\begin{cases} O \\ O \end{cases}\!\!>CH_2$$
$$\qquad\qquad\begin{cases} CO \\ CH \end{cases}\!\!>O$$
$$\qquad\qquad\qquad\quad <CH_2\cdot OH$$

which corresponded in its properties and its constitution to the lactone obtained by W. Roser from narcotine or cotarnine.

$$C_6H(O\cdot CH_3)\begin{cases} O \\ O \end{cases}\!\!>CH_2$$
$$\qquad\qquad\qquad\begin{cases} CO \\ CH \end{cases}\!\!>O$$
$$\qquad\qquad\qquad\qquad <CH_2\cdot OH$$

This observation is considered to establish the constitution of hydrastine and its relation to that of narcotine, and to confirm the opinion previously expressed that narcotine may be represented as methoxylhydrastine.

Canadine.

Under the name "canadine" F. Wilhelm designated an alkaloid, which he reported he had separated in small quantity from the root of *Hydrastis canadensis*, but since then doubt has been thrown on the occurrence of a third alkaloid in hydrastis by Power (*Pharm. Journ.*, [3], xv., 300). Professor Schmidt states, however, that he has received from E. Merck a quantity of such an alkaloid, and that thereupon he prepared it himself direct from hydrastis root. He describes the base as occurring in fine, white, shining crystals, melting at 134° C., and represents it by the formula $C_{21}H_{21}NO_4$. The salts, with the exception of the sulphate, are said to be soluble with difficulty in water and alcohol. As the alkaloid is converted by the action of iodine in alcoholic solution into hydriodide of methylberberine, it is considered that its constitution is that of dihydromethyleneberberine.

The Alkaloids of the Areca Nut.

In a previous communication (*Pharm. Journ.*, xix., 605, 667) Herr Jahns has reported the existence in the areca nut of at least three alkaloids, arecoline, arecaine, and a nameless amorphous base. Further investigation has shown that arecoline is readily saponified by acids or bases, yielding a new base, arecaidine, isomeric with arecaine, and that arecaidine also occurs ready formed in the natural product. Arecaine and arecaidine are easily separated by treatment with methyl alcohol and hydrochloric acid, whereby arecaidine is converted into its methyl ester, arecoline, and arecaine into the hydrochloride. Herr Jahns (*Berichte*, xxiv., 2615) now makes known the existence of a fourth crystalline alkaloid in areca nuts, to which he gives the name "guvacine," from guvaca, the old Indian name of the areca palm. Guvacine is less soluble in water or dilute alcohol than the other alkaloids, crystallizes in small shining crystals that darken at 265° C. and melt at 271–272° with decomposition. The crystals contain no water of crystallization, and upon analysis yield results corresponding to the formula $C_6H_9NO_2$. Of the salts the hydrochloride, sulphate, nitrate, platinochloride $(C_6H_9NO_2\cdot HCl)_2\cdot PtCl_4+4H_2O$, and aurochloride $C_6H_9NO_2\cdot HCl\cdot AuCl_3$, have been prepared and crystallize well. It therefore appears that a series of bases occur in the areca nut, which, with the exception of choline, stand in near relation to each other—

Choline $C_5H_{13}NO_2$	Arecaine $C_7H_{11}NO_2+H_2O$
Guvacine $C_6H_9NO_2$	Arecaidine $C_7H_{11}NO_2+H_2O$
	Arecoline $C_8H_{13}NO_2$

Probably other members of the series may be found by examination of a larger quantity of material.

Cannabinine.

Considerable diversity of opinion has been expressed as to the active principle of Indian hemp. Mr. H. F. Smith reports (*Amer. Journ. Pharm.*, Aug., p. 386) that he has separated an alkaloid of varnish-like consistence, having a strong, peculiar odour, resembling that of coniine, and corresponding generally in its characters to the cannabinine of Siebold and Bradbury (*Pharm. Journ.*, [3], xii., 326). The quantity obtained from a kilogram of the drug was 75 milligrams.

Pichi.

Soon after the introduction of the herbaceous twigs of *Fabiana imbricata* into this country, under the name "pichi," as a remedy in urinary disorders, Dr. Lyons reported

that he had separated from the drug a bitter alkaloidal substance, capable of forming crystalline salts, to which he gave the name "fabianine" (*Pharm. Journ.*, [3], xvi., 722). Subsequently, however, Messrs. Nivière and Liotard reported that they had failed to find an alkaloid in pichi, and they attributed any therapeutic activity it might possess to a fluorescent, glucosidal principle, resembling æsculin (*Pharm. Journ.*, [3], xviii., 460). A similar negative result has been arrived at by Mr. Loudenbeck (*Amer. Journ. Pharm.*, Sept., p. 432), so that it seems probable that the name "fabianine" should be erased from the list of alkaloids. The bitter, fluorescent substance appears, however, worthy of further investigation.

Adonin.

Several species of *Adonis* appear to contain a glucoside similar in physiological action to digitalin, and *A. vernalis* has been used as a substitute for digitalis in the treatment of affections of the heart. V. Cervello isolated the active principle from *A. vernalis* and called it adonidin (*Pharm. Journ.*, [3], xii., 833). He described it as an easily decomposed amorphous glucoside, resembling digitalin in every respect, but more energetic, and subsequently found the same or a similar compound in *A. cupaniana* (*Pharm. Journ.*, [3], xvi., 106). Mordagne also studied the body, but owing to the imperfect crystallizability of adonidin and its readiness to undergo decomposition was unable to make a satisfactory elementary analysis on which to base a formula (*Pharm. Journ.*, [3], xvi., 145). As a commercial article, Podwissotzky found adonidin to be merely a mixture of the active principle with other constituents of the plant (*Pharm. Journ.*, [3], xix., 346). He therefore gave the name picroadonidin to the chemically pure active principle, which he also described as an amorphous glucoside, possessing the properties of a cardiac poison in the highest degree. Y. Tahara has recently examined another species of Adonis, *A. amurensis*, Regg. et Radd., a plant largely cultivated in Japan as an ornamental plant, and found a similar glucosidal constituent therein (*Berichte*, xxiv., 2579). The difference of this body in chemical and physical behaviour from adonidin does not appear very evident, as it is only obtained approximately pure, of the composition $C_{24}H_{40}O_9$; but Tahara distinguishes it as "adonin" in regard to the results of physiological experiments by Professor Inoko, who found that although "adonin" acts qualitatively completely analogous to Cervello's adonidin, it is considerably less toxic.

Morrenia Brachystephana as a Galactogogue.

In two short notes communicated to the German Chemical Society (*Berichte*, xxiv., 1849), Messrs. Arata and Gelzer report the results of a chemical investigation of the milky juice contained in the rhizome and fruit of the *Morrenia Brachystephana*, Griesb., an asclepiadaceous plant which under the name "tasis" is used by the natives of the Argentine Republic as a remedy against various complaints. The plant grows wild throughout the country, but it is also cultivated for the sake of the fine silky hairs, known as "vegetable silk," which are contained in the fruit. The juice is principally used as a galactagogue, and an observation by Professor Arata seems to show that there is some foundation for its reputation in this direction. He states that his own wife having nearly failed in milk ten weeks after the birth of a son took daily doses of 30 grams of an "infusion of the milky juice," with the result that in a short time milk was secreted so abundantly as to suffice for the child's sustenance. The infusion as taken was yellow and mucilaginous, and sweetish, but with a bitter after taste, though it was not disagreeable to take. The first dose caused slight nausea and some headache, and increased secretion of sweat was noticed; the condition otherwise remained normal. The rhizome is described as being dark yellow, with the woody portion of a beautiful lemon yellow colour; it varies considerably in length and from 1 to 3 centimetres in diameter. The dried rhizome yielded 9·3 per cent. of ash, containing silicates, carbonates, phosphates and chlorides of calcium, sodium, magnesium and potassium, together with traces of manganese and iron. An ethereal extract was coloured green by chlorophyll and had an acid reaction. It left on evaporation a green, horny mass, having an aromatic odour and containing chlorophyll, resins, fatty acids and a wax-like body. Alcohol removed amongst other things an alkaloidal substance, having an acrid odour and extremely bitter taste, melting at 106° C., and soluble in water, alcohol, chloroform and amylic alcohol, to which the name "morrenine" has been given. Morrenine was also found in the fruit, as well as a white crystalline body, which has been named "morrenol," and is probably allied to, but not identical with, the asclepion of List and cynanchol of Butlerow. No physiological experiments appear to have been yet made with either of these two bodies.

Hygroscopic Character of Camphor and Thymol.

In the course of a physiological investigation of the irritability of a fungus, Professor Errera was led to the conclusion that camphor possesses a considerable hygroscopic capacity, which is not shared by thymol. Accurate experiments by Herr Clautriau have substantiated this opinion and show that whereas 40 grains of camphor will absorb 0·054 gram of water from air saturated with aqueous vapour at 16° C., thymol does not perceptibly increase in weight under the same condition (*Berichte*, xxiv., 2612). The absorption of water by camphor must be purely a physical phenomenon, since the condensed moisture is readily removed even under the influence of anhydrous camphor. The dry substance, although it attracts a comparatively small quantity of water, does so with such energy that its weight increases even in air containing but little moisture.

Essential Oil of Cinnamon Leaves and Root.

According to Professor E. Schmidt (*Chem. Zeit.*, Sept. 26, p. 1376) the essential oil of cinnamon leaves consists of almost pure eugenol, with a little terpene and cinnamic aldehyde, while the oil from the root also contains eugenol and terpene, together with much safrol and benzaldehyde. Both of these oils therefore differ from the essential oil from the bark, which consists of cinnamic aldehyde and terpene.

Detection of Geranium Oil in Rose Oil.

The attar of roses brought into commerce from South Bulgaria and Turkey is frequently adulterated with Turkish oil of geranium (*Indris Yaghi*), and indeed some difficulty was experienced in obtaining the pure product in order to devise a method for the ready detection of the adulteration. Herr O. F. Müller has recently ob-

served that a number of resins, oils and lacs yield colour reactions with fuchsin solution decolorized by sulphurous acid, the so-called Schiff's reagent. Applying this test to the case in point, Herr Panajotow found that if two or three drops of the Turkish geranium oil be shaken in the cold with 2 c.c. of the reagent it gives at first a blue-violet and after two hours a beautiful blue coloration. Under the same conditions the pure essential oil of rose only gives a red coloration after twenty-four hours, and hence the slightest admixture of geranium oil is recognizable, because the blue colouring matter is always formed before the red (*Berichte*, xxiv., 2700). Herr Panajotow also mentions that the brownish-red fluid resulting from the mixture of equal parts of oil of rose and concentrated sulphuric acid dissolves completely in 95 per cent. alcohol to an almost colourless solution, while the similar product resulting from oil of geranium is rendered turbid by the addition of alcohol, and a yellow, fatty flocculent mass separates.

Stachyose.

The name "stachyose" was given to the crystalline carbohydrate obtained from the tubers of *Stachys tuberifera* by A. v. Planta and E. Schulze, and its composition expressed by the formula $C_{18}H_{32}O_{16}$, or a multiple of the same. Further investigation (*Berichte*, xxiv., 2705) shows that the products of inversion of stachyose with dilute sulphuric acid are galactose, grape sugar, and fruit sugar, the same glucoses as result from the inversion of raffinose (*Pharm. Journ.*, [3], xxi., 719). The amount of mucic acid produced by oxidation with nitric acid indicates, however, that one half of the inverted glucoses consists of galactose, so that it is probable that one molecule of stachyose contains three galactose, two grape sugar, and one fruit sugar, or three galactose, one grape sugar and two fruit sugar groups. This assumption involves the assumption of 36 atoms of carbon in the molecule, or the formula $C_{36}H_{64}O_{32}$, although an estimation of the molecular weight by Raoult's method favours a smaller molecule.

Formation of Bases from Albumenoids.

Not long since E. Drechsel discovered that by boiling casein with hydrochloric acid and stannous chloride nitrogenous organic compounds of basic character, besides ammonia and amido acids, occur amongst the decomposition products. Two of these bases were isolated in pure condition by means of characteristic crystalline double salts, and the formula $C_6H_{13}N_3O_2$ was ascribed to "lysatine," and $C_6H_{14}N_2O_2$ to "lysine." According to Siegfried these two compounds are also obtained from vegetable albuminoids, such as the conglutin of lupins, by similar treatment, and this statement caused E. Schulze to examine the degradation products of albumenoids occurring in the plant organism during germination. Besides asparagine, glutamine, tyrosine, phenylalanine, leucine and amidovalerianic acid, Schulze found in *Lupinus luteus* seeds, after germination in the dark for 12 to 14 days, about two per cent. of the nitrogen present was in the form of a new base, "arginine," which behaved similarly to Drechsel's bases towards reagents, but possessed the formula $C_6H_{14}N_4O_2$. After Drechsel had shown that lysatine yielded urea by boiling with baryta water, Schulze and Likiernik (*Berichte*, xxiv., 2701) applied the same reaction to arginine with like result, 12 grams of argenine cupric nitrate (=6·8 grams of arginine) yielding after an hour's boiling with cold-saturated baryta solution 0·9 gram of urea nitrate. The isolation of a nitrogen compound derived from vegetable albumenoids during germination, and yielding urea decomposition with baryta water, is of great interest in connection with Drechsel's results, and it would appear that since the germinated seeds do not contain lysatine or lysine, the group of atoms in the albumen molecule which yields these bases on boiling the albumenoids with hydrochloric acid, is also the origin of arginine in the seed.

Sterilized Milk.

From time to time attention has been called to the injurious results accruing from the access of disease germs to milk during the interval between its being drawn from the cow and its use as food. Especially the occurrence of diarrhœa in infants fed upon cows' milk has been attributed to this cause, and about five years since, Professor Soxhlet, in a communication of which a digest was given in this Journal (vol. xvii., p. 573), recommended a process of sterilization of milk intended for infants' food, which involved it being kept at the boiling temperature for thirty or forty minutes. A recent communication to the American Journal of Medical Sciences by Professor A. R. Leeds and Dr. E. P. Davis (*Amer. Journ. Pharm.*, Sept., p. 445) seems to show, however, that any advantage resulting from the destruction of accidental germs during the process of sterilization is more than counterbalanced by changes produced in the normal constituents of the milk. For instance, Dr. Leeds finds that one effect of subjecting milk to so high a temperature for any lengthened period is to render insoluble a considerable portion of the soluble proteids. But the effect is greatest upon the galactozymose, the ferment occurring in raw milk which has the power of liquefying starch, since heating the milk to the boiling-point for a single moment is sufficient to destroy the activity of this ferment. The casein too is rendered less susceptible to the action of rennet, pepsin and pancreatin, and the fat is made less assimilable. Finally, Dr. Leeds states that milk sugar is completely destroyed by long heating, and probably affected to a certain extent during the interval usually allowed for milk sterilization. Dr. Leeds is of opinion that if germ-free milk is desired it should be either obtained directly from the animal or be prepared by a process as free as possible from injurious conditions. The plan he recommends is that after the milk has been rendered feebly alkaline with lime water it should be heated to 155° F. for six minutes. Or, still better, that the alkaline liquid should be treated with pancreatin at 155° F., and then, if not intended for immediate use, momentarily heated to the boiling point.

An Acoustic Thermometer.

A suggestion made by S. T. Preston (*Phil. Mag.*, July, p. 58), illustrative of a connection between sound and heat, appears capable of practical application. The idea relates to the varying note afforded by a resonance tube according to the temperature of the enclosed air or gas, and Mr. Preston demonstrates the extreme simplicity of the relations between the vibrating period and temperature of a column of gas according to the kinetic theory of gases. He recalls his statement that the sound-wave moves independently of the density and pressure of the gas, and that the

normal motion of the molecules of the gas, the energy of which motion is called "temperature," is the sole factor in determining the velocity of sound. From this he argues that as the velocity of sound is as the velocity of the gaseous molecules, and the velocity of the molecules as the square root of their energy, therefore, since the temperature is energy, the velocity of sound in a gas must be proportional to the square root of the temperature. If an adjustable tuning fork be selected as a mechanical indicator, the temperature of a column of gas enclosed in a tube will be inversely proportional to the square of the vibrating period of the fork in resonance with it, or if the tube be telescopic, the temperature will be proportional to the square of the length of the adjustable tube when in resonance with a standard tuning fork. Thus a tube of air at a temperature of 819° C. is found to be in resonance with the same tuning fork as a tube of half the length resounds to at 0° C.

TERPENES AND CAMPHORS.*

BY O. WALLACH.

The study of the compounds occurring in essential oils has proved a most difficult task to chemists. These compounds have been arranged in two classes, according to the presence or absence of oxygen in their respective molecules. The non-oxygenated bodies, consisting principally of hydrocarbons of the formula $C_{10}H_{16}$, have been called terpenes, whilst the general term "camphors" has been applied to the second class, which includes bodies with the formula $C_{10}H_{16}O$ or $C_{10}H_{18}O$, bearing a close relationship to the terpenes.

The terpenes especially have been regarded as bodies difficult of investigation and puzzling in constitution, since only a very small number of well-characterized derivatives were known, and the terpenes themselves are unstable substances towards chemical and physical influences. On this account, with the exception of a few valuable researches by Berthellot, Riban, Tilden, Gladstone, Armstrong and Flavitzky, no comprehensive and well-planned investigations have been undertaken until recently. A glance at the older literature of the subject is certainly not tempting, as it consists of an overwhelming number of isolated observations. In books of reference a great number of terpenes with different physical properties are mentioned, and furnished with distinctive names according to their source, but no successful attempt is made to present a correct general view of the whole subject.

For the purpose of establishing order in this intricate and confused chapter of chemistry it appeared necessary to strive, firstly, to ascertain sharp and characteristic differences in character of the various terpenes, so that the recognition and separation of chemical individuals could be accomplished without much difficulty; secondly, upon such a definite basis to determine the behaviour and mutual relations of the individual hydrocarbons, especially with regard to their property of ready convertibility the one into the other; and then, thirdly, after the fulfilment of the above conditions, the study of the constitution of the various compounds might be approached with some hope of success.

The greater portion of the first and second part of this task has already been accomplished, and recently considerable strides have been made in the solution of the third and more interesting problem. The contested question as to the constitution of the ordinary oil of turpentine may be now regarded as answered, and facts have been discovered that throw new light upon the nature of the camphors, although the investigations dealing with their constitution have not yet been concluded. But in this brief summary of the present position of the terpene question it will be impossible to enter into historical details or discuss the merits of independent investigations; only the most important results obtained can be considered.

The terpene hydrocarbons may be classified according to their empirical formulæ into three groups:—Hemiterpenes or Pentenes, C_5H_8; True Terpenes, $C_{10}H_{16}$; and Polyterpenes $(C_5H_8)_x$.

The true terpenes, $C_{10}H_{16}$, are partially decomposed at high temperatures into unsaturated hydrocarbons of the valerylene or pentene series, C_5H_8, of which isoprene is the best-known representative. Through polymerization the latter may be reconverted into $C_{10}H_{16}$, and even higher polymerides, as $C_{15}H_{24}$, $C_{20}H_{32}$, etc., into which the ordinary terpenes are also partially converted at high temperatures. Of the polyterpenes, to which colophony and caoutchouc belong, the sesquiterpene, $C_{15}H_{24}$, occurs frequently in essential oils. The true terpenes will, however, receive the principal attention in this communication, though some remarks concerning the more important oxygen compounds (camphors) will be interposed in suitable places.

The number of true terpenes has proved far larger upon close investigation than was at first supposed, and the following have been recognized as distinctly different from one another in behaviour and constitution:—

1. Pinene; 2. Camphene; 3. Fenchene; 4. Limonene; 5. Dipentene; 6. Sylvestrene; 7. Phellandrene; 8. Terpinene; 9. Terpinolene.

It will be well to recall the respective source, formation and physical and chemical peculiarities of these compounds.

Pinene is the basis of the ordinary turpentine oils, as it forms the most important constituent of the essential oils of many gymnosperms, and also occurs to a larger or smaller amount in numerous other essential oils.

Camphene is important on account of its near relation to camphor. It can be obtained from the latter through the intermediate borneol, or as a conversion-product of pinene. Whether it occurs naturally has not been definitely determined.

Fenchene has only been lately discovered. It stands in close chemical relationship to camphene, and can be obtained in an analogous manner from fenchone, an isomeride of camphor.

Limonene is one of the most widely distributed terpenes. It is found in the essential oils of the Aurantiaceæ, most largely in that of orange-peel, but also extensively in citron and bergamot oils. It occurs moreover in large quantities in the essential oils of cummin, dill, erigeron, and is a never failing constituent in pine oils.

Dipentene bears a very close relationship to limonene, as will be presently shown. Both limonene and pinene are convertible into dipentene at high temperatures, as well as by the action of acids. The hydrocarbon is also widely distributed in nature, and enters largely into the composition of oil of elemi, oil of camphor and the Russian and Swedish turpentine oils. It is formed in considerable quantity, together with isoprene, by the dry distillation of caoutchouc and by the decomposition of some oxygenated terpene derivatives, as cineole, terpine hydrate, terpineole, etc.

Sylvestrene is at present only known from its occurrence in Swedish and Russian turpentine oils.

Phellandrene, until recently only recognized in

* Abstract from a lecture delivered before the Chemical Society at Berlin on February 23, 1891, and published in *Berichte*, xxiv., 1525.

the essential oils of bitter-fennel and water-fennel, appears to be widely-distributed, and is now well-known from its extensive occurrence in oil of elemi and Australian eucalyptus oils.

Terpinene possesses especial importance as a conversion product of other terpenes, and also occurs as a natural constituent of oil of cardamoms.

Terpinolene is still but little known, but its presence has been observed in reactions in which other terpenes are also readily generated.

The terpenes frequently exist in different physical modifications. Thus the pinene of American turpentine oil (Australene) is dextro-rotatory and the pinene of French turpentine oil (Terebenthene) lævo-rotatory. The limonene of the Aurantiaceæ and of oil of cummin is dextro-rotatory and that of pine oils lævo-rotatory. The phellandrene in oil of fennel and oil of elemi rotates to the right, that in Australian eucalyptus oils to the left.

Most optically active terpenes are easily rendered inactive by the action of chemical agents, especially of mineral acids, and also by heating to high temperatures. Inactive modifications further result from the mixture of exactly equal parts of the dextro- and lævo-rotatory compounds. Active terpenes give, as a rule, active derivatives, which behave similarly to the mother-substances, but do not always rotate in the same direction, though the cause of the reversal of the rotation is not understood.

Closer observation has also led to the detection of important differences in the chemical behaviour and other physical properties of the optically active and inactive modifications of various terpenes. Although inactive pinene, camphene, and phellandrene compounds cannot be distinguished from the corresponding active forms except by their optical behaviour, limonene affords an abnormal example. The mixture of two corresponding limonene compounds yields an inactive substance that is totally different in behaviour from its components, and the compounds prepared from the active and inactive limonenes respectively bear so little resemblance to each other that for a long time inactive limonene was regarded as a distinct hydrocarbon, to which the name dipentene was applied. It is now understood that dipentene bears the same relation to dextro- and lævo-limonene as racemic acid to dextro- and lævo-tartaric acid; but as in this instance of physical isomerism another name has so long served to distinguish the abnormal inactive modification, it is deemed advisable to retain the special term "dipentene compounds" for the inactive bodies with dextro- and lævo- limonene components, more especially as it has been discovered and will be presently shown that different kinds of inactive limonene compounds exist.

Although most optically active terpenes can be readily rendered inactive by various agents, yet a few persist in their activity in a most remarkable manner, so that it appears doubtful whether they are capable of existence in an inactive modification. Amongst the true terpenes the dextro-rotatory sylvestrene may be mentioned as an example, and the lævo-rotatory sesquiterpene, $C_{15}H_{24}$, will also be remembered. On the other hand, some terpenes, as fenchene, terpinene, and terpinolene are only known at present in the inactive modification, and it is uncertain whether active forms can exist.

With respect to other physical properties attention must be drawn especially to the boiling-point, specific gravity and refractory power of the different terpenes. Only camphene is a solid (m.p. 50° C.). Pinene, camphene and fenchene boil at 160° and are distinguished by a high specific gravity (circa 0·86). Limonene, dipentene and sylvestrene boil at 175° and possess a correspondingly lower specific gravity of about 0·846 at 20° C. The physical constants of other terpenes have not yet been definitely determined, as they have not yet been obtained absolutely free from foreign matter. It is principally to the credit of Brühl that the connection between the molecular refraction equivalent of isomeric compounds and the nature of their atom-linkage has been recognized. This connection is also observed in the group of terpenes, for those terpenes in which one ethylene bond is assumed from their chemical behaviour possess the same molecular refraction equivalent, and this is the case also with those in which two ethylene bonds are probable.

A glance at the above-mentioned physical properties of the terpenes suffices to show that different groups occur amongst them, but physical characteristics will not serve for individual characterization. A sharp distinction can only be attained by a study of their chemical behaviour, when fundamental differences are discovered amongst terpenes that, like sylvestrene and dextro-limonene, are scarcely distinguishable in physical behaviour.

(*To be continued.*)

BACTERIOLOGY.*

BY J. LEFFINGWELL HATCH, B.SC., M.D.,

Lecturer on Bacteriology and Assistant Demonstrator of Morbid Anatomy in the University of Pennsylvania, and Assistant Pathologist to the Philadelphia Hospital.

It seems to me that the study, or rather the subject, of Bacteriology is particularly pertinent to chemists, since it was Pasteur who opened up the path in bacteriology to the world.

I hope you will pardon what may seem undue technicality on my part, but the subject is so fraught with terms that to use English synonyms would be but to confuse you the more.

I shall divide my subject into three parts :—

First—The history of bacteriology ;

Second—The biology of bacteriology ;

And lastly—I shall speak a few words about Koch, and his latest discovery—the cure for tuberculosis.

History of Bacteriology.

The knowledge of microscopical organisms naturally advances hand in hand with the science of optics, and although the ancients believed the air and water to swarm with beings of such small size as to be invisible to the naked eye, yet it was mere hypothesis and lacked ocular demonstration. To Leeuwenhoeck, a naturalist of Holland, was reserved the honour of discovering and first describing the bacteria. This he did in his work entitled 'Arcana naturæ detecta,' printed at Delphis Batavorum in 1680. His observations were made with simple bi-convex lenses fixed in a silver mounting. In order to give a comparative estimate of their size he placed a grain of dust one-quarter of a millimetre in diameter under the same lens with the bacteria, and thus approximately measured them. In spite of instruments so crude, he was able to describe several species, and point out the great *rôle* that they play in putrefaction and decomposition. He pointed out their presence in water, in vegetable infusions, in the intestines of flies, frogs and chickens, in the fæces of man, and recognised the fact of their augmentation in diarrhœa, the first application of them to human pathology. He also demonstrated their presence in the tartar of the teeth and in saliva. It was a great event for those times, and made quite a stir in the scientific world. One does not know which to admire the more, the nicety of the results announced or the skill of the experimenter.

After Leeuwenhoeck, the study of microscopical beings was neglected for nearly a century. The diffi-

* Lecture delivered before the Alumni Association of the Philadelphia College of Pharmacy.—From the Annual Report.

culties met with in their study by means of simple lenses was enough to turn less hardy observers than Leeuwenhoeck to one side, and it was not until the discovery of the compound microscope that anything further was done towards investigating them.

It was Otto Frederic Müller who first applied the compound microscope to the study of the lower organisms, and he described and classified them in his two works. The first, 'Vermium terrestrium et fluviatilium Historia,' published in 1774; and the second, 'Animalcula infusoria fluviatilia et marina,' published in 1786. It was he who had the honour to put in order this crowd of microscopical beings, that the great Linnæus himself believed ought to be placed to one side, and for which he created his genus "choas," a veritable "*caput mortuum*," where all sorts of beings and things are jostled together.

Müller divided the bacteria into two genera: "Monads" and "Vibrios," which names are handed down to us to-day.

The species of the genus *Monas*, incompletely described and badly figured, are scarcely recognizable; two of the ten species that he includes here are certainly short, rod-shaped bacteria, bacilli. He describes thirty-one species under the genus *Vibrio*, of which, however, only six are true bacteria. The other forms are really Algæ, Desmids, and Diatoms. His *Vibrio lunula* is a Closterium; his *Vibrio acus* is an Euglena, one of the flagellate infusoria. Among the ciliated infusoria to be found in the genus *Vibrio* are the Paramœcii, the little slipper animalcules, and, of the Nematodes, the Anguillulæ.

Lamarck in 1815–1819; Bruguière in 1824, and Bary de Saint-Vincent in 1824, have confined themselves in their works to reproducing, intact or but little modified, the gifts of the Danish naturalist, so that up to the year 1833 little progress was made beyond what Müller had done in the eighteenth century.

Ehrenberg is the next to attract attention. Using perfected instruments, he made great progress in the study of microscopical beings. It was at about the time when the botanist Schleiden was carrying on his studies in plant histology—studies the result of which was to agitate the scientific world, and form the basis of what is now known as cellular structure; I refer to his discovery of the cell in 1838. These results, as well as those of Ehrenberg, were due to the rapid advance of optics, and the improvement of methods of observation.

In Ehrenberg's grand work, entitled 'Die Infusionsthierchen als Vollkommene Organismen,' we find results that are greatly superior to those of his predecessors. He separates those beings which we are considering from those which had been associated with them, although differing so greatly, and reunites them in his family of the *Vibrionia*, which he describes in the following manner: "Filiform animals, without intestines, naked, without external organs, united in chains or filiform series by the effect of an incomplete spontaneous division." This family comprehends the four following genera:—

Bacterium: Little rods, rigid, without vacillating movements.

Vibrio: Filiform bodies, susceptible to undulatory movements like a serpent.

Spirillum: Filiform bodies in an inflexible helix.

Spirochætæ: Bodies in a helix, forming a long, flexible string.

Dujardin takes the ideas of Ehrenberg and modifies them a little in his work entitled 'Histoire Naturelle des Zoophytes, Infusoires,' published at Paris in 1841. Here we find new and interesting details concerning the development of bacteria in diverse infusions and a description of the methods for obtaining and studying the different forms. The four genera of Ehrenberg he condenses into three, fusing the two forms Spirochæta and Spirillum, into one—a movement that has since been approved by many observers, the distinctive characteristics of the two genera having only a relative value of order far too slight as a basis for separation.

The results obtained at this epoch were weighty and for the most part to be preserved; certain ones have been many times confirmed and are still to be found in the best works.

The achromatic microscope was being perfected day by day, and in the hands of such able experimenters as Dujardin announced conclusions that could be considered as strongly supported, if everything was not made certain.

Up to this time the appearance of these beings so simple, these *animalcules* as they were called, in the infusions was regarded as a simple fortuitous phenomenon. At the same time very appreciable alterations in the media in question were observed, but they were far from supposing that there was a relation between these two—a relation of cause and effect. If, indeed, they sought to connect one or the other of them with the phenomenon, it was that they might cause the second to depend upon the first, thus making a law of the ancient adage, "*Corruptio unius, generatio alterius.*" And, as Leeuwenhoeck had regarded the considerable augmentation of microscopical beings in the stools of diarrhœa, so many of the *savants*, Linnæus among others, were borne by the simple views of their intellect to consider these Vibrios as the elements of contagion in many pathological states, although nothing positive had been advanced and not a single fact was forthcoming to support the entirely gratuitous suppositions. The minds of scientists were so little turned from this direction that Davaine and Rayer, in 1850, pointed out, quite simply and merely as a curious fact, and without attaching any great importance to it, the presence of rod-shaped bacteria in the blood of animals dead from the curious disease called "*sang de rate.*"

The auspicious moment at last arrived, and Pasteur appeared on the scene. He established with certainty the close connection, or the relations of cause, which unite the alterations in certain liquids, certain fermentations, to the development and to the life in the interior of the most simple living beings, the bacteria. In his work on lactic fermentation, he has laid the first certain foundation of bacteriology, by the physiological study of these beings. What he demonstrated for this fermentation he extended to others and arrived in forming that train of studies which constitutes one of the most glorious scientific achievements of France.

Guided by the principles that Pasteur promulgated, Devaine went over the observations that he had made several years previously with Rayer upon the blood of the spleen, and was able to establish, by a series of experiments, and a line of able deductions, that the cause of the malady was certainly bacteridian, as bacteria were found in great abundance in the blood of sheep ill or dead from that disease.

Pasteur has shown the way to follow, in elucidating, in all its details, a terrible disease, the ruin of the raisers of the silk worm, *la flacherie*, as it is called in French, which is manifestly bacteridian in origin. It was the first complete study of a contagious affection, and since then, from these remarkable teachings, luminous conclusions have been drawn relative to the study of maladies recognized to be of the same origin, when the same questions of contagion, of recividity, of heredity, of media, which play so great a *rôle* in the ætiology, and the pathogenesis of infectious diseases, arise.

Koch, following in the footsteps of Pasteur, has made remarkable advances in the science of bacteriology, introducing certain refinements into the *technique*

which have facilitated the study, and laid a basis for a more exact classification.

We must not forget to mention the names of Brefeld, Van Tieghem, Prazmowski, and Buchner, in connection with Koch, as they have played a prominent *rôle* in work in which he was the pioneer, and they have all been followed by able investigators in many countries.

The great feature of Koch's work was the pointing out of the advantage of a solid medium; but gelatine had already been employed by Vittadini, in 1852, and potatoes and turnips had been used in Germany.

Coze and Feltz, in 1872, showed that the profound changes in the blood, in the infectious diseases of human beings were also due to the bacteria, and they made an exhaustive study of one of the most terrible of these affections, viz., *septicæmia*.

The most beautiful application of these fecund ideas are found without contradiction in the researches upon anthrax, where men like Koch and Pasteur have exerted themselves to the utmost, and have been able to make the study of this malady the basis of the germ theory of contagious diseases.

Since then this science has advanced with a rapid stride, thanks to the labours of assiduous investigators throughout the world, among whom to be noted as the foremost, besides those already mentioned, are Chauveau, Cornil, Chamberland, and Roux, in France; Klebs, Flügge, Gaffky, Löffler, Eisenberg, in Germany; Lister, Crookshank, and Klein, in England; Sternberg, Formad, Gibbes, Shakespear, and a few others, in America.

The morphology and the physiology of the bacteria, after have been in great honour, has unfortunately been relegated to a second place, and almost eclipsed by the interest and splendour of the grand pathological gifts; and in spite of the labours of such botanists as de Bary, Naegeli, Cohn, Zopf, and physiologists like Duclaux and Pfeifer, the progress of bacteriology as a science has been slow.

Much work has been done that is useless, and many erroneous conclusions have been drawn, yet on the whole there has been laid a solid foundation, and ways have been opened along which the careful observer can reap a rich harvest.

Biology of Bacteriology.

Bacteriology is that science which has for its object the study of the unicellular non-chlorophyll bearing plants.

The Place of Bacteria among Living Beings.—Müller, Ehrenberg, and Dujardin put them in the animal kingdom on account of their mobility. Darwin, a little later, found certain species that were immobile throughout the entire cycle of their existence. Davaine placed algæ side by side with the oscillaria, to which he added beggiatoa or sulfuria. This was in 1864. Robenhorst, in the following year, divided the class into the tribe of oscillaria. Since that time the majority of naturalists are unanimous in placing them at the base of the vegetable kingdom.

How are we to recognize species among these minute beings? But first let us see what we mean by species. De Bary says:—

"By the term species we mean the sum total of the separate individuals and generations, which, during the time afforded for observation, exhibit the same periodically repeated course of development within certain imperically determined limits of variation. We judge of the course of development by the forms which make their appearance in it one after another. These are the marks by which we recognize and distinguish species."

Two things are to be considered in distinguishing species—monomorphism and pleomorphism; under the former we can place a very few species of endosporus bacteria, while the variety known as arthrosporous is especially pleomorphic.

"Wheat is not known to be wheat alone by its seed, but by watching the stem, leaf, flower and fruit grown from the seed, giving rise to another seed capable of reproducing a similar life history. For example, weeds were believed to be variations or species of wheat; but now we know definitely that weeds come only from seeds that have been produced by similar plants, and their appearance among products of wheat are to be attributable simply to an accidental introduction to the soil together with the wheat seeds, either at the time of planting or subsequently."

We also have microscopical weeds, that gain surreptitious entrance to our cultures, and often grow with such rapidity as to check the growth of those we are studying, *e.g.*: aspergillus niger, the different forms of mucor, etc.; these do not grow as variations from the original plant; they are separate species, and have a life history distinctly their own.

There are two schools of Systematists; the one that believes that all species are merely different expressions or phases of the same plant, and is headed by Billroth and Nageli (Professor de Bary, a very eminent botanist and careful observer thinks that their methods of investigation have been imperfect); the other great school represented to-day by Brefeld, Van Teighem, Koch, and Prazmowski, in Germany, and Cornill, Pasteur and Macé in France, is able to distinguish species by carefully following their course of development and life history.

The study of the life history has been made easier by the use of the moist chamber, in which an individual can be observed under the microscope ceaselessly from the moment that it has become separated from the parent form until it performs the same function itself.

The study of the colonies *en masse* upon solid media is also of great moment in their classification. This method, first introduced by Vittadinni in 1852, was used more extensively by Brefeld. More recently it was taken up by Klebs in 1873, and subsequently Koch has perhaps done more to develop this field than any one else.

General Morphology and Physiology.

Bacteria, schizomycetes, or fission fungi, may be considered as minute vegetable cells destitute of nuclei.

The word bacteria comes from the Greek *baktron*, which means a little rod or staff. As all are not rod shape the words microbe, or micro-organism are used by some bacteriologists in preference, and the word bacteria retained for a particular species.

Forms.

I. Spherobacteria. . .	Cocci—Diplo, Strepto. Sarcina.
II. Microbacteria . . .	Bacterium.
III. Desmobacteria . . .	Bacillus. Vibrio.
IV. Spirobacteria . . .	Spirochæta. Spirillum.
V. Leptothricia . . .	Crenothrix. Cladothrix. Beggiatoa. Leuconostoc.

Spherobacteria.—These are small spherical bodies that occur singly or arranged in groups of two, four, or more, and according to their arrangement have received different names; as, Diplococcus, Tetragonous, Sarcina, Staphylococcus, etc.

Microbacteria.—These are the simple bacteria, and consist of short rods, and are frequently dumb-bell shaped.

Desmobacteria (bacilli). Occur as threadlike rods.

Spirobacteria.—These are the so-called screw bacteria, on account of their resemblance to the threads of a screw. There are two forms; the flexible or spirochætæ, and the inflexible or spirilli.

Leptothriciæ.—Also called giant bacteria, on account of their great size, approaching in size and shape the hyphomycetes.

STRUCTURE.

Bacteria have been found to consist of a cell wall and cell contents; the cell wall is probably nothing more or less than a hardening of the outer surface of the cellular plasm. The membrane or outer covering can be demonstrated by reagents, such as alcohol and iodine. Of the chemical composition of the membrane little is known. It is not formed of cellulose, which separates it from the algæ and mushrooms. Nencki found the membrane of a putrefactive form to be composed of an albuminoid, mycoprotein. Neiser discovered that the membrane of the bacillus of Xerros was epithelial, and contained a fat.

Nencki says the constituents of bacteria vary according to whether they are in zoöglea, or in the active state. In the latter condition they are said to consist of 83·42 per cent. of water. In 100 parts of the dry constituents there are the following proportions:—

A nitrogenous body	84·20
Fat	6·04
Ash	4.72
Undetermined substances	5·04

The nitrogenous body is called mycoprotein, and consists of:—

Carbon	52·32
Hydrogen	7·55
Nitrogen	14 75

but no sulphur or phosphorus.

The nitrogenous body appears to vary in different species, for in bacillus anthracis a substance has been obtained which does not gives the reactions of mycoprotein, and therefore is distinguished as anthraxprotein.

The gelatinous membrane has been studied particularly in the mother of vinegar, and has been found to be a hydrocarbon, closely allied to cellulose.

In the bacillus subtilis the membrane is an azotized substance, according to the researches of Vincenzi. Among certain species that sometimes occur in ferruginous waters, like the *Cladothrix dichotoma* and *Crenothrix Kuhniana*, for example, the membrane is often coloured by the oxide of iron, reddish-brown or olive-green.

Among the chromogenic forms the membrane remains uncoloured, at least while living; it is coloured by diffusion after death.

The protoplasm appears frequently homogeneous; the bacteria then seems to be small hyaline masses, entirely deprived of granules.

In an aqueous solution of methyl-green portions are to be seen taking up the colouring matter more intensely, which can readily be mistaken for nuclei. It would seem from this that a cell is all chromotine, which, occurring more plentifully in some places, gives rise to these nucleoid granulations.

Vacuoles often occur—*Spirillum rugula* is an example—due to chemical action or heat; it is a sign of degeneration. Fat granules are often seen in the body material of the little plants.

Among forms that grow in thermal sulphurous springs, such as the Beggiatoa, fine granules are found in abundance in the interior of the cell; when submitted to polarized light, they are found to be doubly refractive, which proves their crystalline nature. Among other characters they are soluble in absolute alcohol and bisulphide of carbon; this indicates that they are sulphur.

(*To be continued.*)

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, OCTOBER 3, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE NEW EXAMINATION SCHEDULES.

AT the next meeting of the Board of Examiners the new schedules of subjects, which were drawn up with the assistance of the teaching staff and approved by the Council a year ago, will come into force, and therefore it will be appropriate in drawing attention to this fact to point out what is the nature of the change effected by their adoption. Such an explanation is the more desirable since it has been assumed that, these new schedules being more extended than the old ones, the examinations will in future be more stringent than hitherto. It is, indeed, highly probable that the prevalence of this idea may have been to some extent the cause of the increase in the number of candidates presenting themselves during the past year, and that under this impression some may have been led to go up before they were fitted to pass. This idea, however, is a very erroneous one, and it may safely be said that so far from there being any prospect of the examinations being rendered more difficult by the new schedules, the contrary should be the case. Putting aside for the moment the consideration of certain additions to the subjects in which candidates are to undergo examination, it will be found on careful comparison of the two schedules that the alteration made is essentially an amplification in detail of the statements that candidates will be required to give evidence of possessing a general knowledge of certain scientific subjects and a practical acquaintance with the technical operations connected with the business of pharmacy. On the present occasion we will confine our attention to the minor or qualifying examination by passing which authority is obtained to carry on the business of a chemist and druggist. In comparing the old and new schedules, it must also be remembered that the object of the examination is not to test the memory of candidates, but their understanding, to ascertain whether they possess such an intelligent acquaintance with the pharmacists' art and the scientific principles involved in its exercise that they can safely be permitted to carry on business on their own ac-

count without danger to the public, and at the same time with credit to the pharmaceutical body. In the absence of any uniform system of pharmaceutical education that would ensure adequate teaching and training, it has been very much a matter of accident whether apprentices are provided with proper facilities for acquiring the knowledge requisite for passing the qualifying examination, and it has been, with some reason, a ground of complaint that the examination schedules did not give a sufficiently explicit statement of what would be required of candidates before they could obtain legal qualification. It is to remove the ground for that complaint, and to meet a want which is serious in the case of those who have no teachers to advise them and direct their studies, that the new schedules have been drawn up.

In the first two subjects of the Minor examination, Prescriptions and Practical Dispensing, alterations that have been made are very slight, and the additional details specified, such as the calculation of percentages, and other quantities occurring in prescriptions, are of such a nature that candidates ought in the ordinary course of their technical training as apprentices to have become familiar with such operations as part of the ordinary routine of work in the shop. In the subject of Pharmacy the alteration is apparently much greater, but all the amplifications come under the more general, though comprehensive, statement in the old schedule that the candidate must possess a practical acquaintance with the processes by which the extracts, tinctures, and other preparations of the Pharmacopœia are made, and a knowledge of the principles upon which those processes are based. To the properly taught pharmaceutical apprentice it would have been made evident in the course of his technical training that those operations comprise evaporation, distillation, and other effects produced by heat, a number of more mechanical processes, such as filtering, dialysis, and various forms of solution and of chemical alteration. But an apprentice who has not had the advantage of acquiring practical acquaintance with the kind of work here referred to, might well be at a loss to understand what was intended by the brief statement that he would have to give evidence of his practical knowledge of pharmaceutical processes and the principles involved in them. There are not a few who are thus situated, and who learn for the first time when presenting themselves as candidates for qualification to carry on the business of a chemist and druggist, what are the requirements which they must satisfy in order to do so. To such the adoption of the new schedules cannot be other than useful as a source of information and as a means of preventing apprentices from wasting time that should be devoted to gaining a thorough knowledge of the art by which they hope eventually to earn their living. The additions to the subject of Pharmacy, as specified in the new schedule, are also of such a nature that the efficiently trained candidate need have no fear of failing to pass. He should have no difficulty in conducting the preparation of any tincture, extract, or other article of the Pharmacopœia, and it is appropriate that all candidates for qualification should be subjected to such a test. It is equally important that they should be tested as to their knowledge of the active ingredients of official preparations containing potent drugs. In the subject of Materia Medica, again, the specified demands of the new examination schedules relate to particulars of which a knowledge ought to be acquired by an apprentice in ordinary routine work. It is absolutely essential that he should be able to recognize drugs and distinguish them from one another, that he should know their active constituents and be able to detect adulteration or substitution. It should not be regarded as superfluous to have gained a knowledge of their natural history sources, of the locality whence they are derived and of their commerce.

All the subjects above mentioned are directly connected with the daily and hourly work of a well conducted pharmaceutical establishment. It is therefore scarcely possible to imagine that a candidate of ordinary intelligence, who had served his apprenticeship in such an establishment and exercised due industry, would be found deficient in his knowledge of those subjects on presenting himself for examination. So far as those subjects are concerned there should not be much need for schools of pharmacy. But in regard to the subjects of Botany and Chemistry the case is different. Much may be done by the zealous and observant student during his apprenticeship towards acquiring a knowledge of these subjects; but as a rule it can scarcely be expected that apprentices can be taught either botany or chemistry otherwise than by attending lectures and laboratory courses provided for that purpose. At present the opportunities of doing so are rare, and it is therefore the more appropriate that in regard to those scientific subjects the examination schedule should set forth more explicitly than has hitherto been done the nature of the knowledge that is expected in the candidate for qualification to carry on business as a chemist and druggist. The subject of Botany is one that is highly necessary for the practical pharmacist to be familiar with. For the recognition of plants used in medicine botanical knowledge is essential. The chief additions that have been made in this subject are the use of the microscope as a means of detecting adulterations and admixtures and the greater prominence that is given to plant physiology. Both of these are so useful in their applica-

tion to the materia medica and to a proper understanding of the conditions under which medicinal plants should be grown and collected for use, that they may be considered as comprised under the terms of the older schedule, though not specially mentioned there. The subjects of Chemistry and Physics have received a greater amount of amplification in the schedule than any others, and an addition has been made, requiring candidates to carry out practically certain operations of analysis and testing. That this is in excess of what is needed for ascertaining the qualification of persons who seek to assume the special title of chemists can scarcely be contended seriously. Formidable as the list of specified requirements in these subjects may appear to the tyro, it will serve a useful purpose if it impresses upon his mind at an early stage of his career the importance of obtaining sound instruction in branches of science from which assistance in his daily work must so often be sought. It may therefore be anticipated that the adoption of the new schedules of examination subjects may also serve to pave the way towards the establishment of a uniform curriculum of pharmaceutical education and create a demand for instruction of a kind that cannot well be given to apprentices within the limits of the shop. As regards those who intend to present themselves as candidates for examination it cannot now be said that there is any difficulty in ascertaining beforehand what will be required of them. That excuse for want of knowledge of the subjects cannot longer be urged. Nor is there any ground for the idea that the examination will be more difficult to pass in future than it has been. Those who could have passed in the time of the old schedules would be equally well able to pass after the new schedules are in force. In both instances there would be the same necessity of manifesting the possession of an intelligent acquaintance with the examination subjects. With a well-founded confidence that such is the case, the passing of the examination may be looked forward to by candidates as certain, and we venture to hope that the new schedules will do much to reduce the number of failures in the future.

The first Evening Meeting of the Pharmaceutical Society for the new session will be held on Wednesday next, at 17, Bloomsbury Square, when the Sessional Prizes and Certificates will be distributed and an Address to the Students will be delivered by Mr. Gainsford Bruce, D.C.L., Q.C., M.P. The chair will be taken at half-past eight o'clock, and students and their friends, ladies as well as gentlemen, are invited to be present.

* * *

Though somewhat late we publish this week the particulars we have now obtained in reference to the case of poisoning with "weed-killer," which occurred at Teignmouth in the early part of September. This case shows very forcibly the necessity of enforcing the provisions of the Pharmacy Act in regard to the sale of these preparations. It is astonishing to see the amount of ignorance displayed in this case. The nurseryman who sold the "weed-killer" and supplied it to a gardener in a watering pot without any warning as to its poisonous nature accounted for this omission by stating that he had no knowledge of the ingredients of the "weed-killer," or of the fact that it was a deadly poison, though it was kept in stock in large drums of a gallon and upwards and was largely supplied to gardeners. Even the medical man who attended the deceased stated in his evidence that the "weed killer" was not ranked as amongst deadly poisons, such as arsenic, etc.! Equally astonishing is the remark of the coroner expressing surprise at the poison not being included in the schedule of the Pharmacy Act. This case is also noteworthy as showing the necessity for watchfulness on the part of local secretaries of the Society, in order that the Society's public duties in regard to the protection of the public from danger arising from the improper sale of poison may be efficiently performed. It appears also that a grave responsibility rests upon the manufacturers of these poisonous preparations, and upon the wholesale dealers who supply them without any poison label or other warning to retailers who are not legally entitled to sell them.

* * *

The use of methylated spirit in the arts and manufactures still continues to increase in England and Ireland, but in Scotland there has been a decrease during the past year. The total quantity of spirit received for methylation was 3,188,306 gallons, and the increase for England was 264,205 gallons, for Ireland it was 2174 gallons, and the decrease for Scotland was 3795 gallons.

* * *

In addition to the notification already given of the commencement of courses of instruction for pharmaceutical students in the provinces, we now learn that courses of lectures on Materia Medica and Practical Pharmacy, Chemistry and Physics have been arranged for by the Leeds Chemists Association, as supplementary to the ordinary courses in Botany, Chemistry and Physics given at the Yorkshire College. These four courses will be given at very moderate fees by Mr. W. West, Mr. F. W. Branson, Professor Smithells and Professor Stroud, and they will commence on the 13th of October. Further particulars can be obtained from Mr. F. W. Branson, the Honorary Secretary of the Leeds Chemists' Association.

* * *

The first meeting of the fifteenth session of the Chemists' Assistants' Association will be held at 9 p.m. on Thursday evening next, October 8, at 103, Great Russell St., W.C., when the inaugural address will be delivered by the President, Mr. W. Lloyd Williams, A.I.C.

* * *

The session of the Edinburgh Chemists' Assistants and Apprentices' Association will be opened on Wednesday, the 7th October, with an address to be delivered by the President, Mr. John Lothian.

* * *

The first meeting of the next session of the Brighton Junior Association of Pharmacy will be held on Wednesday, the 7th October, when the President, Mr. H. W. Kilby Pears, will deliver an address.

Pharmaceutical Society of Ireland.

SPECIAL MEETING OF THE COUNCIL.

A special meeting of the Council of the Pharmaceutical Society of Ireland was held at 67, Lower Mount Street, Dublin, on Wednesday, the 23rd day of Sept., at 3 o'clock p.m.

Present: The Vice-President (Mr. Wells), Messrs. Doran, Grindley, Beggs, Professor Tichborne, Dr. Burnes, Messrs. McNeight, C. Evans, McCormack, Simpson, Merrin, Robinson, Johnston, and the Hon. Treasurer (Mr. Hodgson).

An agreement between the Society and the Registrar, *re* upper part of house, was ordered to be sealed.

A report from Mr. Payne, M.P.S.I., one of the delegates from the Society to the British Pharmaceutical Conference, was received and ordered to be entered on the minutes.

The following were elected to membership :—

Allsom, Edward Whitly, Ivy Lawn, Cork.
Beck, William Robert, 26, Clare Street, Dublin.
Black, John, 49, Dawson Street, Dublin.
Bleakley, William Maunsell, 35, Raneleigh Road, Dublin.
Bourke, William K., Castle Street, Roscrea.
Bowers, William Henry, 164, Great Brunswick Street, Dublin.
Brosnan, Denis P., Irremore, Listowel.
Burnett, John, Apothecaries' Hall, Dublin.
Curtin, John Joseph, 12, Sidney Terrace, Wellington Road, Cork.
Dowling, William, 3, Lower Castle Street, Tralee.
Downes, Robert James, 136, Lower Baggot Street Dublin.
Duggan, William Smith, 18, Castlewood Avenue, Rathmines.
Gilbert, W. R. S., Wesley Place, Ballina.
Gilmore, George, The Medical Hall, High Street, Kilkenny.
Herron, Robert Thomas, 19, English Street, Armagh.
Howard, Richard, Arklow.
Jones, Robert Alexander, Warrenpoint.
Jozè, John, 38, Arran Quay, Dublin.
Lalor, M. S., Farm Hill, Athy.
Leyburne, Edward, 35, Rathmines Road, Dublin.
Macartney, William, Bridge Street, Bangor, Co. Down.
M'Adam, Thomas James, 43, High Street, Omagh.
M'Walter, James Charles, 19, North Earl Street, Dublin.
Meyler, John Cooper Francis, 57, Ranelagh Road, Dublin.
O'Callaghan, E. J., 55, Synge Street, Dublin.
Porter, William Dempsey, 59, Phibsborough Road, Dublin.
Rousselle, Robert Joseph, 107, Grafton Street, Dublin.
Ryan, George Miles, Lower Camden Street, Dublin.
Ryan, William P., Lisnagry, Co. Limerick.
Strong, George, 71, Lower George's Street, Kingstown.
Timmon, John Patrick Thomas, Timmon's Medical Hall, Navan.
Watterson, Archibald, The Medical Hall, Athy.
Woodside, John Alexander, 6, Wellington Street, Ballymena.

Proposed by the Vice-President, seconded by Mr. Grindley.

M'Knight, Robert William, 43, Donegall Place, Belfast.

Proposed by Mr. Lyons, seconded by Mr. Montgomery.

The following were elected as associate druggists:—
Baker, Samuel, 48, Patrick Street, Cork.
Doyle, William, Athlone.
Egan, Miss Margaret M., Kilcullen.
Fagan, Thomas, Athboy.
Kirley, J., Frankford.
M'Tighe, J. J., Roscrea.
Pelan, James, Gorey.
Plunkett, George, Trim.
Wade, William, Oldcastle.

Proposed by Mr. M'Neight, seconded by Mr. Moore.

Jamison, William, Townhall Street, Belfast.

Proposed by Mr. Gibson, seconded by Mr. Rankin.

An account presented from Mr. Martin Haybyrne, for polishing furniture, £3 was ordered for payment.

The British Association for the Advancement of Science.

ADDRESS TO THE CHEMICAL SECTION.

BY PROFESSOR W. C. ROBERTS-AUSTEN, C.B., F.R.S.

The selection of Cardiff as a place of meeting of the British Association led to the presidency of Section B being entrusted to a metallurgist. It will be well, therefore, to deal in this address mainly with considerations connected with the subject to which my life has been devoted, and I hope that it may be possible for me to show that this practical art has both promoted the advancement of science and has received splendid gifts in return.

It is an art for which in this country we have traditional love; nevertheless the modes of teaching it, and its influence on science, are but imperfectly understood and appreciated. Practical metallurgists are far too apt to think that improvements in their processes are mainly the result of their own experience and observation, unaided by pure science. On the other hand, those who teach metallurgy often forget that for the present they have not only to give instruction in the method of conducting technical operations, but have truly to educate, by teaching the chemistry of high temperatures, at which ordinary reactions are modified or even reversed, while they have further to deal with many phenomena of much importance, which cannot, as yet, be traced to the action of elements in fixed atomic proportions, or in which the direct influence of the atom is only beginning to be recognized.

The development of a particular art, like that of an organism, proceeds from its internal activity; it is work which promotes its growth and not the external influence of the environment. In the early stage of the development of an industry the craftsmen gather a store of facts which afford a basis for the labours of the investigator, who penetrates the circle of the "mystery" and renders knowledge scientific. Browning, inspired by the labours of a chemist, finely tells us in his 'Paracelsus':—

> "To know
> Rather consists in opening out a way
> Whence the imprisoned splendour may escape,
> Than in effecting entry for a light
> Supposed to be without."

If it be asked who did most in gaining the industrial treasure and in revealing the light of chemical knowledge, the answer is certainly the metallurgists, whose labours in this respect differ materially from others which have ministered to the welfare of mankind. First it may be urged that in no other art have the relations between theory and practice been so close and enduring. Bacon, who never undervalued research, tells us that in the division of the labour of investigation in the New Atlantis there are some "that raise the former discoveries by experiment into greater observations, axioms, and aphorisms: these we call the *interpreters of nature*." There are also others "that bend themselves, looking into the experiments of their fellows and casting about how to draw out of them things of use and practice for man's life and knowledge . . . . . these we call the *dowry men or*

benefactors." In reviewing the history of metallurgy, especially in our islands, it would seem that the two classes of workers, the interpreters of nature and the practical men, have for centuries sat in joint committee, and, by bringing theoretical speculation into close connection with hard industrial facts, have "carried us nearer the essence of truth."

The main theme of this address will therefore be the relation between theory and practice in metallurgy, with special reference to the indebtedness of the practical man to the scientific investigator.

We will then consider—

(1) Certain facts connected with "oxidation" and "reduction," upon which depend operations of special importance to the metallurgist.

(2) The influence in metallurgical practice of reactions which are either limited or reversible.

(3) The means by which progress in the metallurgic art may be effected, and the special need for studying the molecular constitution of metals and alloys.

(1) The present year is a memorable one for chemists, being the centenary of the birth of Faraday and the bicentenary of the death of Robert Boyle. The work of the former has recently been lovingly and fittingly dealt with in the Royal Institution, where he laboured so long. I would, in turn, briefly recall the services of Boyle, not, however, on account of the coincidence of date, but because with him a new era in chemistry began. He knew too much about the marvellous action of "traces" of elements on masses of metal to feel justified in pronouncing absolutely against the possibilities of transmutation, but he did splendid service by sweeping away the firm belief that metals consist of sulphur, salt, and mercury, and by giving us the definition of an element. He recognized the preponderating influence of metallurgy in the early history of science, and quaintly tells us that "those addicted to chemistry have scarce any views but to the preparation of medicines or to the improvement of metals," a statement which was perfectly correct, for chemistry was built up on a therapeutic as well as a metallurgic basis. The fact is, however, that neither the preparation of materials to be employed in healing, nor the study of their action, had anything like the influence on the growth of theoretical chemistry which was exerted by a few simple metallurgical processes. Again, strange as it may seem, theoretical chemistry was more directly advanced by observations made in connection with methods of purifying the precious metals, and by the recognition of the quantitative significance of the results, than by the acquisition of facts incidentally gathered in the search for a transmuting agent. The belief that chemistry "grew out of alchemy" nevertheless prevails, and has found expression in this section of the British Association. As a fact, however, the great metallurgists treated the search for a transmuting agent with contempt, and taught the necessity of investigation for its own sake. George Agricola, the most distinguished of the sixteenth century metallurgists, in his work 'De Ortu et Causis Subterraneorum' (lib. v.), written about the year 1539, disdainfully rejects both the view of the alchemists that metals consist of sulphur and mercury, and their pretended ability to change silver into gold by the addition of foreign matter.

Biringuccio (1540) says, "I am one of those who ignore the art of the alchemists entirely. They mock nature when they say that with their medicines they correct its defects, and render imperfect metals perfect." "The art," he adds, "was not worthy of the consideration of the wise ancients who strove to obtain possible things." In his time, reaction between elements meant their destruction and reconstitution, nevertheless his sentence "transmutation is impossible, because in order to transmute a body you must begin by destroying it altogether," suggests that he realized the great principle of the conservation of mass upon which the science of chemistry is based. We have also the testimony of the German metallurgist, Becher, who improved our tin-smelting in Cornwall. He is said to have caused a medal to be struck in 1675, which bore the legend: "Hanc unciam argenti finissimi ex plumbo arte alchymica transmutavi," though he should have been aware that he had only extracted the precious metal from the lead, and had not transmuted the base one. This is a lapse which must be forgiven him, for his *terra pinguis* was the basis of the theory of Phlogiston, which exerted so profound an influence for a century after his death, and he wrote, "I wist that I have got hold of my pitcher by the right handle, for the pseudo-chemists seek gold, but I have the true philosophy, science, which is more precious."

At this critical period what was Boyle doing when the theory of Phlogiston dawned in the mind of the metallurgist Becher? In 1674 Boyle wrote his paper on "Fire and flame weighed in the balance," and came to the conclusion that the "ponderous parts of flame" could pass through glass to get at melted lead contained in a closed vessel. It has been considered strange that he did not interpret the experiment correctly, but he like the phlogistic chemists tried to show that the *subtilis ignis*, the material of fire or phlogiston, would penetrate all things, and could be gained or lost by them. Moreover, his later experiments showed him that glass was powerless to screen iron from the "effluvium of a loadstone." His experiment with lead heated in a closed glass vessel was a fundamental one, to which his mind would naturally revert if he could come back now and review the present state of our knowledge in the light of the investigations which have been made in the two centuries that have passed since his own work ceased. If he turned to the end of the first century after his death he would see that the failure to appreciate the work of predecessors was as prevalent in the eighteenth century as in the sixteenth. The spirit of intolerance which lead Paracelsus to publicly burn, in his inaugural lecture at Basle, the works of Galen, Hippocrates, and Avicenna, survived in the eighteenth century when Madame Lavoisier burnt the works of Stahl, but it was reserved for the nineteenth century to reverently gather the ashes, recognising that when the writers of the School of Becher spoke of Phlogiston they meant what we understand by potential energy.

If Boyle, finding that the Fellows of the Royal Society had not carried out their intention to build a "Repository and Laboratory," sought the school of Mines and came to the Royal College of Science, he would surely thank my colleague, Professor Thorpe, for his vigorous defence last year, as President of this Section, of the originality of Priestley and Cavendish, to which Boyle's own researches had directly led. We on our part, remembering Berzelius's view that "oxygen is the centre point round which chemistry revolves," would hope to interest him most by selecting the experiments which arose out of the old metallurgical operation of separating the precious metals from lead by "cupellation." When, in conducting this operation, lead is heated in the presence of air it becomes converted into a very fluid dross. Boyle had, in 1661, taken this operation as the very first illustration in his "Sceptical Chemist" in proof of his argument as to the elemental nature of metals. He would remember the quantitative work of Geber in the eighth century, who stated that the lead so heated in air acquired a "new weight," and he would appreciate the constant reference to the operation of cupellation from the close of the sixth century B.C., when the prophet Jeremiah wrote, to the work of Jean Rey in 1629, whose conclusions he would wish he had examined more closely. Lord Brouncker, as first

President of the Royal Society, had called attention to the increase in weight of the lead in the "coppels" in the Assay Office at the Mint in the Tower, and Mayo had shown that the increase in weight comes from a distinct "*spiritus*" in the air. Boyle would incidentally see that Newton had accepted office in the Mint, where he doubtless continued his experiments on calcination, begun some time before, and, as if to mark his interest in the operation of assaying, figures are represented on a bas-relief on his tomb in Westminster Abbey as conducting cupellation in a muffle. The old work merges wonderfully into the new. Chevreul, in the nineteenth century, confirms Otto Tachens' view in the seventeenth, as to the saponifying action of litharge. Deville employs molten litharge to absorb oxygen dissociated from its compounds, and Graham, by extracting occluded gases from iron and other metals, proves the accuracy of the old belief that elastic fluids can freely permeate even solid metals.

We may imagine with what vivid interest Boyle would turn, not merely to the results of Priestley's work, but to his methods. Priestley had decomposed litharge with the electric spark, and had satisfied himself in 1774 by heating red lead that the gas he obtained in his earlier experiments was really the one now called oxygen.

Boyle would see that in the period 1774–7 Lavoisier, being attracted by the "sceptical chemist's" own experiment on the heating of lead in closed vessels, overthrew the Phlogistic theory and placed chemistry on a firm basis by showing that the increase in weight of lead and tin, when heated in air, represents exactly the weight of the gaseous body added, and, finally, that Dalton having developed the atomic theory and applied it to chemistry, Berzelius made lead memorable by selecting it for the first determination of an atomic weight.

Without diverting his attention from the phenomena of oxidation, Boyle would find questions the interest of which is only equalled by their present obscurity. He would contemplate the most interesting phase of the history of chemical science, described by van't Hoff as that of its evolution from the descriptive to the rational period, in the early days of which the impossibility of separating physics and chemistry became evident, and Boyle would find that chemistry is now regarded from the point of view of the mechanics of the atoms.

Deville's experiments on dissociation have rendered it possible to extend to the groups of atoms in chemical systems the laws which govern the fusion and vaporization of masses of matter, and this has produced a revolution comparable in its importance to that which followed the discovery of the law of definite proportions, for dissociation has shown us that the true causes of chemical change are variations of pressure and of temperature. For instance, oxygen may be prepared on an industrial scale from air by the intervention of oxide of barium heated to a constant temperature of 700°, provided air be admitted to the heated oxide of barium, under a pressure of 1½ atmospheres, while the oxygen, thus absorbed, is evolved if the containing vessel be rendered partially vacuous. It will be evident, therefore, that at a certain critical temperature and pressure the slightest variation of either will destroy the equilibrium of the system and induce chemical change.

The aim of Boyle's chemical writings was to show that no barrier exists between physics and chemistry, and to "serve the commonwealth of learning by begetting a good understanding betwixt the chemists and the mechanical philosophers," who had, as he said, "been too great strangers to each other's discoveries." In view of the dominant lines of research which occupy chemists at the present time, such, for instance, as the investigations of "osmotic pressure" and of the application of Boyle's own law to salts in solution, he would feel that his hope had been realised and that, though he lived a century too soon to take part in Berthollet's discussion with Proust, he nevertheless shares Berthollet's triumph in the long delayed but now rapid development of chemistry as a branch of applied mechanics.

We need, however, no longer look at these questions from the point of view of Boyle, for our own interest in the application of chemical mechanics to metallurgy is sufficiently vivid, as instances to be given subsequently will show.

Hitherto I have mainly dwelt on questions relating to oxidation, but not less interesting is the history of the steps by which an accurate knowledge was acquired of the other great process practised by the metallurgist, the one to which Paracelsus was the first to apply the name of "Reduction." Its explanation followed naturally from the elucidation of the phenomena of combustion by Lavoisier, who in continuation of Macquer's experiments of 1771 proved, in conjunction with other workers, that carbonic anhydride is produced when the diamond is burnt in air or oxygen. Carbon has been known for ages as the most important of the reducing agents, but when, in 1772, Lavoisier heated oxide of lead and carbon together, he did not at first recognise that carbonic anhydride had been produced, simply because the volume of the gas set free was the same as if oxygen merely had been liberated. He soon, however, saw that neither the carbon alone, nor the oxide of lead alone, gave rise to the evolution of carbonic anhydride, which resulted from the *mutual action* of carbon and a constituent of the litharge. "This last observation leads us insensibly," he adds, "to very important reflections on the use of carbon in the reductions of metals." It most certainly did, and by 1815 an accurate, if incomplete, view of reduction had passed into the encyclopædias. It was seen that the removal of oxygen from burnt metals, by carbon, "give the metals," as Fourcroy and Vauquelin put it, "a new existence." Some ten years later Le Play attempted to show that reduction is always effected by the intervention of carbonic oxide, which elicited the classical rejoinder from Gay-Lussac, who pointed out that "carbon alone, and at very moderate temperatures, will reduce certain metallic oxides without the intervention of carbonic oxide or of any other elastic fluid." I mention these facts because metallurgists are slow to recognize their indebtedness to investigators, and too often ignore the extreme pains with which an accurate knowledge has been acquired of the principles upon which their processes have been based.

The importance of a coherent explanation of reduction in smelting pig-iron is enormous. The largest blast-furnaces in 1815 hardly exceeded those in use in the previous century, and were at most only 40 feet high with a capacity of 5000 cubic feet. At the present day their gigantic successors are sometimes 90 feet high with a capacity of 25,000 cubic feet. This development of the blast-furnace is due to the researches of a number of investigators, among whom von Tunner, Lowthian Bell, and Grüner deserve special mention. We are, however, forcibly reminded of the present incompleteness of our knowledge of the mechanism of reduction, when we remember that the experiments of H. P. Baker have led us to believe that pure carbon cannot be burnt in perfectly dry and pure oxygen, and therefore that the reducing agent, carbonic oxide, cannot be produced at all unless moisture be present.

Ludwig Mond, Langer, and Quincke, teach us not only that nickel can separate carbon from carbonic oxide, but the wholly unexpected fact that dry carbonic oxide can at a temperature of 100° take up

nickel, which it again deposits if heated to 150°. Mond and Quincke and, independently, Berthelot, have since proved the existence of the corresponding compound of iron and carbonic oxide, and it may safely be concluded that in the blast-furnace smelting iron this peculiar action of carbonic oxide plays an important part, and it doubtless aids the carburization of iron by cementation. It is truly remarkable that the past year should have brought us so great an increase in our knowledge of what takes place in the reduction of an oxide of iron, and in the carburization of the liberated metal. My own experiments have, I trust, made it clear that iron can, at an elevated temperature, be carburized by the diamond *in vacuo*; that is, in the absence of anything more than "a trace" of an elastic fluid or of any third element. Osmond has further shown within the last few months that the action between iron and carbon is a mutual one, for though carbon in the pure diamond form carburizes iron, the metal in its turn, at a temperature of 1050°, attacks the diamond, invests it with a black layer, and truly unites with it.

The question of the direct carburization of iron (Darby's process) by filtering the molten metal through carbon, promises to be of much importance, for at present, as is well known, two millions of tons of steel which are made in the Bessemer converter in this country alone, are re-carburized after "the blow" by the addition of spiegeleisen.

Carbonic oxide, moreover, would appear to be more chemically active than had been supposed; for during the present year Berthelot has shown that the perfectly pure gas heated to 500° or 550° produces carbonic anhydride with deposition of carbon at red heat, not by ordinary dissociation, but by decomposition preceded by polymerization. He further shows that carbonic oxide will decompose ammoniacal nitrate of silver, and thus brings it into close connection with the aldehydes.

(2) In turning to the modern aspects of metallurgical practice, we shall see that the whole range of the metallurgist's field of study is changing. It is no longer possible for him to devise a series of operations on the evidence afforded by a set of equations which indicate the completion of an operation; he has, as I have already suggested, to consider the complicated problems which have been introduced into chemistry from the sciences of physics and mechanics. He has, in fact, no longer to deal merely with atoms and molecules, but with the influence of mass. As Ostwald points out, we are reminded that many chemical processes are reciprocating so that the original products may be obtained from the product of the reaction. The result of such opposed processes is a state of CHEMICAL EQUILIBRIUM, in which both the original and newly-formed substances are present in definite quantities that remain the same so long as the conditions, more especially temperature and pressure, do not undergo further change. Again, in very many metallurgical processes, reactions are rendered incomplete by the limitations imposed by the presence of bodies which cannot be speedily eliminated from the system, and the result may be to greatly retard the completion of an operation. The time has come when the principles of dynamic chemistry must be applied to the study of metallurgical problems if they are to be correctly understood, and it is, moreover, necessary to remember the part played by the surface separating the different aggregates in contact with one another. When, for instance, a reaction has to take place accompanied by the evolution of gas, there must be space into which the gas can pass. The rate, therefore, at which change takes place will obviously depend on the state of division of the mass.

One of the most remarkable points in the whole range of chemistry is the action engendered between two elements capable of reacting by the presence of a third body. It may be, and this is the most wonderful fact of all, that merely a trace of a third body is necessary to induce reaction, or to profoundly modify the structure of a metal. H. Le Chatelier and Mouret have pointed out that in certain cases it is inaccurate to say that the third body causes the reaction to take place, because, after it has destroyed the inter-molecular resistances which prevented the reaction taking place, the third body ceases to intervene. This is apparently the case when platinum sponge effects the union of oxygen and hydrogen, or conversely, when very hot platinum splits up water vapour into its constituent gases. Future investigation will, it is to be hoped, show whether the platinum does not exert some direct action in both cases. We can no longer neglect the study of such questions from the point of view of their practical application. The manufacture of red-lead presents a case in point. In "drossing" molten lead, the oxidation of the lead is greatly promoted by the presence of a trace of antimony, and conversely, in the separation of silver from molten lead, by the aid of zinc, H. Roessler and Endelmann have recently shown that aluminium has a remarkable effect in protecting the zinc from loss by oxidation, and, further, the presence of one-thousandth part of aluminium in the zinc is sufficient to exert this protecting action on that metal. I am satisfied that if metallurgists are to advance their industrial practice, they must, if I may use such an expression, persistently think in calories, and not merely employ the ordinary atomic "tools of thought." They will then be able to state what reactions can, under given conditions, take place; to indicate those which will be completed; and to avoid those that are impracticable.

(*To be continued.*)

Chemists' Assistants and Apprentices' Association of Victoria.

ADDRESS BY MR. SIDNEY PLOWMAN.

The *Australasian Journal of Pharmacy* for August contains an account of the proceedings at the opening of the session of the newly-formed Assistants and Apprentices' Association of Victoria. At this meeting, which was held in the College of Pharmacy, Melbourne, the President, Mr. Sidney Plowman, delivered a most interesting Inaugural Address, from which the following passages are taken:—

The first object of your Association, as set forth in your rules, is to advance pharmaceutical research. One is compelled to admit that so far in Australia pharmaceutical research has not been much advanced. It would be almost too much to expect that you will at once become discoverers and inventors; still, if we look upon what is being done in the old country, we find that there have been—and are now—associations of chemists' assistants contributing largely to the fund of general knowledge. For instance, in London there are the Chemists' Assistants' Association and the School of Pharmacy Students' Association. In Edinburgh there is also a Chemists' Assistants' Association. Most valuable contributions from each of these are from time to time published, and the London Association actually publish an annual volume of their proceedings. And here, again, I must emphatically state that these various associations are largely supported by the employers; that, far from being a cause of disunion, they have promoted a friendly feeling between employers and *employés*.

With regard to the promotion of pharmaceutical research, is it not remarkable that, considering the vast extent of our island-continent, so comparatively few

remedies derived from plants indigenous and peculiar to Australia have been introduced into practical use? The chemistry of a few drugs has been worked out, but these drugs are chiefly derived from plants growing in the more northern parts of the continent

The study of the pharmacology of Victorian plants has certainly not made much advance. In all probability there are in the colony many indigenous plants containing principles having properties entitling them to a place in the British Pharmacopœia. I would recommend that you endeavour to isolate active principles from promising indigenous plants, and to determine their physical and chemical properties. Further pharmacological research on them can be then taken up by physiologists, and their value as remedial agents ascertained. The experimental growing of medicinal plants is a pursuit which you might with advantage follow. I believe the climate and soil of Victoria are peculiarly suited for the growth of most medicinal plants and for the development of their active principles.

Speaking of the B.P., I would recommend that you raise your voices, not only for the addition of valuable drugs and preparations, but for the excision of those that are needless. If I had the power I would reduce the size of the book by one quarter at least.

Why should aq. laurocerasi be retained? Its strength varies according to the age of the leaves and the season at which they are gathered. In acid. hydrocyan. dil. we have a perfectly definite compound, and still we go to the trouble of distilling cherry laurel leaves with water to produce an indefinite preparation which has to be made up to ·1 per cent. HCN with the diluted hydrocyanic acid, or to be let down to the same strength with water to meet the official requirements. The small quantity of volatile oil in the preparation is, in my opinion, of absolute unimportance. Again, its full dose is in two fluid drachms. This dose compares very remarkably with doses of other aquæ, and on this account, also, I consider it should cease to be an official "aqua."

Canella bark we are all familiar with as an ingredient in hiera picra; but why should the Pharmacopœia give an elaborate description of it, and demand that the corky layer shall be removed, etc., for the sake of putting sixty whole grains of it into one pint of vinum rhei? Vin. rhei may be a valuable preparation; but I ask how many of you have seen it prescribed, and who has ever been known to have derived benefit from it. Confections are popularly supposed to be things which can be freely eaten with a spoon, but the first confection in the B.P. is confectio opii, the full dose of which is only twenty grains. Considering that there are twenty-six other official preparations of opium we might well do without this dangerous one. Again, take decoct. sarsæ and decoct. sarsæ co. The full dose of each is half a pint. If the preparations are of the least value it is admitted that they must be continued for an indefinite time, in order that they shall act as "alteratives" (whatever that may mean). The idea of drenching a patient with half a pint of physic three times a day for some months is too absurd. The belief in the necessity of a temperature of 120°. F. for the water in making infusum chiettæ and inf. cuspariæ, the horrible messiness of infusum cusso, the huge joke of mistura ferri aromatica might well be discussed at your meetings. In the last preparation metallic iron is actually digested for three days in peppermint water with certain aromatics and astringents, with the result that as much as one whole grain of tannate of iron is contained in sixteen fluid ounces of the dirty fluid called an "*iron*" mixture.

Emplastrum ferri, emplastrum picis, and pix burgundica itself could be parted with without much loss to anyone, and custom might be set aside by which inert chlorophyll is carefully separated, and then as carefully re-inserted to form the green extracts. Mulberries, figs, prunes, syrup of mulberries, syrup of orange flower, and the like might very well be expunged when we consider that new and really active remedies are constantly being discovered, and that we run some risk of making our national Pharmacopœia a most unwieldy volume. I have only touched very lightly upon the excrescences of the B.P., but I wish you to understand that in making these criticisms I am not finding fault with the B.P. as a whole.

I have examined many other pharmacopœias, and I consider that ours will compare favourably with any in existence. At the same time, it is capable of improvement, and it is partly for you to indicate, if possible, where it may be improved, where excisions may be made, and where additions may be profitably inserted. But I think that the nomenclature of the Pharmacopœia is capable of improvement. For instance, we have liquor ammoniæ acetatis fortior and liq. ammoniæ acetatis; we have liquor plumbi subacetatis and liquor plumbi subacetatis dilutus. In the one case the past participle indicates a dilute preparation, and in the other the comparative adjective shows that the stronger preparation is meant. In the meantime the preparation without the qualifying adjective or participle is, at first sight, indefinite. I think it is desirable that whenever there are two preparations having the same name, but of different strengths, *each* should have a distinctive term applied, such as "fortior" and "mitior," or "dilutus." This and similar subjects might well be discussed at your future meetings.

I have thus far spoken about your first object—viz., the advancement of pharmaceutical research. Possibly I ought to have spoken about education first, because, ordinarily, education precedes research. I must confess that recently I have heard a great deal concerning the over-education of chemists. I have heard it stated that it is absurd to compel a young man to go through a year's training at the College of Pharmacy when his future energies will be probably limited to a business up country, with a gross return of a few hundreds a year. My reply to such a statement is this—that the compulsory training is especially valuable to such a one. At a very small expense he can have a working bench; he can test every chemical on his premises; he can make a large proportion of his galenicals; he can standardize such preparations as ext. nuc. vom. and ext. opii, and can be usefully and profitably employed instead of spending his ample leisure time in growling at the powers that be because they do not give him every possible advantage over his fellow men.

Another aspect of the education question is this. Unless just cause be shown, how can any body of men claim protection and privilege from the State? At present you have a law which enforces a certain amount of attendance at lectures, etc., on the part of students, and provides a protection for certain titles, and restricts the sale of a few poisons to those who have passed the examinations of the Pharmacy Board. Is this sufficient? I say distinctly, no! The educational system is undoubtedly the best in the Southern Hemisphere, the protection of titles is satisfactory as far as it goes; but I do say that, besides the restriction of the sale of certain poisons, the dispensing of all prescriptions and the sale of *really* active drugs should be entirely confined to qualified pharmaceutical chemists, or their assistants acting under their direct supervision.

But before such a privilege can be granted by the State you must give a *quid pro quo*. I place before you the fact that you can only obtain such extra privileges by showing that you are entitled to them by your training as apprentices, by your undergoing the

compulsory education prescribed for you, and by the subsequent prosecution of your scientific work. It is the subsequent work which is the most important. The mere attendance at lectures and the passing of the examinations of the Pharmacy Board, are as nothing unless you individually follow up the work. I believe that many students look upon attendance at lectures here as a process that must be gone through, and are absolutely indifferent as to what pabulum is placed before them. They say, or they think, "We shall get over it somehow, like the measles, and then we will go to a crammer. We will pass the examinations and then we will make money, if possible." Surely there is something nobler than this to be done? Let anyone examine the British Pharmacopœia of to-day. He will find positive marvels. I say this advisedly. The lamellæ are simply astonishing. Each lamella weighs only $\frac{1}{50}$ of a grain, and in the case of lamellæ atropinæ the quantity of active principle in each is only $\frac{1}{5000}$ gr.; lamellæ cocainæ contain $\frac{1}{200}$ gr. of cocaine, and lamellæ physostigminæ contain but $\frac{1}{1000}$ gr. of physostigminæ or eserine. Hundreds of these can be carried in the watch pocket beneath the watch and still the first will dilate the pupil of the eye so that the fundus can be thoroughly explored. The second will cause absolute anæsthesia of the conjunctiva, so that superficial operations can be performed upon the eye, and foreign bodies can be removed with the utmost deliberation; while the last will cause contraction of the pupil, and perhaps give the necessary, or, at least, temporary relief in acute glaucoma, a disease which, if left alone, almost invariably ends in total blindness. Bearing these facts in mind, should you not endeavour to acquire a thorough knowledge of your work, to be *au courant* with the last pharmaceutical developments, and possibly by your combined chemical and pharmaceutical knowledge add to our list of really active remedies?

I am sorry to have to remark at this point that there is a feeling that chemists are not quite so conscientious as they might be in the making up of prescriptions.

I firmly believe that this feeling is without foundation; but the only way for you, as the coming generation, to overcome this feeling is to personally test every chemical in your establishment, to make every galenical that can be made profitably, to look upon exactitude as a religion, and so to become pharmaceutical chemists in deed as well as in name.

If you do this you will find that, considered on the lowest ground, it will pay. You will find that if prescribers know that they can obtain exactly what they order for their patients, they will rather write a prescription in which there is an intelligent desire to combine certain remedies for a definite purpose than to order, say, syrup of the tungstates, vanadates, and osmates, the precise composition of which is quite unknown. The art of dispensing and the art of prescribing go hand in hand, and if those responsible for the dispensing fail in their duty, and only look at the acquisition of pounds, shillings, and pence, the art of prescribing will also decay, and we might, in the future, see prescriptions such as this—

℞ Pil. X Y Z (A. B. and Co.)
1 t.d.s
Syr. Phosph. Vanadates, Tungstate and Osmates.
(M. N. and Co.)
℥ss b. d. ex aquâ.

But, on the other hand, if the pharmacist of the future rises to the occasion, and shows that he is of absolute integrity as regards his drugs and chemicals—that he is a man of education and culture, he will be properly consulted by the medical man as to the proper combination of medicines, and he will, still more than now, be looked up to by the public at large. By such means we may even hope to see a golden age when there shall be universal intelligent prescribing and faithful, intelligent dispensing, and when the Victorian pharmaceutical chemist shall be a true compounder and not a mere vendor of parcels put up in another country and vouched for as panaceas for all the ills that flesh is heir to.

I have spent so much time upon the first object of our Association that I have some hesitation in touching upon the remaining ones. But I think that no one can object to the promotion of friendly and social intercourse beween the members of this Association. Chemists, as a rule, are solitary men, and if you can by your periodical meetings break down the barriers existing between you as assistants, I believe you will form lasting friendships, which will be a source of consolation and happiness during the whole of your future lives.

The remainder of the objects of the Association are of a purely business character, but I desire to call your attention to section D of rule 2 which reads as follows: "To establish a contributors' box for the reception of questions of pharmaceutical interest, such questions to be debated upon at once, if practicable, or to be submitted at a future meeting for discussion."

This is really an invitation to every member, whether he be an assistant or apprentice, to submit to the meetings of the Association any difficulty he may meet with. I do hope that every member will, as occasions arise, respond to this invitation and afford matter for discussion.

I have in my previous remarks stated that you have by your general demeanour shown the greatest possible friendliness to your employers; but I am bound to state—and I state this quite as an individual—that when you become employers yourselves you might bring about some reforms in the ordinary conduct of your business. A pharmaceutical chemist must always be at the beck and call of the public, but I do think that by common agreement the ostensible shop hours might well be shortened. I know that custom is stronger than law; but I think that you might, when you enter into business for yourselves, endeavour to depart from the custom of open Sunday trading. I cannot see any reason why a pharmaceutical chemist, who aspires to be considered a professional man, should on Sunday appear to compete with confectioners and the like for the sale of lozenges, etc.

Before I conclude I must give you a few words of exhortation. If we look at the earliest London Pharmacopœia, we find that the following were official:—Antidotus contra venena et pestem, with some 150 ingredients; urina hominis and dog's excrement, under the euphemism of album græcum. To-day we have the lamellæ, to which I have already alluded. Here is progress indeed. Of late years the progress has proceeded in an increased ratio. Will you be content to sit with folded hands and calmly look on while others do the work? I trow not. I believe the formation of this Association will indicate the beginning of the time when the pharmacists of Victoria shall of their own right take their place in the front ranks of the scientists of the day.

Parliamentary and Law Proceedings.

Poisoning by Carbolic Acid Dispensed as Black Draught.

An inquest was held by Mr. H. Cuthbertson, coroner, on Tuesday, the 22nd Sept., at the County Asylum, Angelton, near Bridgend, Glamorganshire, touching the death of Dinah Jenkins, aged 36, the wife of the lodgekeeper, who had died from poison on the previous Sunday.

David Jenkins, the husband of the deceased, said his wife first complained of a cold on the Tuesday, but

she did not take to her bed at all. On Saturday night Dr. Marshall told witness to come over to the surgery and that he would give him a bottle of medicine. He received a bottle and his wife took a dose at half-past ten and another at about one o'clock. The same night Dr. Marshall gave him a bottle to go to the store to get a 2 oz. dose of black draught and directed him to let his wife take it at about half-past six the following morning. Witness went to the store that night about half-past ten. He gave the bottle empty to John Davies and asked him for two ounces of black draught. Davies filled the bottle and handed it him back. It contained some dark stuff. Davies was deputy head-attendant, and had charge of the store. He stopped talking with Davies a few minutes, and then left. Witness did not enter the store-room, but remained outside, and did not see Davies fill the bottle. On Sunday morning, at about half-past six, he emptied the contents of the bottle into a medicine glass to give to his wife. His wife complained of feeling sick and was not inclined to take it. He put the glass on a table near the bedside and told her not to sup it but to drink it up at once. He then went to the kitchen and returned in about three minutes to see if she had taken it. She had not done so, and he told her she had better take it before he went—he was going on duty. She caught hold of the glass and drunk it off at once. Immediately after she said, "Oh, dear, there is carbolic in it," and complained of a great burning in her throat. He caught up the glass and smelt it. He ran out and said to an attendant who was passing, "John, there's something wrong about this draught." The attendant smelt the glass and said "There is carbolic in it." Witness went to the stores and asked John Davies if he had not made a mistake in giving him the draught the night before. He opened the cupboard and looked round, and said he was afraid he had, and told him to send for the doctor at once. Witness sent one of the attendants for the doctor and went back to the house. Dr. Marshall came. His wife died between eight and nine o'clock. When he got back she was unconscious. Witness did not smell the stuff when he poured it into the glass.

The Coroner, pointing to the jar, said there was no label "Poison" on it. It had no business to be kept in any store without a big label marked "Poison" on it.

Witness, continuing, said the store was lighted by gas, and the cupboard was about three yards from the gas. Davies was a total abstainer.

John Davies, deputy head attendant, said he had been employed at the Asylum about twenty-three years, and had had charge of the store about seven or eight years. He did not act as a dispenser, but simply gave out medicines from the store from time to time as they were required. On Saturday night David Jenkins came to the store at about half-past ten and asked for a black draught. He handed him a 2-oz. bottle. Witness filled it with what he believed at the time to be a black draught and gave him the bottle back. The hand bottle from which the black draught was usually taken was empty, and he had resort in this instance to the store jar. This was kept in the same compartment of the cupboard with another jar containing carbolic acid. The draught was always kept in the outermost jar and it was from this he filled the bottle. He did not look at the label. The cupboard had been cleaned, and the only way he could account for the mistake was that the bottles had somehow changed places. Turpentine was also kept along with the jars. Had the jar been largely labelled "Poison" he would have easily seen it. Both liquids were of the same colour. He did not possess the sense of smell.

Dr. Pringle, medical superintendent, said he was summoned to the deceased at about half-past seven Sunday morning. When he got to the door of the lodge he was told that she was dead. On going in he found that she had begun to breathe again. He caused 2oz. of whiskey to be administered and afterwards some ammonia. She revived somewhat and the pulse came back to the wrist, but after a little time the pulse again failed and she gradually sank. Before witness arrived Dr. Marshall had administered emetics. He made a *post-mortem* examination and he certified that the cause of death was poisoning by carbolic acid. He was not aware that any carbolic acid was kept in the head attendant's store. He had a special place for carbolic acid made some years ago in the engineer's yard, of which the engineer alone had the key. He did not know that turpentine was kept in the same compartment. A patient used to clean out the stores; he had been discharged, having recovered, a few weeks since. John Davies was an absolutely steady person, and he believed that he had not tasted drink for fourteen or fifteen year.

The Coroner: None of the jars containing poison are labelled poison.

Dr. Pringle: No.

In reply to a juryman, who asked whether he thought Mr. Davies, who was devoid of the sense of smell, was a fit person to give out medicine, he said Davies had been employed there twenty years and he had never heard of anything of that kind taking place before, and he had given out thousands of bottles of medicine.

By the Coroner: A similar quantity of turpentine would have proved exceedingly dangerous.

Richard Lewis, messenger boy at the Asylum, said he last cleared out the cupboard where the jars were contained about three weeks since. He did not remember as to how he replaced the jars.

The Coroner said there was no doubt that the affair was quite an accident. But it appeared to him there was a very lax system in the place. He considered if there were medicines to be dispensed that a proper dispenser ought to be employed to do the work and not an attendant. He did not think either that it was right or proper that carbolic acid, turpentine, and other poisons should be kept with medicines. Neither did he consider that boys ought to be allowed to clean out these cupboards and interfere, and he did not think that jars containing poison should be simply labelled as to their contents, but should also be labelled "Poison." Dr. Pringle had admitted that he was not aware of these things. It seemed a very odd thing to him (the Coroner). He ought to have known it. He did not know that turpentine was kept there, and he said that the same quantity of turpentine as the carbolic acid that had been taken would probably have killed the woman. He considered it very lax that things should be so. All these matters would be inquired into later on by the commissioners. Of course death was accidental, and he should advise the jury to make the following recommendations, that carbolic acid and other poisons should not be kept, in the same place with medicines; that all jars and bottles containing poison should be properly labelled, and that a proper dispenser ought to be kept, instead of the duties being relegated to an attendant.

The jury returned a verdict of "Accidental Death," and adopted the recommendations.

Poisoning by a Weed-Killer.

An inquest was held at the Teignmouth Infirmary on the 15th ult., before Mr. Sidney Hacker, concerning the death of a boy named Milton, aged nine years, who had died from poisoning.

It appeared from the evidence that on the previous day a man, named Mear, in the employ of a nurseryman, had been sent to a customer with a gallon of "weed-killer," contained in a watering-can. Whilst resting on the way, his attention was diverted, and

during that time the deceased came up behind him and drank from the spout of the can under the impression that it contained water. The boy was taken to the infirmary, where he died shortly afterwards.

Frederick Hannaford, nurseryman, stated that on the day in question a customer came to his shop and ordered a gallon of weed-killer, to be sent that afternoon. It was his custom to keep it in stock in various size drums, from a gallon upwards, but not having a gallon can in stock the liquid was drawn into a watering can from a large drum. The boy was told to apologize for its being sent in that manner. Witness had no knowledge of the ingredients of the weed-killer. He did not know it was a deadly poison. The drums were labelled "weed-killer," and the liquid was considered to be harmless to poultry, etc. It was generally kept by gardeners and used from watering pots.

Dr. Frederick Blucke said that on Monday afternoon the deceased was brought to the Institution, where he received prompt attention. He was conscious and had vomited a good deal before he reached there. Witness cleansed the boy's stomach, and he seemed to rally a good bit. Witness then went for further aid and on his return the child was dead. A post-mortem had been made, and the contents of the stomach and can analysed, both of which corresponded. Deceased must have taken a large quantity, and the fluid was absorbed before he reached the Infirmary. The weed-killer was not ranked amongst deadly poisons, such as arsenic, etc.

The coroner commented on the poison not being included in the schedule of the Pharmacy Act, and said that steps should be taken to prevent its being sold in the manner described.

The jury returned a verdict of accidental death, caused by drinking weed-killer.

Obituary.

Notice has been received of the death of the following:—

On the 22nd of September, Mr. Thomas William Harrison, Chemist and Druggist, Norman Street, New Hendon, Sunderland. Aged 51 years.

On the 22nd of September, Mr. Richard John Weatherley, Chemist and Druggist, Ambler Road, Finsbury, N. Aged 40 years.

On the 24th of September, Mr. Philip Martin Rowe, Chemist and Druggist, Lyme Regis. Aged 55 years.

On the 25th of September, Mr. John Perry Mills, Chemist and Druggist, Wellington, Somerset. Aged 42 years.

BOOKS RECEIVED.

NOTES ON NEW REMEDIES, including those in the Additions to the British Pharmacopœia of 1890. Compiled by E. B. SHUTTLEWORTH. Toronto. 1891. From the Author.

CONTRIBUTIONS TO PRACTICAL MEDICINE. By Sir JAMES SAWYER, Knt., M.D., etc. Second Edition. Birmingham: Cornish Brothers. 1891. From the Author.

THE PRACTICE OF HYPNOTIC SUGGESTION. By GEO. C. KINGSBURY, M.A., M.D. Bristol: J. Wright and Co., 1891. From the Publishers.

THE FUTURE WATER SUPPLY OF BIRMINGHAM. A Lecture. By THOMAS BARCLAY, Birmingham: Cornish Brothers. From the Author.

MANUALE PHARMACEUTICUM SEU PROMPTARIUM. By Dr. H. HAGER. Sixth Edition. Parts XI. and XII. Leipzig: E. GÜNTHER. 1892. From the Publisher.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

EXTRACTS OF NUX VOMICA AND OPIUM.

Sir,—In reply to Mr. Cripps's letter contained in your last issue, I may say that my objection to standardizing the extract of nux vomica by means of an extract prepared from the exhausted marc by a weaker menstruum is that it introduces mucilaginous matter into the extract. This, as pointed out by Mr. Cripps, renders the separation of the alkaloids in the assay process more difficult, and there is the further disadvantage that it does not produce so clear a tincture. My objection is perhaps however more in the nature of a preference for my own plan, which is not only suitable for this extract, but for extracts generally, and so far as I know, is the only plan yet suggested for general use in standardizing extracts.

I am pleased to be supported by Mr. Cripps in reference to the alkaloidal strength of opium, and trust that the official standard will be raised in the next issue of the British Pharmacopœia.

Liverpool. M. CONROY.

LOZENGES.

Sir,—Mr. Davis's paper in last week's Journal brings to my recollection an incident that occurred some eighteen months ago.

A noted west end physician ordered in a prescription some pastilles of codeine or cocaine, I forget which; and appended the name of an equally well-known west-end firm.

I was obliged, therefore, to keep my customer waiting while a supply was obtained, and when they arrived, I was amazed to find the pastilles were made of the usual gelatine and glycerine basis, the sheet cut across diagonally with a knife, and so carefully that the pastilles were of various weights, the heavier nearly double the lighter! Now had this worthy physician left the making of these pastilles to any chemist worth his salt (and presumably specially trained to such an end) his patient would have received the pastilles with the least possible loss of time, and what is more each pastille would have contained the fraction of a grain indicated.

PHARMAKOS.

A DISPENSING QUERY.

Sir,—I had the following prescription to dispense a week ago:—

℞	Potass. bromid.	gr. iv.
	Tinct. belladon.	♏ iv.
	Glycerin.	♏ v.
	Aq. ad	℥ij.

Ft. M.

Night and morning.

Mitte . . . . . ℥vi.

After being kept a day or two the mixture suddenly burst the bottle. Can any of your readers give me any explanation on the point?

Market Place, Louth. A. BELLAMY.

Associate asks opinions on the making of aërated waters by the "liquefied carbonic acid process."

Poisons.—Part III. of the series appeared in the *Pharmaceutical Journal* for January 17 last.

Mr. D. Jenkins is thanked for his communication.

"*Student.*"—Apply for a prospectus to the Dean of the School, 17, Bloomsbury Square.

Querist.—According to the Spirits Act, 1880, section 130, subsection *c*, it is unlawful to use any methylated spirit, or any derivative thereof in the preparation of any article capable of being used wholly or entirely as a beverage or internally as a medicine.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Alcock, Abraham, Wright, Scanlan, Kirkby, Nichols, Apprentice.

INTRODUCTORY SESSIONAL ADDRESS

DELIVERED AT THE

COMMENCEMENT OF THE FIFTIETH SESSION OF THE SCHOOL OF PHARMACY,

October 7, 1891,

BY MR. GAINSFORD BRUCE,

D.C.L., Q.C., M.P.

My first duty is to offer my congratulations to those who have received prizes to-day. You have begun well. At the very outset of your career you have proved that you take an intelligent interest in the technical studies connected with your business, and that you possess the industry, energy and perseverance without which no real success in life can ever be gained. May the prizes you have won be but an earnest of the success which you will reap hereafter. Be assured that an accurate knowledge of all that is necessary to proficiency in business, if combined with industry and integrity, is the sure road to success.

I observe from the board which is placed there, that in the year 1863, your distinguished President was a Pereira medallist. I hope that some twenty-five years hence, or perhaps sooner, one of the prizemen of to-day may fill the same distinguished position your President now occupies, and may we all be there to see. And now may I add a word to those who have striven for prizes and have not been successful. You may be disappointed! But if the disappointment nerves you to renewed study and further effort it may prove to you a most precious experience. As it is the battle that makes the soldier, so it is determined effort that makes the man. One of the first of the lessons of life is to learn to endure defeat and to turn failure into success.

I hope that before long means may be found to establish as a prize a research scholarship, so that those students who have proved themselves to be skilful chemists may have the opportunity of being enabled to continue their studies for a longer period, and at the same time render assistance, under the direction of your professor in the Research Laboratory.

I occupy to-day the place which on former occasion has been filled by distinguished men of science, by eminent members of the medical profession, by noted chemists and experienced pharmacists.

On this occasion you have honoured with an invitation to address you, one who is a mere layman, who has no knowledge of the mysteries of prescribing or compounding, who is one of the public outside of you, and I hope I do not draw any unwarrantable inference when I regard this circumstance as an indication that you recognise the public interest as one of the objects which your Society must ever keep prominently in view. Your charter has constituted your Society a public body, Parliament has confered upon it public duties, and I am sure that you have no wish to limit and confine the scope of your action to the narrower concerns of trade or profession. Not that I conceive the interests of the public to be at variance or inconsistent with the obligation of watching jealously over the welfare of all those who follow your occupation, of defending their rights and of seeking to advance their status. The two may well go hand in hand, the interests of your business and the interests of the public are I believe the same. A prudent and enlightened regard for the protection and welfare of your trade will tend to secure to the public the services of honourable, intelligent and skilful pharmacists. The apothecary in penury, the occupier of a "needy shop" upon whose back "contempt and beggary hang," is not likely to minister honestly or efficiently to the public wants.

Although it is with reference to the aspect of your work which concerns the public that I should chiefly insist, yet I cannot forbear saying a few words about the advantage which I conceive must always accrue to the members of a profession or trade from their uniting together with a view to advance their common interests and to preserve amongst themselves a high standard of character and acquirements. The old maxim *union is strength*, when applied to such societies, expresses a truth which not even a politician will venture to impugn. It is my good fortune to belong to a profession which has always been distinguished for the close union existing amongst its members, and I feel confident that the profession of the bar would not have attained its high position had it not been that its most eminent and distinguished members have always been in sympathy with and ready to extend their support to the most humble of their brethren. It is when men following a common pursuit recognize it as a bond of fellowship that they become actuated by a general desire to uphold and advance whatever is most excellent and worthy in the work in which they are engaged. The character and reputation of their calling become a common property, which all the members of the calling are interested in seeking to enhance, the youngest feels a pride in the success of the most experienced, and any unfortunate incident that may affect the fair fame of one is felt by all to be a reproach to the whole. The cultivation of this feeling tends to maintain a high standard of conduct, to extinguish ungenerous and unfair rivalry, and to extend whatever may enlarge the usefulness or add to the dignity of the general body.

In old days in England it was the policy of those who administered our law to recognize the advantage of conferring upon the members of a trade powers to form themselves into a guild in order that they might better promote their business

and protect the public against bad materials and careless workmanship. Some of these old guilds still flourish and are now rendering most valuable service in affording to young men seeking to join a craft means of efficient education in the numerous methods of working which science has discovered. History has come back upon itself, and society is endeavouring now in various ways to fulfil the example set us by our forefathers centuries ago. There is hardly a body of traders, or handycraftsmen, or labourers, and I may add of capitalists, who do not feel the advantage of uniting themselves together for the purpose of promoting the interests of their occupation. Some of these societies have no doubt been formed on very narrow lines, and their usefulness has often been interfered with by stupid political prejudices, and their energies have sometimes been misdirected by ignorant or selfish leaders, but I think no candid person can deny that on the whole good has resulted from trade alliances, and wherever the action of the trade has been guided by wise and prudent counsels the public have been the gainers. But the usefulness of any such society must always, to a very large extent, depend upon the spirit in which its affairs are administered. I am glad to know that your Society is directed by a Council composed of men of great public spirit, guided by broad and enlightened principles, whose main object is to raise the standard of knowledge and skill of those engaged in pharmacy, and to secure every guarantee that the resources of science can afford for the genuineness and purity of the drugs supplied to the public.

Your Society cannot claim an ancient history. It was established just fifty years ago, and its Charter was granted in the year 1845. But you have made up for the absence of old renown by the activity and vigour with which you have in recent years prosecuted the objects for which you were incorporated. Your Charter became necessary when the apothecaries established their right to practise as general medical practitioners. At one time the apothecaries and the grocers seemed to have been incorporated in one company, but in the thirteenth year of James I. the apothecaries obtained a separate charter and became a distinct body. In a well-known case, the College of Physicians *v.* Rose, the apothecaries established their right to attend patients and administer medicines to them, and in the year 1815 an Act was passed for regulating the practice of apothecaries throughout England and Wales. The apothecary after this soon ceased altogether to be a mere dispenser of medicine, and it became necessary to recognize the calling of a chemist and druggist as a separate business, and to confer upon the pharmaceutical chemist a legal status.

Your Society was established according to the language of your Charter, for the purpose of advancing chemistry and pharmacy and promoting an uniform system of education of those who should practise the same, and also for the protection of those who carry on the business of chemists and druggists. In the year 1852 an Act was passed for regulating the qualification of pharmaceutical chemists, and in 1868 another Act was passed, which made it unlawful for any person to keep open shop for retailing, dispensing, or compounding poisons unless he should be a pharmaceutical chemist or a chemist and druggist who should have been in business before the passing of the Act, or a person duly registered according to the provisions of the Act of 1852 or 1868. The practical result of these provisions is that with the exception of those who were actually engaged as chemists and druggists prior to 1868 no one can dispense or sell poisons who has not satisfied your Boards of Examiners that he has competent experience, knowledge and skill. As poisons form ingredients in many of the medicines in common use, it has become impracticable for any one to carry on business as a chemist or druggist unless he is authorized to dispense poisons, so that the Legislature has in effect provided that those dispensing medicines shall be persons of education and duly qualified for their work. The responsibility of testing the education and skill of candidates rests with your Society, and the bye-laws regulating the examinations are made by your Society pursuant to the powers conferred by Act of Parliament, and are subject to confirmation and approval by Her Majesty's Privy Council.

The question of examinations offers a fertile theme for discussion. The examinations conducted by your Boards of Examiners are, to a large extent, of a practical character, for the candidates are required to go through the actual work of making up medicines from prescriptions, and their knowledge of drugs is tested by specimens produced for their inspection and examination. But whatever care may be taken, and whatever precautions may be adopted, there are some subjects which must be included in your examination with reference to which an examination alone cannot give certain or satisfactory results. I believe it to be quite impossible for the most careful examiners always to be able to distinguish between honestly acquired permanent knowledge and that superficial and fleeting acquaintance with a subject which is the result of cramming or priming. It is true that before a candidate can be admitted to your examination he must produce a certificate of having been engaged for three years as an apprentice or student. But it is quite possible, and I am assured that it is not uncommon, for candidates to produce such certificates without ever having given their minds to the acquisition of any systematic knowledge of their business. It often happens that candidates

allow the period of examination to draw near without securing the advantage of any proper training, and then just at the last by a great effort they endeavour to stuff themselves with the requisite knowledge. In some cases they incur the mortification of failure; in other cases they succeed in imposing upon the examiners and scrape through.

It is with a view of meeting the inconvenience thus arising, that your Society has proposed that its powers should be extended by Parliament, so as to allow of the examination being broken up into separate parts and to require periods of time to elapse between the separate parts. If this plan were adopted, the student or apprentice would be forced to give systematic attention to his business at the commencement of his period of studentship, and he would be prevented putting off serious study until near the end of that period. It is also proposed to require the attendance of students at courses of instruction in chemistry, botany, and materia medica. These proposals do not involve any addition to the severity of the examination. The object of them is simply to provide that the student should proceed by gradual steps, that he should be helped on his way during his student course, instead of being left to make a big jump at the end of it. All experience in education teaches us that it is no kindness to young men to leave them absolutely to their own resources during the period of their studentship, and that it is wise and right to save them from the results of thoughtless procrastination. The proposal to require students to attend courses of instruction in the branches of knowledge most necessary for the proper conduct of the business of a chemist and druggist, if carried out, could not fail to be of assistance to them in qualifying them for their work. Some years ago the objection might have been raised that the apprentice in a chemist's shop in a country town might have far to go to attend such courses of instruction, and that the expenditure of time and money involved were far beyond his means. But now that opportunities for technical education have been established almost in every corner of the country, it is hard to believe that any such difficulty would arise. I cannot conceive it to be possible that while scientific lectures are being provided for the agriculturist, the mechanic and the carpenter, that the chemist's pupil and assistant should be left without the means of that kind of instruction which his education and intelligence render him so apt to profit by, and which the nature of his calling renders it so necessary for him to obtain. If the proposals of your Society were to be adopted, and any difficulty were to arise in any remote place as to the means of acquiring such instruction, it would become the duty of your Society to take means, by the agency of the University Extension Scheme, or otherwise, to make provision to provide in the neighbourhood of the place the necessary lectures. Such an obligation I feel sure that your Society would readily recognise, because the large expenditure it has already incurred in establishing technical teaching of the very highest order in this institution, affords the best proof of its willingness to devote its resources to the cause of education.

I have heard the objection raised to the proposal to make attendance at lectures compulsory, that it matters not in what manner a student acquires his knowledge, if he can pass the examination. But this objection is founded upon the assumption that an examination is an unerring test of competence, and that is just what I ventured to point out a few minutes ago I do not think it ever can be. An examination does no doubt serve to secure the rejection of the obviously incompetent, but unless an examination is made so strict as to be oppressive to men of average memory and acquirements, it is but an uncertain test of efficiency. The real place of an examination in the machinery of education is as an adjunct to other means. It is only by systematic teaching, combined with examination, that you can secure the acquirement of solid and lasting learning and an intelligent understanding of the reasons of things. You may perhaps be inclined to ask, why is it that these proposals of your Council which have been embodied in a Bill which has been before Parliament for several successive sessions has not passed into law? The Bill of last session was introduced by Sir Henry Roscoe, Dr. Farquharson, Sir Trevor Lawrence, Sir Guyer Hunter, and Mr. H. S. King, members of Parliament of great influence, and some of them of high scientific repute, but in the pressure of business no opportunity occurred of discussing the proposals it contained. Where we have, as we have had during recent sessions, nearly the whole time of the House of Commons occupied in the discussion of measures of the highest public interest and importance, it is not possible to secure time for the consideration of measures of a minor character, unless the Government will take the responsibility of promoting them. I am not inclined to find much fault with the system. It has its disadvantages, but it has the enormous advantage of saving the House of Commons to a large extent from wasting time in the discussion of the thousand and one idle and frivolous nostrums of the vain and irrepressible private member.

I hope, however, that before long you will be able to gain the public ear through various public organs, that you will satisfy all impartial minds that the proposals of your Bill are not only for the advantage of chemists and druggists and their assistants and apprentices, but are also for the public good, and when that is generally recognized public

opinion will force the matter upon the attention of Parliament and you will find that speedy legislation will ensue.

I have left myself but little time to speak of the most interesting of the departments of your work—that carried out in your Research Laboratory. But this is a subject so technical in its character that I feel great difficulty in dealing with it, and still greater difficulty in dealing with it in a manner at all commensurate with its importance. At your recent Jubilee meeting the Royal Society recognized "the successful exertions of the Pharmaceutical Society to promote the progress of a most important branch of Natural Science." The Chemical Society congratulated your Society, "Not merely as having accomplished most valuable work in the past, but also on the fact that it has now recognized the need for and the importance of research by establishing on a permanent basis a laboratory for the investigation of problems of chemical pharmacology." Such testimony from two of the great learned societies most competent to form an opinion of the nature of your investigations, affords perhaps the best evidence of the value and usefulness of the researches on which you are engaged. But I may add that a short time ago, when the President of the Medical Council, Sir Henry Acland, spoke in this place of the benefits to be derived from the institution of your Research Laboratory, the *Times* newspaper in a leading article pointed out the necessity, from a public point of view, for special research into the exact chemical constitution of drugs and alleged remedies, with a view to precisely fixing the constitution of alkaloids of acknowledged or of hypothetical value, and generally to supply to the experimental therapeutist and the physiological inquirer absolutely pure bodies of known chemical composition, whether existing in commerce or not. Perhaps the best testimony to the value and importance of the work done in your Research Laboratory is that distinguished men such as Professor Frankland, Professor Michael Foster, and Dr. Lauder Brunton are members of your Research Committee.

Still I do not feel quite content to leave the character of your work to be judged of by mere general statements coming even from such high authorities. The public mind is commonly better satisfied by the statement of specific results, and, therefore, I propose to indicate, although necessarily in a very imperfect way, some of the discoveries of great public benefit which have been made in your Research Laboratory.

Henbane and belladonna are medicines which from very early times have been in general use, and more recently one of their active principles, hyoscyamine, has been extensively employed in therapeutics. By investigations made in your Laboratory, it has been discovered that the root of the plant *Scopola carniolica* yields the same alkaloid in an almost pure form, and that hyoscyamine can be much more easily prepared from *Scopola carniolica* than from belladonna or henbane, because these plants contain other alkaloids from which hyoscyamine can only be separated by troublesome and expensive processes. It has also been discovered that a tincture of scopola can be used with advantage for nearly all the purposes for which belladonna is used.

You have directed very careful attention to a complete examination of what is known as the artificial salicylic acid of commerce. As the result of a series of very careful experiments you found that this acid prepared from carbolic acid was liable to be contaminated with cresotic acids of a hurtful and dangerous character, and a method was discovered by which pure salicylic acid could be obtained from the impure compound. Thus physicians who formerly had been driven to use salicylic acid derived from the oil of wintergreen, an expensive article, may now obtain the artificially prepared acid in an absolutely pure state. As salicylic acid is largely used in medicine and is often given in large and frequent doses, this discovery may be regarded as of great practical utility.

The nitrite of amyl of the British Pharmacopœia is a medicine which is in frequent use on account of its remarkable effect upon blood pressure. It has been subjected to careful examination in your Research Laboratory and has been found to be a mixture of several compounds. It contains, amongst other things, a considerable proportion of iso-butyl nitrite, and this latter substance is found to exercise a much more powerful effect upon blood pressure than the official amyl nitrite. So that of the amyl nitrite of the Pharmacopœia it may truly be said that itself is the least part of itself. It is like a lady over-adorned, "*Pars minima est ipsa puella sui.*" A method has been discovered by your Professor of Chemistry by which iso-butyl nitrite may be readily prepared in a perfectly pure state. In consequence of this most unexpected and valuable discovery respecting the action of iso-butyl nitrite your investigations have been extended to a number of nitrites belonging to the same series. This work has involved a vast amount of very delicate and difficult manipulation, and the latest results, which are, I am told, highly interesting and important, will shortly be made public.

One of the most important of the investigations now in progress is that concerning the aconite alkaloids. Although the *Aconitum Napellus*, or common monkshood, has been long and extensively used, little was known of the nature of its active constituents. But in your Research Laboratory aconitine has been prepared in a perfectly pure state, its physical and chemical properties have been fully described, and active progress is being made respecting the other alkaloids contained in the same plant and in other species of aconite. This has been recognised on all hands as an inquiry of the highest importance, and the Royal Society has made a grant of £150 out of the Government Fund for scientific research towards the expense of this investigation.

As my time has nearly expired I must be content to specify only one other instance in which your researches have proved to be of great service in medical practice. The valuable antiseptic properties of a substance prepared by precipitating a solution of cyanide of mercury and potassium with a solution of zinc sulphate was brought not long ago into notice by Sir Joseph Lister, F.R.S. A surgical dressing prepared with this material was found to be devoid of the irritating properties of mercuric cyanide and superior to zinc cyanide in its antiseptic power. An intimate mixture of the two cyanides was found not to answer the purpose, because the cyanide of mercury is easily soluble, and on becoming dissolved exerted corrosive action. The substance obtained by precipitation had hitherto been regarded as a double salt. But in practice it was found that the use of the dressing did not always give the same result and the composition of the substance seemed to vary. It became, therefore, of great importance to ascertain the true chemical character of this substance and to discover a method of preparing it so that it should constantly be of the same composition. This investigation was undertaken in your Laboratory at the request of Sir Joseph Lister, and your professor of chemistry, Professor Dunstan, was able to demonstrate that the theory of an ordinary double salt could not be upheld, and he discovered a process by which the preparation could be made, containing a much larger and constant proportion of mercuric cyanide, and in such a condition of chemical or mechanical combination as not to be easily soluble.

And now, Mr. President, ladies and gentlemen, it only remains for me to say that I trust that your Society will long continue to flourish, and that no consideration will induce you to relax the efforts you are making to advance the cause of science and to promote the welfare of those who practise your mystery. None know so well as you the truth of the saying of Friar Laurence :

> "O mickle is the powerful grace that lies
> In plants, herbs, stones, and their true qualities,
> For nought so vile that on the earth doth live,
> But to the earth some special grace doth give."

And yet it is strange that until you established your Research Laboratory how little had been done to investigate the active principle of herbs, even those that were known to have remedial properties. I am told that at the present time there are more than a hundred herbs at Kew that have been recently discovered and are believed to possess medicinal virtue, yet until you are able by investigations in your Laboratory to discover the special grace that each doth give, the science of medicine is not likely to derive any benefit from these botanical discoveries.

You may well feel that the labour before you seems to be without end, and so it is ; but so must it be always in every department of the study of the great and inscrutable secrets of nature. It is but an indication of the dignity of your pursuit, and it should only lead you to be more earnest in the prosecution of all the learning appertaining to your art. Lord Bacon has said, "It is necessary that he that will know the properties and proceedings of matter should comprehend in his understanding the sum of all things which have been, which are, or which shall be."

BACTERIOLOGY.*

BY J. LEFFINGWELL HATCH, B.SC., M.D.

(*Continued from page* 274.)

The iodine test colours the protoplasm blue in many species, such as *Bacillus butyricus*, *Bacillus Pasteurianus*, *Spirillum myliferum* and *Sarcina ventriculi*.

This coloration is due to the presence of starch in the protoplasm. This phenomenon is often to be observed at the time of spore formation.

In the rods of *Bacillus butyricus* the amylaceous reaction is shown first at the extremities, then in the middle, and finally throughout the entire mass of protoplasm. This starch is, without doubt, a nutritive reserve material to supply the needs of the species at the moment of the formation of spores.

Nearly all bacteria, when seen in an isolated condition, are colourless. *En masse*, nevertheless, they present a more or less distinct tint, which in some species is very brilliant, and has given rise to the term "chromogenic."

In *Beggiatoa roseo persicina* the pigment seems due to the protoplasm. This colouring matter can be diffused throughout the media on which these organisms grow. Sometimes it is produced under normal, at others under abnormal conditions of nutrition, or even after death of the little cells. There are different shades of colours produced by bacteria; the following table contains the most important ones :—

Different shades of red are due to the following forms :—

Micrococcus prodigiosus, Spirillum rubrum, Bacillus roseo persicina, and Micrococcus roseus.

Different shades of yellow and orange.—Sarcina lutea, Micrococcus pyogenes aureus, Bacillus luteus, and Micrococcus aurantiacus.

Azure blue.—Bacillus of blue milk; and Bacillus Syncyanus.

Green.—Bacillus Pyocyaneus; and Bacillus of green pus.

Violet black.—Bacillus violaceus.

A green pigment has been described by Van Tieghem in two species which he called respectively *Bacterium viride* and *Bacillus virens*.

Engelmann has also described a green pigment, which he calls the Bacterium chlorium.

These authors think this green pigment is identical with chlorophyll, but this is questionable, as they merely assume it without any proofs. Very little is known about these pigments ; they are produced only under certain conditions. Bacillus syncyanus will not develop any coloured material in saccharine solutions.

The Bacillus violaceus gives rise to a white growth on gelatine, which shows only a faint tint of violet on the edges where it has begun to undergo dessication.

The chemical composition of these pigments is not established. They are isolated with great difficulty, and can only be obtained in very small quantities at one time. Certain of them seem to approach the aniline dyes by the optical properties of their solution.

The colouring matter of *Beggiatoa roseo-persicina* has been studied by Ray Lankaster, who has given to its pigment, which is sometimes rose red, sometimes the colour of peach blossoms, or at others an intense violet, the name of *bacteriopurpurine*. It is insoluble in water, alcohol, chloroform, ammonia, acetic and sulphuric acid. Boiling in alcohol changes it to brown.

Spectroscopic analysis shows that it has special absorbent bands of its own. A large band in the yellow near the ray D of Frauenhofer; two faint ones in the green near the rays E and B ; a faint one in the blue near the ray F ; at the end of the ray G a shadowing of the most refrangible part of spectrum.

* Lecture delivered before the Alumni Association of the Philadelphia College of Pharmacy.—From the Annual Report.

The colouring material formed by the *Bacillus pyocyanus* has been completely studied. It is the species which produces the phenomenon of *blue pus*, so well known to the surgeons.

Fordos was the first to isolate the blue pigment in its pure state and call it *pyocyanine*. He obtained it by treating the pigment with ammonia; this solution when shaken up with chloroform yielded to him the pyocyanine, which crystallized out on the evaporation of the chloroform. It appears in many forms, sometimes as rectangular lamellæ, at others as long needles isolated or in bundles, in tufts, or in stars. It has also been obtained as octahedrons, rhombs, and hexagonals. The crystals present a beautiful blue tint. This pyocyanine has been carefully and thoroughly studied by Gessard. According to him it is a base whose reactions approach that of the ptomaines. The air and reducing agents transform it into a yellow matter, already pointed out by Fordos under the name of pyoxanthos.

Zoöglea.

Bacteria in their multiplication produce extensive surface aggregations; these are known as zoöglea.

This zoöglea is the result of the adherence of the individuals of the colony due to the secretion of a mucilaginous or gelatinous envelope around the cells, which is brought about by the absorption of moisture.

The zoöglea stage is a resting stage, often preceded or followed by a motile stage. Bacteria may be present in a solution in an active stage and after a time a scum or pellicle forms on the surface of the liquid, which consists of zoöglea.

Different species produce different shaped zoöglea, as, for example, the zoöglea of Leuconostoc mesenteroides, which appears like frog spawn.

Kafyr of Caucasia is an acid fermentation of milk due to Kafyr grains, which are zoöglea from the Bacillus caucasicus. They are of a greyish-yellow colour, and look like crumbs of dry bread.

The zoöglea of the chromogenic forms appear as areas of brilliant colours upon the media on which they are growing.

The Bacillus aceti produces a thick gelatinous zoöglea, which is popularly known as the mother of vinegar.

The Bacillus subtilis, when grown from a decoction of hay, appears as a thick scum on top.

The Bacillus anthracis develops an incomplete veil-like zoöglea, limited to the periphery of the surface of the liquid; this veil attaches itself in small portions, which fall in white flocculent masses into the midst of the liquid. These fleecy masses swim for some time in the liquid medium without disturbing its transparency, but are at length deposited at the bottom as a white substance.

The Bacillus butyricus and the Bacillus termo do not form a pellicle at the surface, but are disseminated throughout the liquefied gelatine. Another peculiar form of zoöglea is the *Ascococus Billrothii*; in this form the gelatinous envelope develops to such an enormous extent that it forms the characteristic form of the species.

At a certain phase in the cycle of evolution of the *Beggiatoa roseopersicina* the cells are united in such a manner as to form the walls of a sphere, the centre of which is filled with an ambient liquid.

Motility.

Many bacteria are devoid of movement throughout the whole of their life history. Others during certain stages, and possibly some forms always, are endowed with locomotive power. The character of the movement is very varied, and ranges from a slow, undulating movement to one of great rapidity. Many forms appear to progress in a definite direction. This movement has been attributed to the presence of a flagellum which, by moving rapidly from side to side, causes the organism to move forward in the same manner as a boat is propelled by sculling with an oar.

Dallinger and Drysdale first demonstrated a flagellum on the Bacterium termo. Since then many observers, and particularly Koch, have been able to stain and photograph these flagelli.

Respiration.

Like all living beings, the bacteria have need of oxygen. They can obtain it from the air, or from the nutritive media, or from the breaking down of unstable substances which eliminate the oxygen.

If, for example, milk is coloured blue by the aid of some drops of a solution of carmine of indigo, and some of the common bacteria of the air or water are then sown in it, the liquid will be seen to become discoloured in proportion as these organisms develop in it; the carmine of indigo is reduced by the bacteria, which take the oxygen from it.

In agitating the liquid in the air, the blue coloration again reappears, pointing to the absorption of oxygen. Some forms, however, can grow without direct access to the air. These conditions as to whether direct or indirect oxygenation are necessary have given rise to two divisions, namely, aerobic and anaerobic; of the latter there are two subdivisions, the facultative and the obligate. The facultative are those forms which when deprived of the access of free oxygen are able to still carry on life's processes; the obligate are those which can live only in a location remote from the direct action of the air.

The Bacillus anthracis develops in the blood of individuals suffering from anthrax; it takes the oxygen from the oxyhæmoglobin and thus causes asphyxia of the tissues, which manifest the characteristic cyanosis of deoxygenated blood.

It is easy to observe by direct examination the necessity of oxygen for the growth of bacteria. In a preparation made with a drop from a culture of mobile bacteria, the Bacillus subtilus, or Bacterium termo, for example, or, still more simply, with a drop from a maceration of vegetable or animal substance where these forms abound, one can see at the end of a very short space of time all the mobile bacteria approach the edges of the lamella and form there a thick layer. It is because the oxygen is abundant there. If one surrounds the preparation with wax or paraffin so that the access of air is made completely impossible, the bacteria mass themselves together around any air bubbles that the liquid may contain.

After a few moments their movements cease at the centre, and are only recommenced when air is allowed to come to them within a certain time afterwards. They can be stimulated to life again from this apparent lethargy if the total loss of air has not been continued over too great a length of time.

Englemann has given a very pretty proof of this avidity for oxygen, which certain species possess with the aid of a piece of special apparatus known as a micro-spectral-objective. He causes a spectrum to fall upon a filament of green alga, and can then see the bacteria in suspension in the liquid accumulated in two parts against the green filament. The greatest mass is in the red, between the rays B and C of Fraunhofer; a second group, but not so large, is seen in that part of the spectrum where the rays are most refrangigle—that is, outside of the ray F. It is, indeed, in these two places that the bands of absorption of the pigment chlorophyll is found, and these spectral bands are due to the activity of the pigment decomposition taking place by the action of the sunlight, which causes the breaking up of the carbonic acid with the assimilation of the carbon into cellulose of the plant, and a disengagement of free oxygen as a result.

From this it will be seen that the bacteria are found huddled about these two points to gain the oxygen which is thrown off from the alga. The bacteria em

ploy this oxygen as all living cells do; it serves to oxydize or to burn up certain principles of protoplasm, in order to obtain their vital forces in direct accordance with the heat produced by the combination. The residue is carbonic acid, which is liberated, and whose presence it is always easy to demonstrate, and of water, which is mingled in the ambient media.

In some certain cases the action is much more complex, and the absorption of oxygen is considerable.

The species employed oxygenise directly a great part of the aliment in which it is placed; it forms thus a new compound, which is rejected from the cell.

The bacteria of the mother of vinegar on the surface of the alcoholic liquid rapidly transforms great quantities of alcohol into acetic acid.

Nutrition.

Like all non-chlorophyll vegetables, bacteria require, for their nutrition, oxygen, nitrogen, carbon, water and certain mineral salts.

The nitrogen is obtained from albumen or ammonia and its derivatives. Carbon comes from cane sugar, milk sugar and glycerine, and in some cases it is formed by the splitting up of complex proteid bodies. Water is an essential factor for their growth, but deprivation of it does not kill all forms. Sugar, by abstracting water, prevents the development of micro-organisms, as instanced in preserves.

Mineral or inorganic substances, such as sodium, potassium, the different phosphates and sulphates, are necessary in small proportions.

The choice of aliment influences considerably the development of many species; some prefer an acid medium, others an alkaline, and by far the greater proportion select a food of neutral reaction. It is in accordance with these phenomena that certain artificial foods have been prepared on which the different forms of bacteria thrive luxuriantly. A good example is Pasteur's fluid.

Secretion and Excretion.

The aliments are rarely found in the media in a form that can be directly assimilated. It is nearly always necessary that they undergo special modifications before they can be absorbed by the micro-organisms. Some are solid and insoluble, like starch, cellulose, albumen and fibrine; others, even when in solution, cannot serve the purpose of nutrition until changed into less complex forms; thus it is that cane sugar is required to be intervened, in order that the nitrates can be reduced. These transformations operate under the influence of special secretory soluble ferments, to which the general name diastases has been given.

The conditions of nutrition of the bacteria are, in this point of view, identical with those of beings higher in the scale of evolution. A great number of bacteria possess the property of transforming the albumens of peptones. This property exists particularly marked among the species which occasion putrefaction. The putrefaction, in this case, begins by a peptonization; before the production of the putrid phenomena, so called, which are characterized especially by the presence of putrid gas, the media is rich in peptones which can easily be extracted by boiling, and evaporation after filtration. The liquefaction of gelatine, a phenomenon of so great importance in the study of certain forms in cultures, was considered for some time to be due to a ferment secreted by a liquefying species. This liquefaction is indeed a veritable peptonization.

It is probable that there exist many other kinds of soluble ferments in this same group; they seem to approach the ferment trypsin of the pancreas rather than pepsin, and they are especially active in an alkaline or neutral medium. The coagulation of milk is due to the influence of a secretion from the bacillus lactis, but the coagulum remains intact if other species do not interfere.

The transformation of urine into carbonate of ammonia is caused by the Micrococcus urea, which operates by the mediation of the diastase, isolated by Musculus, and the production of which by the bacteria has been put beyond a doubt by Pasteur and Joubert.

Side by side with these processes of secretion, which serve directly to the nutrition and the life of the species, there exist others which seem to prevent the development and deterioration of the organisms. These toxic products which each cell produces continually ought to be considered as an excrement. They are by their nature and their effect perfectly comparable to the products of excretion of higher beings. They have been pointed out in the decomposition of animal matter, and designated under the name of ptomaines.

Selmi obtained the first of these poisons from the human body. Since that time a great many forms have been studied and described, and even the chemistry of these products has been carefully worked out. It is only within the last month that Koch has astounded the world with his cure for consumption, which undoubtedly depends upon the innoculation of an individual with the virus that is obtained from the ptomaine of the Bacillus tuberculosis by filtration.

Reproduction.

Bacteria, as the general term Schizomycetes indicates, multiply by fission and by processes which may be considered as fructification. The bacteria exhibiting the latter processes have been divided into two groups, the endosporous, and the arthrosporous.

In fission the cells first increase in size and a transverse septum then forms from the cell wall, dividing the interior cell plasm into two equal parts; these may separate and lead independent existences, or they may remain linked together.

In chains of cocci the individual cells are distinct, but in thread forms, which are composed of rod-shaped cells linked together, the component parts can only be made out on the addition of suitable agents.

By endosporous cell formation we mean the development of a little granule within the shell, which grows at the expense of the cell plasm, and which gradually enlarges and develops into a cellular, egg-shaped, highly defined, refracted body. The cell wall finally disappears, breaks down, and the spore disappears; the spore is capable of reproducing its species.

By arthrosporous cell formation we mean the specialization of certain cells among a collection of cocci, which fits them for the function of reproduction. These cells that are capable of reproducing their species arrive at this condition by abstracting nutrition from the surrounding cells, the surrounding cells thus aiding indirectly in the development of the species by delivering up to these spores a portion of their nutrition, but are incapable by themselves of reproduction.

Spores are invested by a thick membrane, which is believed to be composed of two layers. It is probable to this membrane they owe the property they possess of retaining their vitality when exposed to extremes of temperature. They also offer considerable resistance to the action of chemical agents, and to aniline dyes.

There have been a variety of views in regard to the action of certain forms, which reproduce usually by fission, but under certain conditions reproduce themselves by sporulation. The most noteworthy are these: It was originally attributed to the fact, that the pabulum upon which they were growing had become deprived of ingredients essential to their normal extension, and thus the stored-up nutritive material took upon itself the function of sporulation in order to perpetuate the species.

Another view, and probably a more rational one, is that sporulation is due to the free access of oxygen, as experiment has shown that those forms that are

usually reproduced by fission are induced to sporulation when supplied with an abundance of oxygen.

The temperature is a great factor in reproduction, some forms requiring higher, and others a lower one; but the majority of bacteria develop best at about the normal temperature of the body.

(*To be continued.*)

NOTES ON ESSENTIAL OILS, ETC.

The following notes are taken from the October *Berichte* of Messrs. Schimmel and Co., of Leipzig:—

ARNICA FLOWERS OIL.—It is stated that the oil of arnica root is sometimes supplied for that of the flowers. The oil distilled from the flowers this year by Messrs. Schimmel themselves has a specific gravity of 0·900 at 25° C., and solidifies at +15° to 20° C. to a butter-like mass. The latter property is not possessed by the oil of arnica root and it has a specific gravity of 0·999 at 15° C.

BETEL OIL.—A sample of oil distilled from fresh betel leaves in Manila, at the request of Messrs. Schimmel, is described as of a golden yellow colour, possessing a pronounced odour of betelphenol and having a specific gravity of 1·044 at 15° C. The phenol was separated from the oil by the method of Bertram and Gildemeister, and during the purification by distillation at a pressure of 11 mm. it passed over quite regularly between 128° and 129°, a behaviour that pointed to a homogeneous body. By treatment of the phenol with benzoyl chloride a benzoyl compound was obtained that crystallized in scales and melted at 50°. It was evident that this was not a mixture of benzoyl compounds, as the portion that crystallized first had the same melting-point as that which crystallized last; it followed, therefore, that it represented no other phenol than betelphenol. Other constituents occur in this oil only in small quantity, and of these, to judge from the boiling point, terpenes form only a small fraction. The results of the examination of betel oil up to the present time may therefore be summed up as follows:—

(1) Oil distilled from fresh leaves from Java (Eykman), contained besides terpenes and other bodies, chavicol and betelphenol.
(2) Oil from dried Siam leaves consisted of sesquiterpene and betelphenol.
(3) Oil distilled from fresh leaves (Java) contained terpenes, betelphenol and a small quantity of another phenol (probably chavicol), the nature of which could not be determined, from want of material (melting point of the benzoyl compound 72°–73°).
(4) Oil from fresh leaves distilled in Manila contained no other phenol than betelphenol.

Betelphenol was contained in all the oils, whether derived from Java, Siam or Manila, or from fresh or dry leaves; it would therefore appear to be a characteristic constituent of betel oil.

CAJEPUT OIL.—Under this head it is remarked that it would be of scientific interest to know more about the essential oils of the following species of *Melaleuca*, mentioned in Maiden's 'Useful Native Plants of Australia.' All the oils were represented at the international exhibition in London in 1862, but have not received the attention that was then expected.

Melaleuca decussata, R. Br.—Yields about $\frac{3}{8}$ per cent. of an essential oil of oily consistence and dark yellow colour, resembling cajeput oil in taste and odour. Victoria and S. Australia.

Melaleuca ericifolia, Smith.—Yields a pale yellow oil, very similar in smell and taste to cajeput oil. Sp. gr. 0·899–0·902; boils between 149° and 184° (Wittstein, Müller). 1000 lbs. of leaves give 5 oz. of oil. Rotatory power, according to Gladstone, +26°. All the colonies with the exception of W. Australia.

Melaleuca genistifolia, Smith.—The essential oil from this species is of a yellowish-green colour and mild odour and taste. According to Bosisto 100 lbs. of leaves yield 10 ozs. 2 drs. of oil. N. S. Wales and N. Australia.

Melaleuca linarifolia, Smith.—Yields a pale yellow, thin oil, possessing an agreeable cajeput-like odour and a pleasant taste, first like mace and afterwards resembling mint. Sp. gr. 0·903; boiling point, 175°–180°. Yield 28 ozs. from 100 lbs. of leaves (Bosisto). Rotation +11° (Gladstone). N. S. Wales and Queensland.

Melaleuca squarrosa, Smith.—Yields, according to Bosisto, a very small quantity of a green essential oil, having a very disagreeable taste. S. Australia, Tasmania, Victoria and N. S. Wales.

Melaleuca uncinata, R.Br.—The essential oil from this species is of a green colour, and resembles in taste cajeput oil, with an under flavour like peppermint. S. and W. Australia, Victoria, N. S. Wales and Queensland.

Melaleuca Wilsonii, F. v. M.—Yields an essential oil which is very similar to cajeput oil. It is pale yellow and has a specific gravity of 0·925. 100 lbs. of fresh leaves gave 4 ozs. of oil. Victoria and S. Australia.

DILL OIL.—A distillate from Indian dill seed is reported to have shown, besides a difference in the aroma, a considerable variation in chemical composition from oil distilled from German seed. From the distillate from Indian seed there was a remarkable separation of a constituent heavier than water, the nature of which has not yet been determined. The specific gravity reached 0·970 and the optical rotation +41° 30′. German dill oil consists of limonene and carvol and has an average specific gravity of 0·910.

GARLIC OIL.—Notwithstanding that some demand has sprung up for this oil it is probable that its distillation will be given up. It was originally produced for the purpose of a chemical examination, and it is considered that when this has been completed there will cease to be any valid reason for continuing an operation so disagreeable to those taking part in it as well as to neighbours.

NEROLI OIL.—In order to be able to submit neroli oil to a closer examination, Messrs. Schimmel obtained in the spring of last year, from the Riviera, a large quantity of the flowers of the bitter orange. The blossoms were consigned preserved in diluted sea water and were received in good condition with the full odour of fresh flowers. From the equivalent of 560 kilos of fresh flowers there was obtained by a process of cohobation 0·460 gram of pure neroli oil, which in many respects differed from the best French distillates met with in commerce. It had a specific gravity of 0·887 and was optically inactive. Already at a temperature of + 11° C., it showed an abundant separation of a solid body in fine shining scales. At 0° the oil solidified to a mass of the consistence of butter. The stearoptene of neroli oil, like the stearoptene of rose oil, appears to be a paraffin-like body; it can be separated from the liquid portion of the oil by the addition of 90 per cent. alcohol, in which it is difficultly soluble. The specific gravity of eleven samples of commercial neroli oil obtained from the best sources varied between 0·875 and 0·889 at 15° C. Of nine oils one was optically active, whilst the others were all dextrorotatory, the rotation varying between + 0°52′ and + 9°40′. Only one solidified at 0° C., the others remained liquid and did not show any separation of stearoptene upon the addition of 90 per cent. alcohol. The cause of these differences between Messrs. Schimmel's distillate and commercial samples is not explicable without further investigation.

(*To be continued.*)

The Pharmaceutical Journal.
FIFTY-FIRST YEAR OF PUBLICATION.
SATURDAY, OCTOBER 10, 1891.

THE COUNCIL MEETING.

At the opening of the first meeting of the Council for the coming session the President communicated to the members that he had been requested by the son of the late Mr. Barnard to acknowledge the kind message of sympathy and condolence sent by the Council. One pharmaceutical chemist was elected a member of the Society, thirteen persons were elected Associates, and forty-four persons were elected Apprentices and Students.

In moving the adoption of the Report of the Finance Committee the President stated that the receipts consisted mainly of examination fees. Some subscriptions had been received on the account of the Benevolent Fund, together with some ground rents, and on the donation account a legacy of one hundred pounds left by the late Mr. W. Davison, of York, had been received from the executors. It was proposed, in accordance with established usage, to invest one hundred pounds on the Benevolent Fund account, as under arrangement with the Inland Revenue authorities the interest of such investments is free from income tax. The investments on this account now amount to about three thousand pounds, and it is hoped that a better investment of the money, yielding more interest, may soon be possible. The motion was unanimously agreed to. On the recommendation of the Benevolent Fund Committee six grants of ten pounds each were authorised. The Secretary reported the death in September of Mr. H. G. Mumbray, at the age of 70. There are at present forty-five annuitants on the list, and the Committee recommended the election of six more in December next. After consideration of the applications during the past year, the Committee has recommended that seven candidates shall be placed on the list as being the most deserving and necessitous. The names of these candidates will be found at page 295. In the discussion of this subject Mr. Richardson drew attention to the fact that most of the present applicants had been subscribers to the Benevolent Fund, and remarked that this circumstance gave the Committee encouragement in its endeavours to assist their poorer brethren. Mr. Hampson, in moving that six annuitants be elected next December, took advantage of the opportunity to put forward his views in regard to the conditions of election of annuitants, to which we shall refer on a future occasion.

An application from Mr. Branson, on behalf of the Leeds Chemists' Association, for a grant of twenty pounds in aid of the Museum, was referred to the Library, etc., Committee for further consideration. The President drew attention to a very troublesome form of unauthorized communications to which members of the Society have lately been subjected. The only apparent explanation of these strange effusions is that their author is the subject of some hallucination, and so far as we are informed that is the general impression that has been produced in the minds of those who have received these communications, which purport to be issued by authority of a Committee, of whose existence no one has any cognizance.

The very important subject of local secretaries of the Society was brought forward by the President, and attention was directed to the fact that the election of these officers would take place during the present month. It is strange that when there is such a strong feeling throughout the country against centralization that there should be so little practical recognition of the importance attaching to the functions of local secretaries as the provincial representatives of the Pharmaceutical Society. If there is one thing that is wanted for the good of the pharmaceutical community in this country and for that of the Society, it is a greater amount of vitality in the provinces, a more energetic co-operation of those supporters of the Society who believe in the value of associated action. To give effect to such a feeling for the benefit of pharmacy in the several centres of the country, it is only to the Society's local secretaries that we can look. The election of suitable men to fill those important posts is therefore one only second in interest to the election of members of Council. It is to be hoped, therefore, that the President's remarks on this subject will be specially considered, and that they may have the result of creating a much greater interest in the appointment of the Society's provincial representatives. After some discussion of the mode of awarding the Redwood Scholarship the report of the General Purposes Committee was read giving an account of cases that had been placed in the hands of the Solicitor. In one case judgment has been obtained for penalties and costs, and several cases are standing over for trial. The sale of "weed killers" was discussed, and the recommendation of proceedings against unregistered vendors was unanimously adopted.

The inaugural meeting of the School of Pharmacy last Wednesday evening was characterized by a new departure in the delivery of the address, which was undertaken on that occasion by a gentleman who could speak from the point of view of the general public. It is always useful to see ourselves as others see us, and it may be considered especially useful for members of the Pharmaceutical Society that they should know how they are regarded by the public. It was a further advan-

tage for them that the address was delivered by one who could speak as a lawyer and as a member of the Legislature, and they have much reason for satisfaction at hearing from him a recognition of the fact that their interests and the interests of the public are one and the same; that faithful and efficient services in the supply of drugs and medicines can only be looked for concurrently with the prosperity of those engaged in that business, and that association with a view to advance common interests and maintain a high standard of character and acquirements is one of the most important means of securing the welfare of any class, as well as its capability of acting for the benefit of the public.

* * *

A Scottish correspondent who sends a report of the prosecution for the illegal sale of methylated spirit, published at page 304, avails himself of the opportunity to express a hope that this case will, perhaps, awaken the muddle-headed judges to see the meaning of "seller." No doubt he refers to the use of the term "seller" in the Pharmacy Act, 1868, in connection with the sale of poisons, and it will be evident from his remark that he considers the judgment given in the Wheeldon case to have been founded upon an erroneous interpretation of the Act. But we think it will be equally apparent to most persons that our correspondent's logic must be very much at fault, when it leads him to the conclusion that, because an employer is legally responsible for the acts of those engaged by him, the fact of his being thus responsible should absolve persons in his employ from being also individually responsible for acts committed by them either with or without the consent or direction of their employer. It is that strange conclusion which suggests a muddle of ideas; for if the Pharmacy Act was intended to prevent the sale of poisons by persons who have no legal qualification to do so, what greater absurdity can be imagined than that of allowing unqualified persons to sell poisons upon condition of their qualified employers being held responsible for their unlawful acts. All the judges who have dealt with the Pharmacy Act have agreed that this Act was intended to prevent the improper sale of poison, and that since there cannot be a sale of a poison without the direct agency of a person who hands it over the mischief to be prevented attaches to that particular act of sale. Hence they held that the person who does that act without the qualification required by law renders himself personally responsible. Whether his employer should be or is also responsible for the unlawful act of his servant is altogether another and totally independent question.

* * *

The fifteenth session of the Chemists' Assistants' Association was commenced on Thursday evening, the 8th inst., when there was a large attendance of members at the rooms of the Association to hear an address from Mr. Lloyd Williams, the President, the principal topic of which was the advantages of association. We hope to refer to the address more fully next week.

* * *

The first meeting of the Dundee Chemists' Assistants and Apprentices' Association for the ensuing session will take place on Thursday, the 15th inst., when Mr. Thomas Maben will deliver an inaugural address.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, October 7, 1891.

Present—

MR. MICHAEL CARTEIGHE, PRESIDENT.

Messrs. Abraham, Allen, Atkins, Cross, Evans, Gostling, Hampson, Hills, Leigh, Martindale, Newsholme, Richardson, Storrar, Warren, and Watt.

The minutes of the last meeting were read and confirmed.

In the absence of the Vice-President the Treasurer took the vice-chair.

The Late Mr. Barnard.

The PRESIDENT said he had been requested by the son of the late Mr. Barnard to convey to the Council the thanks of himself and the other members of the family for the kind message of sympathy and condolence sent by the Council.

Elections.

MEMBER.

Pharmaceutical Chemist.

Frederick James Perrett, of 68, Newington Butts, S.E., having passed the Major examination and tendered his subscription for the current year was elected a "Member" of the Society.

ASSOCIATES IN BUSINESS.

The following, having passed the Minor examination, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Gill, Sutton Dudley .....West Bromwich.
Oxen, David Hunter .....Newcastle (Staffs).
Rogers, Ernest Henry .....Oxford.
Rowland, Thomas William . Epping.

ASSOCIATES.

The following, having passed the Minor examination, and tendered (or paid as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Carnegie, Robert.....Peterhead.
Castle, John William.....Durham.
Griffiths, Edward .....Bodedern.
Harrison, William Arthur.....Louth.
Hodgson, John Duncanson ...Sunderland.
Hume, John Gordon .....Gatehouse.
Knight, Peter .....Aberdeen.
Roberts, Thomas John .....Ruthin.
Robertson, James .....Leith.
Softly, Alfred Ernest..... ..London.
Sturrock, Robert.. .. ..Aberdeen.
Vernon, Walter .....Middlesborough.
Wilkie, Herbert Farnington...Duns.
Williams, Cuthbert Ford .....Leicester.
Wright, George Burkitt.....Doncaster.

APPRENTICES OR STUDENTS.

The following, having passed the Preliminary examination, and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Abram, Frederic Wm. Joseph...Wisbeach.
Barlow, Samuel .....Truro.
Brookes, Henry James .....London.
Browning, Kate Emma .....Weymouth.
Bunbury, Mervyn Wm. Richardson...London.
Cameron, Lauchlan.. .. ..Brighton.
Carpenter, George Reginald...Bridgwater.

ST BARTHOLOMEW'S

Chaplin, Albert Edward .....Taunton.
Clarke, John George .....Bury St. Edmunds.
Clarkson, James S.....Whitby.
Corney, Alfred Ernest .....Portsmouth.
Crawhall, Thomas Currah.....Stanhope.
Gill, William Sharpe .....Boston Spa.
Glaister, Robert .....Lanark.
Hart, Frederick .....London.
Helsby, Fred ....Sheffield.
Heron, John.....Glasgow.
Howard, Alfred .....Hyde
Howell, Gwilym Harris.....Brecon.
Ives, Herbert Edward ... .Ixworth.
James, Ernest .....London.
Jones, Robert Haselwood .....Bury St. Edmunds.
King, John William S. .....London.
Last, G. Valentine Chapman...Liverpool.
Lloyd, Henry Bright .....Cheltenham.
McMurray, James Dickson ...Newton Stewart.
Martin, Johnson .....Great Lever.
Morris, William Evans .....Portmadoc.
Moss, John Henry .....Whitehaven.
Platt, William Edmund.....Ellesmere Port.
Porter, Walton .....Whitehaven.
Rook, William Arthur .....Lower Edmonton.
Ross, Alexander .....Inverness.
Sarson, Fred .....Leicester.
Smout, William Henry .....Coseley.
Sturton, Frank Ainsworth.....Peterborough.
Tildesley, William James.....Wokingham.
Turney, Frederick Edmund ...Plymouth.
Tytler, William W.....Arbroath.
Walden, William Herbert.....Reedham.
Wark, David Sawyers .....Lincoln.
Williams, Gregory Thomas ...Cardiff.
Willis, William Arthur .. ..Bournemouth.
Wood, Ernest Thomas .....Stonehouse (Devon).

Several persons were restored to their former status in the Society upon payment of the current year's subscription and fine.

Restorations to the Register.

The names of the following persons, who had severally made the required declarations and paid a fine of one guinea, were restored to the Register of Chemists and Druggists:—

John Crane, 146, Wandsworth Road, London, S.W.
James Haffenden, 180, Kennington Lane, London, S.E.

Report of the Finance Committee.

The report of this Committee was of the usual character, and recommended the payment of various accounts, the sale of £1000 stock, and the investment of £100 in consols on the Benevolent Fund account.

The President (as Chairman of the Committee), in moving the adoption of the report and recommendations, said the receipts required no special mention, as they consisted mainly of examination fees. On the Benevolent Fund account a few subscriptions had been received and some ground rents, and on the Donation account a legacy of £100 from the executors of Mr. Davison of York. The payments were of the usual character. During the year nearly £1000 had been spent out of current revenue in structural alterations and improvements, and it was now recommended that so much stock be sold out as would cover that expenditure. It was proposed to invest £100 on the Benevolent Fund account, as was usual when such an amount was available. It was invested in consols because there was an arrangement with the Inland Revenue officers, by which the interest on this Fund was paid without deduction of income tax. At present the amount so invested was about £3000, and it would soon be possible, he hoped, to make a re-investment in freehold ground rents yielding better interest. It was, however, getting more difficult than it had been to find such investment, especially for moderate amounts, there being a great rush on the part of insurance companies with large funds at their disposal, for such properties. It was quite possible, therefore, that the Council might not be able to invest on such favourable terms as heretofore, but still there was every hope of being able to get a much better return than that yielded from consols.

The motion was duly seconded and unanimously agreed to.

Report of the Benevolent Fund Committee.

The report of this Committee included a recommendation of the following grants:—

£10 to a former member, age 63, who is confined to his bed from paralysis. Applicant had a similar grant last year. (Yarmouth.)

£10 to the widow (age 71) of a registered chemist and druggist. Her late husband was a hospital dispenser. Has eight children, only one of whom is able to render any assistance. (Rochester.)

£10 to the widow (aged 51), of a registered chemist and druggist, who has had three previous grants of £15 each, the last in 1887. (Buckingham.)

£10 to the widow (aged 71) of an annuitant, who died last month, and who had been a member and subscriber for many years. (Manchester.)

£10 to the widow (age 60) of a registered chemist and druggist, who had a grant of £5 in 1888. St. (Leonards.)

£10 to a former member (age 68) in bad health. He had a similar grant in 1890. (London.)

Two cases which had been deferred for further inquiries, had not been entertained; three other applications had also been declined, and one had been adjourned for further information.

The Secretary had reported the death in September of Mr. H. G. Mumbray, aged 70, who was elected an annuitant in 1889.

The Secretary had also submitted a financial statement, and reported that there were now forty-five annuitants on the list, three having died during the year. The Committee, having considered the subject, recommended that six annuitants be elected in December next, the date of election to be Thursday, December 3.

The Committee having considered the cases of the applicants who had applied during the past year, recommended that the following, who were deemed to be the most deserving and necessitous, be placed on the list of approved candidates for an annuity for election in December next:—

Geo. Cheetham (71), Timperley, Cheshire.
Alfred Kent (74), Ramsgate.
C. Geo. Harvey (78), Levenshulme.
Joseph Barker (63), Yarmouth.
Henry Machon (64), Saffron Walden.
Rebecca Mumbray (71), Manchester.
James Pearce (68), Devonshire Road, Holloway.

The following were the unsuccessful candidates at the last election:—

Harriett M. Bensley (55), Wells, Norfolk.
Mary B. Rowan (70), Plymouth.

Mr. Hampson, in the absence of the Vice-President, moved the adoption of the report and recommendations. The cases had been all thoroughly considered, as they always were, and though the number seemed large, it was not beyond the average, taking into account that the period covered was two months.

Mr. Atkins, in seconding the motion, said he cordially agreed in the recommendation that six annuitants should be elected in December.

Mr. Richardson said it was very pleasing to find that a very large proportion of the present applicants had been subscribers to the Fund in better days. It

gave the Committee a better heart to assist their poorer brethren, when it was found that they had in former days contributed their mite to the more necessitous.

The motion was unanimously adopted.

The Next Election of Annuitants.

Mr. Hampson then moved that six annuitants be elected on December 3 next. He was very glad that the Committee had been able to recommend the election of six annuitants, the Fund being fairly prosperous, but at the same time he wished it were still more so, so that the Committee might be still more generous in giving assistance. He could not, however, allow the occasion to pass without a renewed protest against the present method of election. It might seem inconsistent on his part to move this resolution whilst protesting against the method of election, but he was quite sure that what he said would be received in a friendly spirit, and that no one would suppose for a moment that he had any other desire than to benefit the Fund. This election might be termed a race—he did not know whether it would be correct to call it a handicap, but it was certainly a race—and one of a barbaric character. The various candidates were put on the list because they were eligible, but in their inmost hearts they knew that some were much more eligible than others. Still the least eligible or weakest case was put on an equality with the stronger, and they were left to fight it out to the death. All these candidates, most of whom were of advanced age, were called on to scramble together, to use their utmost efforts, and struggle to success over the shoulders of their neighbours. He hoped that the Council, as well as the subscribers to and friends of the Fund, would not only take his remarks in the spirit in which they were offered, but would seriously consider this question. He should be delighted if the Society were the pioneer in an improved system, under which instead of having what was called a fair fight there was a wise selection of the best and most deserving cases.

Mr. Atkins, in seconding the motion, said he could quite understand the benevolent spirit which actuated Mr. Hampson, and which deserved the highest commendation, but his fear was that the general body of subscribers would not be willing to delegate to the Council the power of selection, or if they did that they would lose interest in the Fund. He had lately seen an instance in which the choice of a medical officer, made after due deliberation by a small body appointed to consider the testimonials, had not been accepted by the general body of governors, who insisted on their rights, and the consequence was that a strong personal element was imported into the case, with very unsatisfactory results. If Mr. Hampson could assure the Council that the course he advocated would not alienate the sympathies of the wider body represented there would be a good deal in his suggestion. He should also like to say that he should be very glad if the Committee could see its way to the election of adults to homes, where for a small payment they would be secure of a certain amount of comfort. Assistance was often given to enable persons to furnish houses for letting, but this year that attempt had in several cases been most disastrous, owing to the exceptionally wet season. In his own town and in some others there were homes provided for persons who had seen better days. This might seem a utopian scheme, but he should be glad if the Committee could see its way to employ some of the funds in this manner.

Mr. Evans said he should be sorry if the power were taken from the contributors to the fund of electing the annuitants, as he thought it would militate against the success of the fund. There might be instances, as Mr. Hampson said, in which the most deserving applicants were overlooked, but in any case of that sort members of the Council who worked so well on particular occasions might render their aid, and thus prevent injustice being done. He might also be allowed to say that he did not share the regret of the President as to the difficulty in getting good ground rents, and for his own part he hoped the Council would not be able to invest much more money in that way.

Mr. Richardson said this question had been discussed on several previous occasions, but Mr. Hampson still used the word "barbaric," which he must take leave to object to as being a very harsh term to apply. He thought the election was conducted in the best and cheapest manner, as it need not cost the candidate one penny, and he was quite certain the fund would suffer if it were put into the hands of an autocratic body to elect the annuitants. Mr. Atkins had referred to a case which occurred at Salisbury, and he was also connected with a large hospital in his own neighbourhood where a resolution was passed that the medical officers should be elected by committee, which was a self-elected committee from the weekly board. The consequence was that the subscriptions fell off 25 per cent. in two years. He quite acknowledged that it was very ignoble on the part of those who withheld their subscriptions on such a ground, but still it must be borne in mind that there were a great many people who wanted a little patronage, which they obtained in return for the support that they gave to benevolence. There were a great many people of independent means, with nothing else to do, who loved this sort of thing, and it would take away the whole occupation of lots of old ladies who were very delighted to take up a case, write postcards, and busy themselves in assisting in an election. He could quite see how cruel it was to these old persons, many of them upwards of seventy years of age, to have the shock and worry of a contested election, but taking the thing all round he did not think the fund could be administered better than it was at present. He hoped that in a few years an auxiliary force, of which the President had become a distinguished member, would be of great use, and that it would be possible to introduce the children of masonic brethren in large numbers into the masonic schools.

Mr. Hills took it that Mr. Hampson was only trying to educate pharmaceutical opinion in this matter, as he did not propose anything definite. They all knew that Mr. Hampson had the welfare of the fund at heart as much as anyone, and he could not allow the occasion to pass without saying how strongly he felt in sympathy with the remarks that gentlemen had made. As soon as the Council could see its way to abolish this process of election the better he should like it. He thought when six additional annuitants had been elected it would be the largest number—fifty-one—there had ever been on the fund.

The Secretary said there had once been fifty-two on the list.

Mr. Allen said this was not a new question, Mr. Hampson having brought it forward more than once before, and therefore they were somewhat prepared to deal with it. Whilst he sympathized with the people who were unfortunately in the position of wanting annuities quite as keenly as anyone, he could not at present view the question in the same light as Mr. Hampson or Mr. Hills. It seemed to him that the present practice was very firmly rooted, that subscribers looked on their voting power as an equivalent for their subscriptions, and that the day was far distant when they would give up that power. This was a day of advertising, and whatever might be thought about it, each candidate had a certain number of friends who took up that case and did what the Council thoroughly objected to, canvassed persistently in favour of their *protegé*. Now it seemed to him very

likely that if Mr. Hampson's views were adopted this canvassing, instead of being spread over the whole body of subscribers, would concentrate itself on the members of the Committee or the Council, and that they would have all kinds of pressure put upon them from influential persons outside, and that, therefore, for the present it was far preferable to continue the present plan.

Mr. GOSTLING said he had great sympathy with Mr. Hampson, but he could not see his way to adopt his views at present. If all the subscribers acted from a true spirit of benevolence, no doubt they would be willing to leave the matter to the Council, which was not a self-elected body, but elected in the main by the subscribers, and he should rejoice if the time came when they would be willing to trust the Council to exercise its discretion in this matter. There was one instance in which, as he conceived, true benevolence had been exercised, and the fullest confidence placed in the management of the institution. That was the case of Mr. Müller's orphanage at Bristol; the subscribers had no voice whatever in the elections; they sent their money and trusted entirely to the managers to select the best cases, and he believed the method of selection was simply this, that he received from the subscribers the names of the persons who were really eligible, and they were taken in order without any selection at all.

Mr. CROSS said there were several round the table who sympathized with the idea of Mr. Hampson that the candidates should be put to as little trouble as possible, especially considering the advanced age of many of them, but they might congratulate themselves that a considerable number were to be elected, and there were not a large number of remanets on the list at present. There were only two former candidates coming forward, and that spoke well for the conduct of the elections at the present time. If there were a number of candidates coming up for the third, fourth or fifth time the matter would be more serious, but as nothing of the kind had occurred he thought it was better to bears the ills they had than to attempt to alter the mode of election at present.

Mr. EVANS asked if the votes were cumulative.

The PRESIDENT said yes, those given at one election were carried forward to the next.

Mr. MARTINDALE thought that perhaps this Fund was as little abused as any. In some institutions there was a dreadful amount of canvassing went on, but that could not be said of the Society's Benevolent Fund. Ordinarily it was a great trouble and expense for persons to support the candidates they were interested in.

Mr. HAMPSON, in reply, said the instances mentioned by Mr. Atkins and Mr. Richardson were not at all on all fours with the present. They referred to the election of medical officers, men in health and strength, who could canvass and do what they liked; but in the case of the Benevolent Fund the members elected were old people, some with almost their feet in the grave, and they were called upon to institute a canvass and to enter this race. Mr. Richardson objected to the word "barbaric," and he would therefore substitute another for it, and say it was unchristian. It contravened all the ethical theories of the religions of the world; it was not charity, because you gave with the charity something which was hurtful and reprehensible. He did not wish to thrust the subject on the Council, but had felt it a point of duty to bring it forward in order that members might discuss it. He had not propounded any scheme. He did not say the Council would have to elect the annuitants; the members might elect certain members of the Society to inquire into these cases in conjunction with the Benevolent Fund Committee and estimate their merits. All he objected to was the competitive system of the present method.

The PRESIDENT said he was quite sure that all subscribers to the Fund would appreciate the motives which prompted Mr. Hampson, and he might perhaps paraphrase his remarks by saying that he would be glad if the Council could get twice as much money from voluntary sources without having to send round circulars and letters, and if it were practicable to appoint a properly constituted body as a committee to elect the annuitants. But it was very difficult to uproot a custom which was almost universal, and he did not feel that the evil was so great in this case as in some others which had been referred to. Happily, owing to the judicious care with which the Benevolent Fund committee selected the best cases, there was never what might be called a large race. There might be of course people from time to time who were not so badly off as others, and, therefore, who were not put on the list; though no doubt if there were more funds more annuities could be given and there would be more candidates. Still, he thought in the judicious way the list was made up there was not much practical harm done. As a rule there were not more than three or four remanets and those who were unsuccessful on one occasion enlisted the sympathies of the subscribers, and usually a candidate succeeded in the second year. In many charities they went on for year after year until sometimes they became ineligible, but there was nothing of that sort in this case. He would take this opportunity of reminding the subscribers that these annuities were paid in great part out of the subscriptions and not from the invested funds. They trusted to the generosity of the present and future subscribers to supply the necessary means. He recollected very well their friend Mr. Sandford was quite horrified when it was first proposed to elect more annuitants than could be provided for by the interest derivable from the invested capital; but knowing the generosity of the members, and how much easier it was to subscribe half-a-crown or half-a-guinea per annum than to give £10 as a donation, the Council introduced the new method of trusting to being backed up by the subscribers, and he was glad to say the Council had been loyally supported. This was one of those cases in which what was called sound finance might be departed from with great advantage.

The motion was then put and carried unanimously.

THE LEEDS CHEMISTS' ASSOCIATION.

The PRESIDENT said a letter had been received from Mr. Branson, Honorary Secretary to the Leeds Chemists' Association, asking for a grant of £20 in aid of the Museum, for the purchase of new fittings, etc. The Leeds Association was intending to have a complete collection of materia medica specimens, and for some years had been carrying on classes in connection with the Yorkshire College of Science, in which materia medica, practical pharmacy, practical chemistry, and physics were taught. He would move that the application be referred to the Library, Museum, and Laboratory Committee.

This course was unanimously agreed to.

UNAUTHORIZED NOTICES.

The PRESIDENT said he had been informed that a registered chemist and druggist had been sending communications broadcast over the country, couched in terms which implied that the writer was secretary or chairman or some officer of a committee which had for its function the carrying out of the Pharmacy Act. The number and variety of these letters and postcards had become a source of embarrassment to many members, and some of them were somewhat of the nature of an intimidation. One of them ran thus:—"Dear sir,—I am instructed to inquire of

you if you carry on retail trade in conjunction with wholesale dealing also in other indirect manner, proved to be a violation of the Pharmacy Act, 1868. By order of the Committee." This, of course, was a stumbling block to many people who knew nothing of the writer, and who imagined there was some committee appointed, possibly by the Council, to deal with cases of that sort. He could only say that he knew of no such committee, and that no body of any kind other than the Council had any power to take proceedings under the Pharmacy Act, so that any threats or observations of this kind made by any person without the authority of the Council were absolutely worthless. In some cases the letters referred to other matters, and seemed to show that with regard to the laws appertaining to pharmacy the writer was suffering under some form of hallucination or misconception. He might, perhaps, as well say that the name of the writer was Mr. G. W. Sargent. Mr. Sargent had not honoured him with any of his communications, though he had written not only to local and divisional secretaries, but to members of Council and others, and had actually taken recently to writing to subscribers to the Benevolent Fund, who were not necessarily even chemists and druggists, to whom the letters naturally caused considerable annoyance. He hoped that if any more letters of the sort were received, those to whom they were addressed would estimate them at their true value.

Mr. GOSTLING said he was very glad the President had mentioned this matter, as there was very little doubt that harm was being done to the Benevolent Fund. He had received a letter in which it was stated that "large sums of money were continuing to be subscribed to the Benevolent Fund for the purpose of carrying on illicit trading, and other illicit practices."

Mr. CROSS said nearly every chemist in Shrewsbury had been the recipient of several of these letters. It was a wonder to him how one man could get through so much work of this kind as Mr. Sargent appeared to do.

LOCAL SECRETARIES.

The PRESIDENT drew attention to the fact that the election of local secretaries would take place during the present month. Last year, for the first time, at the suggestion of Mr. Cross, the plan was adopted of holding this election in October instead of in May, concurrently with election of Council, and he then pointed out to members and associates in every town the importance of taking an interest in this election. He was glad to know that last year sufficient interest was taken in the election in many towns to lead to a meeting of the trade being called, which was the right thing to do, because whether a man belonged to the Society or not he was distinctly interested in having someone in every district to represent him in regard to various matters connected with the trade; amongst others, questions of infringement which affected everyone on the register. He did not mean to say that the Society had not had heretofore, in the majority of cases, some of the best men appointed; but occasionally the best men, men of very considerable reputation and standing, had for that very reason so much to do, that it might be necessary from time to time to consider how far it was desirable they should retain office. In many cases local secretaries who had been in business for a number of years would be very glad to give way, if on a meeting being held it was thought that a younger man was available, who would be able to give more time to the duties. The principle on which the Society was founded being of the most democratic character, it seemed to him that the essence of the constitution was that in the election of local secretaries there should be sufficient interest manifested to secure a good man, who would be willing to devote a little time and trouble to the business. The affairs of the Society in the provinces could not be carried on without appealing to these gentlemen on many occasions, and in certain cases there was the important duty of supervising the local examinations. Even in the smallest town, a local secretary, if he took sufficient interest in the trade, might be of very great service to the body represented by the Council, and he hoped, therefore, that due attention would be paid to this election.

Mr. HAMPSON remarked that the prosperity of the Benevolent Fund depended in great measure on the efforts of the local secretaries.

The PRESIDENT said that was quite true. The activity of the local secretaries could be shown in a splendid manner by the amount of subscriptions they obtained. No doubt opportunities varied in different places, but is was well known that where the local secretary voluntarily undertook duties of this kind he produced much more effect than any number of letters or circulars from the office.

THE REDWOOD SCHOLARSHIP.

The PRESIDENT said he wished to propose that the Library, Museum, and Laboratory Committee be asked to consider whether the regulations for this scholarship might not advantageously be modified. At the time it was founded there was no Research Laboratory in existence, but, nevertheless, the distinguished man in whose honour it was established had a strong feeling that he should like to have the scholarship associated with something of that kind if it had been possible, and he had the same feeling now. It seemed to him that it might be advisable to so alter the character of the examination as to make the scholarship available for a man who had passed his Major, instead of one who was a mere student. There were good men in the School and elsewhere who were pharmaceutical chemists, who would be glad to avail themselves of further instruction in the Research Laboratory if they could get something like £25 towards carrying them through the year. The present scholars, considering the many branches of knowledge they had to acquire, could not devote much time to chemistry, physics, and the higher branches of botany; and there was to some extent a want of encouragement to extra knowledge in these directions. He thought, possibly, therefore, it might be well to so alter the conditions of the scholarship as to make it suitable for a man who had passed his examination instead of one commencing his studies. He would not go farther into detail at present, but if any alteration were to be made, it would be well to do so while the Council had the advantage of Professor Redwood's advice and assistance, and he would therefore move—

> "That the Library, Museum, Laboratory and House Committee be requested to consider and report how far the present regulations of the Redwood Scholarship award may be modified or altered."

Mr. MARTINDALE seconded the motion. He thought it a subject of great importance that students who had passed the Major should have an opportunity of pursuing the study of chemistry systematically, and with a freedom which they could not feel when they were preparing for an examination.

The motion was unanimously agreed to.

REPORT OF THE GENERAL PURPOSES COMMITTEE.

The report of this committee included the usual letter from the Solicitor reporting on cases which had been placed in his hands. In one case a judgment for penalty and costs had been obtained and one case stands for trial.

Several cases of the sale of weed killer or other

poisons by unregistered persons had been reported to the Committee, and proceedings were recommended.

This report was as usual read and considered in Committee.

On resuming, the report and recommendations of the Committee were unanimously adopted.

EVENING MEETING IN LONDON.

MR. MICHAEL CARTEIGHE, PRESIDENT, IN THE CHAIR.

The Inaugural meeting of the Session took place on Wednesday, the 7th inst. The weather was very unfavourable and the hall was not so crowded as on many occasions, though there was a fair sprinkling of ladies present. The President, Mr. Michael Carteighe, took the chair at half-past eight o'clock.

The School of Pharmacy Prize Competition.

The President said the first business would be to receive the report of the Professors and Lecturers upon the results of the competition for medals and certificates among the pupils in the Society's School of Pharmacy during the last session.

Professor Attfield then read the following report:—

Report on the Society's School of Pharmacy, Forty-ninth Session, 1890–1891, *by the Dean of the School, Professor Attfield.*

Seventy-seven students attended the Society's School of Pharmacy during the past session. This is an average number. Thirty-nine worked at all the subjects; the others being, for the most part, such pupils as prefer to spread their pharmaceutical studies over two or even three years.

For Practical Chemistry there were sixty-two entries, the average of the past twelve years being between sixty-two and sixty-three. Exactly half the entries were for the whole session, the other half for shorter periods. Fifty of the entries were made at the commencement of the session, the other twelve subsequently. The average period of study per pupil was nearly four hours daily for nearly seven months. At the examination for prizes in April thirty-two of the students voluntarily competed, the largest number within my experience as Director of the Laboratories. The Bronze Medal was gained by Mr. William Bonny Hoile, the Redwood Scholar of the year; and the two Certificates of Honour were won by Mr. Henry Garnett and Mr. James Downing. In July sixteen students competed for the Silver Medal, which was secured by Mr. Henry Garnett, one of the two Bell Scholars of the year; the three Certificates of Honour being taken by Mr. W. B. Hoile, Mr. Frank F. Riches, and Mr. Ernest H. Lee.

Professor Dunstan reports that the work of the students in chemistry has been entirely satisfactory. The two Medals are taken by the Bell Scholars, Mr. Harrison having been awarded the Bronze Medal in April and Mr. Garnett the Silver Medal at the Sessional Examination in July. The Redwood Scholar, Mr. Hoile, obtained the second Certificate of Honour in April and again in July. The first Certificate of Honour was awarded in April to Mr. Garnett. In the Sessional Examination the three Certificates of Honour were awarded to Mr. Harrison, Mr. Hoile, and Mr. E. H. Lee. It is gratifying to be able to add that both the Bell Scholars have applied to the Research Committee for admission to the Research Laboratory, and have been admitted as workers during the present session.

In the department of Botany Professor Green states that the work was well sustained throughout both courses of lectures and in the illustrative practical work, and that the conduct and diligence of the students were quite satisfactory. At the end of the First Course the Bronze Medal was won by Mr. Frank F. Riches and the two Certificates of Honour by the Bell Scholars, Messrs. Garnett and Harrison. The Silver Medal, awarded at the close of the Session, was obtained by Mr. Garnett, and the three Certificates of Honour by Mr. Frank F. Riches, Mr. Harrison and Mr. E. H. Lee.

Mr. Ince announces that a favourable account may be given of the work and general conduct of the students in the department of Practical Pharmacy and Dispensing. Attention has been given during the past session to certain details of arrangement intended to promote the convenience of the class; a new, separate lecture-room has been provided, and it is hoped that full benefit may accrue from this enlarged and much needed accommodation. At the conclusion of the first course, the Bronze Medal was awarded to Mr. W. B. Hoile, the Redwood Scholar, who also was successful in obtaining the Silver Medal at the close of the session.

Mr. Greenish states that the attendance at the lectures on materia medica was extremely regular, and the attention and diligence shown by the students all that could be desired. The Bronze Medal at the end of the first course was awarded to Mr. W. B. Hoile, the Redwood Scholar, whilst at the end of the session Mr. Harrison, one of the Bell Scholars, succeeded by a very small majority only in carrying off the Silver Medal from his fellow competitors. The attention and success with which the lectures and practical work in microscopy were followed, were most gratifying, and warrant the increased facilities to be afforded in the coming session for instruction in this important branch of materia medica.

The Professors and Lecturers observe with satisfaction that the Council have appointed Mr. T. S. Dymond, F.I.C., Assistant-Lecturer in Chemistry. Mr. Dymond was formerly a student in the School, and has been for some years the Assistant to the Professor of Chemistry as well as, latterly, Demonstrator in the Research Laboratory.

A report on the forty-ninth session of the School of Pharmacy of the Pharmaceutical Society of Great Britain, communicated to the Society in the first week of the fiftieth session, would scarcely be complete without some reference to the Jubilee of the School. Next October, 1892, the School will have completed fifty years of life. How that event should best be commemorated will be for the Council, the Staff of the School, and the students to decide during the present session. A bond of union between old students already exists in the form of the School of Pharmacy Students' Association, the officers and members of which would find congenial work in piecing together such rolls and records of the School as the Council, the teachers and students of the earlier decades might contribute. Possibly the old student who now occupies

the Presidential chair of the Society might be induced to deliver a Jubilee address on the occasion. The School extends far beyond its Bloomsbury walls. It is composed of students now located in all parts of the empire. Its tone and teaching have not only conferred advantages but have implanted responsibilities, and it is not too much to say that the result has been a succession of bodies of pharmacists who have promoted the welfare of the Pharmaceutical Society and of pharmacy generally. A review of the life-work of the School seems to the Professors and Lecturers to be demanded at the end of fifty years, and they are prepared to organize whatever commemorative plan or plans may be selected.

The Dean of the School then called the names of the prize winners, to whom the President presented the prizes and certificates as follows :—

JAMES DUNNING.

Certificate of Honour — 1st Course — Practical Chemistry.

ERNEST HARRY LEE.

Certif. of Honour—Session—Practical Chemistry.
Certificate of Honour—Session—Chemistry.
Certificate of Honour—Session Botany.

FRANK FRASER RICHES.

Bronze Medal—1st Course—Botany.
Certif. of Honour—Session—Practical Chemistry.
Certificate of Honour—Session—Botany.

EDWARD FRANK HARRISON.

Bronze Medal—1st Course—Chemistry.
Certificate of Honour—1st Course—Botany.
Certificate of Honour—Session—Chemistry.
Certificate of Honour—Session—Botany.
Silver Medal—Session—Materia Medica.

WILLIAM BONNY HOILE.

Bronze Medal—1st Course—Practical Chemistry.
Certificate of Honour—1st Course—Chemistry.
Bronze Medal—1st Course—Pharmacy.
Bronze Medal—1st Course—Materia Medica.
Certif. of Honour—Session—Practical Chemistry.
Certificate of Honour—Session—Chemistry.
Silver Medal—Session—Pharmacy.

HENRY GARNETT.

Certificate of Honour — 1st Course — Practical Chemistry.
Certificate of Honour—1st Course—Chemistry.
Certificate of Honour—1st Course—Botany.
Silver Medal—Session—Practical Chemistry.
Silver Medal—Session—Chemistry.
Silver Medal—Session—Botany.

THE HERBARIUM PRIZE.

Professor GREEN having been called upon to report on the competition for the Herbarium Prize, said he had much pleasure in stating that the gentleman who obtained the silver medal had sent in a very fine collection. The competition was not a very keen one, but two other collections sent in were worthy of special commendation. As this competition would in future be conducted on somewhat different lines, the number of specimens being limited to 150, he wished to emphasize what he had said more than once before, and which might be taken as his advice to future competitors. Plants should not be sent in simply for the sake of swelling a list, but they should be all carefully selected, especial care being taken that they represented really what the plant was. Many specimens had been submitted in past years which were of no particular value, but only formed an item in a long catalogue. Many plants flowered at one period and fruited at another some weeks later, and the specimen sent in only represented one of these two stages, and could not therefore be considered typical of the plant. Every specimen should show exactly what the plant was, as far as possible throughout its whole life. The number now being limited, it was very necessary that more attention should be given to this point, and if he had the honour of being asked to advise on the award of this prize in future he should lay great stress on these points—that the plants must not only be gathered in a suitable condition and properly pressed, but that they should properly illustrate the genera and species to which they belonged.

The PRESIDENT then presented the prizes to the successful competitors as follows :—

HENRY WILLIAM CLEAR—Silver Medal.
CHARLES EDMUND ASHBY—Certificate of Honour.
JAMES DUNNING—Certificate of Honour.

THE COUNCIL PRIZES.

The PRESIDENT, in the unavoidable absence of the gentlemen who had conducted the examination for these prizes, briefly stated the effect of their report, remarking on the fact that all three prizes, which were not confined to pupils in the Society's School, but were open to all comers, had been taken by the Bell and Redwood scholars.

The PRESIDENT then presented the prizes to the successful competitors as follows :—

I. PEREIRA MEDAL (SILVER); and Books of the value of £5 presented by Mr. T. H. Hills.

HENRY GARNETT.

II. PHARMACEUTICAL SOCIETY'S MEDAL (SILVER); and Books of the value of £3, presented by Mr. T. H. Hills.

WILLIAM BONNY HOILE.

III. PHARMACEUTICAL SOCIETY'S MEDAL (BRONZE); and Books of the value of £2, presented by Mr. T. H. Hills.

EDWARD FRANK HARRISON.

REPORT ON THE BELL AND REDWOOD SCHOLARSHIPS.

Mr. W. M. HOLMES, in presenting the report upon the result of the examination for the Bell and Redwood Scholarships, which had been conducted by Mr. Tanner and himself, said that twenty-two candidates had presented themselves at thirteen centres, a number that was below the average. The work done by the successful candidates had been very good, and they had fully earned their distinction. The candidate third in order of merit had found himself unable to accept the Redwood Scholarship, and the Committee had therefore recommended its award to the next competitor on the list. The subjects for the examination, which were the same for the Redwood as for the Bell Scholarships, were arithmetic, English, French or German, Chemistry and Pharmacy. All the candidates this year had chosen French, and this, as a whole, had been their weakest subject. Mr. Holmes then remarked that the total value of each of the Bell Scholarships was upwards of £75 and that of the Redwood scholarship was £20, and said he thought if the advantages which these scholar-

ships confer upon the recipients were clearly laid before apprentices at the outset of their career, a larger number would join the ranks of the Society. His own impression was that the apprenticeship itself was at fault. Apprentices were too often taken, not because there were special facilities for teaching them their business, but because their labour was cheap. If apprentices were more generally encouraged to study throughout the term of their apprenticeship, not twenty-two, but ten times that number would compete for these scholarships. The names of the successful candidates were—

JACOB BELL MEMORIAL SCHOLARSHIP.

Hooper Albert Dickinson Jowett.
Eustace Harold Gane.

REDWOOD SCHOLARSHIP.

William Foskett Edward Horrell.

The PRESIDENT congratulated the successful candidates and also handed to each of the Bell Scholars books of the value of £2 10*s.*, presented by Mr. T. H. Hills in memory of Jacob Bell.

THE INAUGURAL SESSIONAL ADDRESS.

Mr. GAINSFORD BRUCE, Q.C., M.P., then delivered the Inaugural Address, which will be found at p. 285.

At the conclusion of the address—

Professor ARMSTRONG proposed a cordial vote of thanks to Mr. Gainsford Bruce for the most able and interesting address that had been delivered. He said he had had an opportunity on many similar occasions of listening to addresses from men occupying high positions in the scientific or medical world, but he had felt more satisfaction on the present occasion than he had ever done before. The men he referred to had nearly always been members of the scientific fraternity, and he could not help feeling that in this country men of science formed but a very narrow section of the community, and their methods and objects were but very slightly understood by the general public. On the present occasion a gentleman had addressed them who had no connection with science, and yet he had shown the deepest interest in their work. He had obviously taken the trouble to inform himself of the nature of that work, and had stated the case in a very clear and perfect manner. Having done this he would be in a position to act as their interpreter, and when the occasion arose would be able to speak as to the work done by the Pharmaceutical Society. If science were ever to have its proper influence and effect in this country, to take the position it held in Germany, it would be through the agency of gentlemen like Mr. Gainsford Bruce, who had been at the pains to understand scientific work, and on that ground he felt that they were deeply indebted to him.

Mr. GILES, in seconding the motion, said he supposed he was looked upon as a sort of connecting link between pharmaceutical science and the bar, and for that reason had been selected to second the vote of thanks. The address they had heard, however, showed that no such intervention was necessary, for he had been surprised at the facile manner in which Mr. Bruce had discoursed of matters pharmaceutical and scientific. Mr. Bruce belonged to a profession which was *ex officio* learned and *ex hypothesi* eloquent, but there were degrees in all things. A witty Frenchman had said that all women were beautiful, but some were more beautiful than others, and in the same way, though all counsel were eloquent, some were more eloquent than others, and he thought the meeting would have no difficulty in deciding to which category Mr. Bruce belonged.

The motion having been carried by acclamation,

Mr. GAINSFORD BRUCE briefly acknowledged the compliment, and the proceedings terminated.

Pharmaceutical Society of Ireland.

ANNUAL MEETING.

On Monday evening, the 5th instant, the annual meeting of the members of this Society was held in their new and commodious house in Lower Mount Street.

The chair was taken by the Vice-President, Mr. F W. Wells.

The Registrar, Mr. Ferrall, read the minutes of the last meeting, which were confirmed.

The Vice-President said:—Gentlemen, in the absence of our President it becomes my duty to preside at this, the Sixteenth Annual Meeting of the Pharmaceutical Society of Ireland. Before we proceed to the scrutiny of the voting papers, I have, on behalf of your Council, to give an account of our stewardship. The year that closes to-night has been a most eventful one for the Society, I think I may say the most eventful one in its history. Last year was marked by the passing of the Pharmacy Act Amendment Bill, a Bill which was not, as you are all aware, promoted by your Council, nor did they approve of it. When it came from the House of Lords, it was a very different measure to what it was when it entered that House, and much more workable, but still in its present form there are some clauses under which it will be very hard to protect the public and the pharmacist. But, gentlemen, it was the duty of your Council to carry out the Act fairly as amended, and that they have done to the best of their ability. Early in the year they had to draft a lot of new regulations and to alter many of the old ones, so as to bring them into conformity with the new Act; these will appear in the Calendar for 1892. I would like now to refer to one very important event of the year. Most of you are aware that in 1875 this Society came into existence, but like many in this world, the father of the child, the Government of the day, sent it out on the world with a good name and an empty pocket. However, the College of Physicians had pity on the tender babe, and became its foster-mother, and gave it the use of their fine halls, where the Society felt quite at home; but the day soon came when the foster-mother got tired of the child and put it out on the world again. Then your Council had to take apartments; but our worthy treasurer, Mr. Hodgson, one of the original Council and one of our most useful members, was never satisfied with this arrangement; his great anxiety ever since has been to get a house for the Society. With this object in view he hoarded up our funds. Many of us thought we should make other use of the money, but he would not part with his nest egg, and I think it right to say that had it not been for Mr. Hodgson we would not have had funds to fight against the Bill last year. I consider we are deeply indebted to him for the way he has always looked after our financial affairs, and I think the Auditors will bear me out when I say that the keeping of our accounts for the past year has been no sinecure. Well, at last Mr. Hodgson has got his wish gratified. To-night, in the name of your Council, I have the pleasure of bidding you wel-

come to the future house of the Society. I think you will admit that the house is in every way most suitable to our requirements. We had hoped to have it more complete for the meeting to-night, but it is very hard to get workmen to hurry themselves. You can form a very good idea for yourselves of the many advantages we will have in such a commodious building. This fine room, in which we meet to-night, will be the Examination Hall, and we have left it to the new Council to have it fitted up for that purpose. We have set apart a room downstairs as a Committee and Reading Room for the use of members and, I trust, we may soon have the evening meetings again revived. In accordance with clause 13 of the Amendment Act an election took place in January for seven druggists to sit on the Council with the twenty-one pharmaceutical chemists then on it. There were eleven nominated for the seven places, the voting being confined to druggists only. At the election to-night, for the first time in the history of the Society, the whole Council retire, and the new one to be elected to-night will consist of twenty-one members, of whom fourteen must be pharmaceutical chemists, the remaining seven may be registered druggists, but the whole twenty-one may be pharmaceutical chemists. In June, much to the regret of your Council, Mr. Charles Evans resigned the Presidency which he had held for two years with credit to himself and much benefit to the Society. Mr. Wm. Hayes was unanimously elected to the office, but, unfortunately, had to go to Australia, so that we have been without a President for the past three months. During the year your Council drafted regulations for the Examination of Assistants to Pharmaceutical Chemists in accordance with the power given by Clause 19 of the Amendment Act, and which have been approved of by the Privy Council. The first examination will take place at an early date. This will supply a long felt want to pharmacists. Hitherto the only legally qualified assistant he could get was a licentiate, but it has been impossible to get a sufficient number of our men yet to supply the wants. Now we will be able to have an assistant who has shown his competence by going through a thorough examination in materia medica and practical pharmacy, and who will be competent to transact the business of a licentiate of the Pharmaceutical Society in his temporary absence, but shall not be entitled to conduct or manage a business or to keep open shop on his own account. I am aware that some have objected to this qualification, but I have not heard any good objection to it; on the contrary, I consider it will be a great advantage to the employer, and when a young man gets through this examination he will be anxious to go on for the licence. As to the examinations for the Preliminary, we had 64 candidates, of whom 40 passed; this shows a great improvement on the previous year, when we had 45 candidates of whom only 22 passed. In addition we had 14 this year up for the licence who had passed the Preliminary of other licensing bodies, and paid the fee to be placed on our Preliminary Register. From this you will see that there is no fear for the future as to the supply of pharmaceutical chemists. For the licence 43 presented themselves (9 of whom were for re-examination); 36 passed. This also shows a large increase in the number of successful candidates over the previous year, when 36 presented themselves, of whom 24 passed. This shows a very satisfactory improvement in the candidates presenting themselves for examination. At first sight one might think this could be accounted for by the change in the examiners which took place in January last, but I do not think that it does, as I find at the October examination, 1890 (which is included in the year's return), that out of 13 candidates 12 passed. One cause of the improvement is doubtless the fact that a rejected candidate has now to pay the examination fee at the second examination, whereas he used to get the second examination without further payment. As a result men come up now intending to pass, where before they came up simply to see what the examination was like, but I think there is no doubt that the 100 hours chemistry course, which has now had a fair trial, has a good deal to say to it. During the year, out of the 43 candidates there were 26 who had taken out the 100 hours, some few of them (4) had taken out 200 hours, and two others 150 and 166. I find that only—

1 candidate	failed in	Practical Chemistry.
2 candidates	,,	Theoretical Chemistry.
1 candidate	,,	Botany.
1 ,,	,,	Materia Medica.
3 candidates	,,	Compounding.
5 ,,	,,	Prescription Reading.
2 ,,	,,	Pharmaceutical Paper.
5 ,,	,,	Grand Total.
2 ,,	,,	1 subject only.
1 candidate	,,	1 subject.
2 candidates	,,	2 subjects.
1 candidate	,,	3 subjects.
1 ,,	,,	5 subjects.

The registration under clause 6 of the Amendment Act of those chemists and druggists or chemists or druggists who were practising in Ireland as principals at the passing of the principal Act gave an immense amount of work to the Committee of your Council appointed to look into the claims sent in. I do not think words could describe the trouble this class has given to your Committee; we have spent hour after hour, going into the applications. Of course, there were some of these, the old *bonâ fide* chemists and druggists, which were easily passed, but in the majority of cases it took a great deal of writing to get the necessary evidence from the applicant. I am satisfied that a large number who have been placed on the Register were in no sense druggists. In many cases the benefit of the doubt was given in favour of the applicant, and in this way very few have been refused. We have, however, some very doubtful cases yet to decide. Those who have been refused gave us in most cases clear evidence that they were not entitled to be registered. The Committee are most anxious to place everyone on the Register who is entitled, at the same time they feel that a great responsibility rests on them to protect not only the public, but also the druggists who are justly entitled to be registered, as well as the licentiates of our Society. It would hardly be necessary to remind our friends the druggists that they have got a share in a great monopoly, and that every person that the Committee register who is not really a druggist, it is a wrong done to them (the *bonâ fide* druggists), yet some think we should not refuse any who apply and state they sold even one ounce of poison. The frauds that have been attempted on us are numerous and ingenious; they are quite sufficient to make one adopt the new adage "Take every one to be a rogue till you know them to be honest." I will mention a few. Some sent invoices with dates altered, prior to 1875. In one such case there is a footnote "Sunlight soap will follow from the works." What a ray of light comes from the soap in this case. Another one was altered to 1872; the water mark in the paper shows that it was only made in 1875. Several have dates altered and items partly taken out and poisons written instead, others have manufactured poison books for the occasion, some got billheads printed with 187 on them, one man claimed under section 7 and stated that he was not quite twelve years in business on his own account, but applied after June 1 and was late; he then made an affidavit that he was in business on his own account prior to 1875, and got a friend to certify the same thing. In another case a magistrate stated that he

knew of his own knowledge that a lady was a partner in business with her mother prior to 1875, but according to her own showing she was then only 11 years old, rather a young partner to have selling poisons. In some cases ladies claimed with their husbands as partners, but unfortunately the framers of the Act forgot to make provision for sleeping partners, so your Committee had to refuse the applications. I mention these cases to show you the difficulty the Committee have had to contend with. I believe many of the applicants have been persuaded that because they got a few poisons to oblige a customer that therefore they could claim as druggists. Examinations for registration as registered druggists were held in Dublin, Belfast and Cork for those under clause 7 of the Pharmacy Amendment Act, 1890. There were 176 candidates, of whom 160 passed and are registered as registered druggists. This examination was for those who went into business as druggists as principals between the passing of the Pharmacy Act, 1875, and the passing of the Amendment Act, 1890. Application under this clause had to be made on or before the 1st day of June, 1891. The Council are not bound to hold any further examinations under this clause, but they may give one more chance to those who failed. This examination was a very simple one indeed, and from the answering of many of the candidates, it was clear that they were in no sense druggists, and knew little or nothing about drugs. For instance, one of the candidates said he did not know if senna was a poison, but thought it was, as it was a laxative, and they were mostly poisons. Another said chloride of lime was prussic acid. Another did not know what an ointment was, could not say whether it was a pill, a powder, or a tincture; he had never seen it before. After the examination some of the candidates said they had never seen many of the specimens till the evening before. I must say that the examiner, Dr. Falkner, gave them every chance, and those who failed were very ignorant indeed of the drugs, etc., shown them. Under clause 8, which may be called the perpetuation clause, we had 61 candidates, of whom 44 were successful and were registered as registered druggists. Examinations under this clause will be held four times a year, in Dublin, and in other places wherever 12 candidates apply. I am very pleased to be able to report that we close this year with the largest number of members which we have yet had; viz., 3 of the original members who are still on the Council and subscribers, and 154 elected members. Of these 51 have joined during this year, so that in two years we have trebled the number. I think this shows that the licentiates are better pleased with the action of the Council for the past two years. There were 12 members struck off the list during the year for non-payment of subscription. For the first time in the history of the Society we have now associate-druggists who pay the same subscriptions as members. Under that title 70 druggists have joined us this year, so that there are 227 persons entitled to vote at the election to-night. The Society's School of Chemistry, under the care of Professor Tichborne and Mr. Kelly, has more than realized our best expectations, and has supplied a want to pharmaceutical students. We had 30 students during the past year, the old room was not large enough for the class, but in the new house we have fitted up a room which can be made to accommodate about 40 students. The class will commence work next week, the Registrar will take the names and fees of intending pupils. There is one other matter that I wish to refer to. A great many of our licentiates have from time to time complained to us of want of protection; and I think they do so justly. They must bear with the Council for not having done more in the past year, in consequence of the amount of work that has been thrown on our shoulders. I am glad, however, to say that we brought one set of test cases in the police court, and as you are all perhaps aware we got some very important decision in favour of the Society. I think we may understand that the question of a shop within a shop has been fairly settled now. The Council know the power that they have, and I think that those who break the law ought also to know the power that we have. Hitherto it has generally cost us about £10 to recover £5, and of that £5 the inspector has had to get a third; but our worthy Treasurer will be glad to know that on this occasion for the first time in the history of the Society we have netted a profit in connection with our prosecutions. Many members may not be aware of what we can do. For every bottle made up on prescription, made up by a person not legally entitled to do so, we can take out three separate summonses, so that if the offender makes up one prescription in each day of the week we can proceed against him for eighteen separate sums of £5 each. In one of the cases in which we prosecuted we brought three separate charges, making nine offences; in connection with another there were six offences; and in the other ones there was only one offence in each case. In one of the cases we got three convictions; and the man not being in a position to pay the magistrate asked us to be satisfied with one penalty. To this the Council assented. I should mention that the magistrates not only imposed fines in each case, but added the alternative of two months' imprisonment in the event of the fines not being paid. One of the offenders actually went to jail for four days. It should be understood that these prosecutions are not to be one-sided affairs. The druggists, as well as the pharmaceutical chemists, have a great stake involved, and it is likely that after January 1 there will be a great many men selling poisons without being entitled to do so. It will therefore be for the druggists to watch their own interests; and now that we have associate druggist members of the Society the Society will have no hesitation in defending their rights. Our next duty is to have the voting papers scrutinized, and I would ask Mr. Boyd, Mr. Downes, and Mr. Grindley to act as scrutineers.

Mr. Holmes asked why he had not received a voting paper.

The Vice-President said there was a bye-law that any member who was in arrear with his subscription was not entitled to vote.

Mr. Holmes said he was an original member of the Society, and one of those who was named in the Act of Parliament under which it was formed, and therefore he was free from all charges. He had been receiving voting papers for the last sixteen years.

Mr. Hodgson said that some years ago, at a time when the Society was very much in want of funds, all the original members of the Society made an agreement that they would voluntarily pay their guinea each the same as the rest of the members. That, however, did not deprive any gentleman who was an original member of the privilege that was given to him by the Act of Parliament.

Mr. Robinson moved that a voting paper be given to Mr. Holmes, which was seconded by Mr. Beggs.

The Chairman in putting the motion said he had the regulation before him in black and white, and he really believed that they would be exceeding their duty in allowing any member who had not paid his subscription to vote.

The motion was agreed to and a voting paper was given to Mr. Holmes.

Mr. Bernard called attention to the circumstance that two of the gentlemen who were named as scrutineers of the ballot were themselves candidates for membership of the Council, and said that he and some other members had a decided objection to it.

The Vice-President said he was only following the

precedent that had been set at all former elections. He did not see why those who were interested should not see that the thing was fairly done. At the same time if the meeting thought it better that the scrutineers should be gentlemen who were outside the Council it should be done.

Mr. Robinson moved that Mr. Allen, Dr. John Evans and Mr. Downes be the scrutineers.

Mr. Beggs seconded the motion, which was agreed to.

The scrutineers proceeded to perform their duty and later on in the evening made the following report:—The number of voting papers sent in had been 182, of which 13 were spoiled. The voting for the candidates was as follows:—Mr. Hodgson, 157 votes; Mr. Baxter, 156; Mr. Charles Evans, 155; Mr. Hayes, 153; Dr. Burnes, 152; Professor Tichborne, 152; Mr. Simpson, 149; Mr. Montgomery, 146; Dr. Whitla, 146; Mr. Beggs, 145; Mr. Boyd, 144; Mr. Doran, 143; Mr. Robinson, 143; Mr. Sunner, 138; Mr. Gibson, 136; Mr. Merrin, 132; Mr. Grindley, 120; Mr. Lyons, 119; Mr. W. F. Wells, 118; Mr. McCormack, 116; and Mr. Stewart, 110.

The foregoing having the highest number of votes were duly declared elected. The voting for the other candidates was as follows:—Mr. Turkington, 47; Mr. Clotworthy, 19; Mr. Shaw, 25; Mr. Rankin, 61; Mr. Moore, 53; Mr. McNeight, 56; and Mr. Johnston, 45.

Mr. Hodgson, the Treasurer, then made his annual financial statement. The year's operations closed with a balance in the Bank of Ireland of £377 12*s.* 3*d.* The regular income of the Society had been similar to what it usually had been. The amount received in fees paid by those—25 in number—who went in for examination for the licence was £131 5*s.*; 70 fees paid by candidates at the Preliminary examinations amounted to £147; and subscriptions paid by 119 members had produced £124 19*s.* From those who came in under the original Act for re-examination and from others who came in under the Amendment Act £90 had been received. From 370 persons who had paid fees to be registered as chemists and druggists £388 10*s.* had been received; 166 fees paid by persons who had gone in at the modified examinations for chemists and druggists had produced £419 3*s.*; 86 fees paid for examination as druggists' assistants had amounted to £361 4*s.*; and 74 subscriptions paid by associate druggists had come to £77 14*s.* Income received from pharmaceutical chemists amounted to £402. Adding some small items arising from examinations the total income of the Society for the year came to £1717 16*s.* 6*d.* On the other side of the account there appeared £160 18*s.* paid in fees to examiners for the licence; £33 in fees to preliminary examiners; £25 fees refunded; £17 fees paid in connection with their School of Pharmacy; sundry sums paid for salary of the Registrar, postage, etc.; a year's subscription to the *Pharmaceutical Journal*; £50 rent for their late rooms in Harcourt Street; £40 to Messrs. Casey and Clay for expenses in connection with the new Act; £50 in connection with sundry prosecutions; and £57 for printing, stationery, etc. Then there was the large sum of £675 which had been paid for their new house. They had it virtually rent free, for it was only subject to £10 a year ground rent, and that could be made by the letting of a stable at the rear. The house was thoroughly well suited to them in every respect. It contained residential apartments for the Registrar, a room which could be used as a club room, and in which he hoped that all members of the Society would now meet together, for they should all work together and there should be no friction; also a room for the School of Pharmacy; and the large chamber in which they were now met which was to be filled up as an examination hall and used for no other purpose. Nothing had to be spent in papering or painting, and the outlay necessary for completing the fittings would not amount to more than a couple of hundred pounds. Since the accounts were made up their bank balance had been increased by various payments to £453 14*s.* 9*d.*, and they had also in the funds a sum of £248 3*s.* 1*d.* The accounts had been audited by Mr. Simpson and Mr. Grindley.

Dr. Burnes gave a satisfactory account of the School of Chemistry, in which he said 30 pupils were now entered.

The Chairman brought forward a notice of motion that the *Chemist and Druggist* be substituted for the *Pharmaceutical Journal*, as the organ of the Society. A discussion ensued, in the course of which on the one hand it was urged that the *Pharmaceutical Journal* was being supplied to the members rather at a loss to its proprietors than otherwise, whilst on the other hand several members expressed a preference for the *Chemist and Druggist*.

Eventually a show of hands being called for, ten were raised for the *Chemist and Druggist* and seven for the *Pharmaceutical Journal*.

The Vice-President, in the course of the discussion, explained that the vote there was to be taken merely as a recommendation to the Council.

Mr. Barnard brought forward a motion, complaining of the action which had been taken by the Apothecaries' Hall of Dublin in connection with an election held last September, "for a registered apothecary or pharmaceutical chemist" for the South Dublin City Dispensary. The appointment was given to an apothecary, and Mr. Barnard contended that the just rights of pharmaceutical chemists had been ignored in the matter.

After a long discussion, the matter was referred to the Council, with a request that they would consider it at their November meeting.

The proceedings terminated at a late hour.

Parliamentary and Law Proceedings.

The Sale of Methylated Spirits.

At Stirling J. P. Court on October 5 Dr. Fraser, Kilsyth, was charged with selling 2 gills of methylated spirits without being duly licensed. The penalty for the offence is £50.

Mr. Archibald, solicitor, Stirling, for Dr. Fraser, said that the prosecution in this case truly illustrated the doctrine that an employer was responsible for those engaged by him, even if there was a recklessness which the employer might object to. In this instance the Excise officer visited the shop, and had a conversation with an assistant about the efficacy of methylated spirit and camphor in the treatment of sprains. A preparation for this purpose was made up and the officer got it. He then asked for 2 gills of the methylated spirit by itself, and was supplied. All this was done in the absence of Dr. Fraser, who knew nothing about it until communicated with by the Crown authorities.

For the prosecution it was pointed out that the sale of methylated spirit had increased so much that special instructions were issued to test each chemist as to sale. The liquid was being used as a beverage, and twopence worth of it, prosecutor stated, would make a person drunk for a week. The Bench imposed a fine of £5, including expenses.—*Glasgow Evening Citizen.*

A. F. W.—Use a stoppered bottle and rub the stopper round with paraffin.

W. H.—The articles sold under the name are frequently preparations of arsenic.

Communications, Letters, etc., have been received from Messrs. Barton, Sugdon, Stead, Lloyd, Robb, Powell, King, Cologne.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, OCTOBER 17, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

APPOINTMENT OF LOCAL SECRETARIES.

IT does not require more than an average amount of sagacity to perceive that under existing conditions a greater amount of co-operation is one of the most urgent necessities of chemists and druggists throughout the kingdom. On all sides is heard the cry that unity is above all things essential, if the care for their technical interests as traders is ever to be made practically effectual in promoting the interests of the body. So far as words go there seems to be, on this point, a perfect unanimity among those of the most opposite opinions. But by a strange anomaly all this sentimental argument is unaccompanied by corresponding action, and chemists are still open to the reproach and the disadvantage of being deficient in organized association. It is in this respect that we have on several occasions urged the importance of increasing the activity of the Pharmaceutical Society in the provinces, and now that the time has come for the election of local secretaries the subject may again be brought under the notice of our readers. The remarks made at the last Council meeting by the PRESIDENT and the TREASURER of the Society are alone sufficient to show that with the lapse of time there has been a considerable development of the functions appertaining to a local secretary of the Society. He is no longer the mere local representative of a central organization of a private character, charged with the duty of collecting subscriptions, but is or should be, likewise, the representative of the chemists in his district in regard to the Society as an official body having public duties to perform, in the discharge of which every person on the register of chemists and druggists is directly interested. The letters which appear in this week's Journal also show that this view of the matter is being adopted in provincial centres, and it may be inferred that there is a fair prospect of effecting that improvement in the appointment of local secretaries, which was contemplated by the plan suggested by Mr. CROSS. The first necessity is that sufficient interest should be taken in this matter, by the chemists in the several districts, to ensure the nomination of men to serve the office who would be able and willing to devote time and trouble to the efficient performance of its manifold duties. There are so many ways in which the work to be done by the Council must be influenced by a correct appreciation of conditions obtaining in the provinces that, as the PRESIDENT pointed out last Wednesday, it is impossible for the affairs of the Society to be carried on without assistance from its local representatives. On the other hand it is equally the case that all the chemists in a particular locality must be interested in having some person to represent them, whether they are members of the Society or not. At the time of the appointment of local secretaries last year meetings of the trade were held at several places to consider the question who should be nominated. It is to be hoped that this course will be more generally followed this year, and that there will be a more general manifestation of local activity in the selection of provincial representatives. It may be especially urged upon members and associates of the Society to stimulate interest in that direction, since we feel sure that the result would not only be beneficial to the entire body, but also one of the best means of extending the influence of the Society and securing it support.

There is at the present time very widespread dissatisfaction at the frequent infringement of the Pharmacy Act, and no doubt this needs repression. But in order that it may be done thoroughly and effectually those who are prejudiced by illegal trading must provide means of placing the facts at the disposal of the body that is authorized to prosecute. With proper local organization there should be no difficulty in doing all that is required in that way, and the Society's local secretary would be the most appropriate medium through which cases of illegal trading could be made known. We trust, therefore, that the circular issued by Mr. BREMRIDGE last Monday, to call attention to this matter, may have had the desired effect of securing careful consideration and earnest co-operation in the selection of nominees for the Society's representative officers throughout the country.

The *Scotsman* reports another case in which a penalty has been inflicted for the illegal sale of methylated spirit without being duly licensed. In this case the person proceeded against was a registered chemist carrying on business at Morrison Street, Edinburgh.

* * *

The *Pharmaceutische Zeitung* reports the sudden death, after a long illness, of Dr. Victor von Richter, the Professor of Chemistry at the University of Breslau, in his forty-ninth year. The Professor was well known in this country and America by the translations of his excellent manuals of chemistry.

We regret to have to announce the death of Mr. George Lea Sanders, of Tiverton, which took place on the 13th instant. Mr. Sanders had been an annuitant on the Benevolent Fund since 1884 and was 80 years of age.

Transactions of the Pharmaceutical Society.

DONATIONS TO THE LIBRARY AND MUSEUM.

At the meeting of the Library, Museum, Laboratory and House Committee, held on Wednesday, the 13th inst., the following Donations were announced, and it was ordered that the thanks of the Society should be communicated to the respective donors:—

To the Library in London—

King's College, London, Calendar, 1891.
From the COLLEGE.

University College, London, Calendar, 1891.
From the COLLEGE.

Yorkshire College, Leeds, Calendar, 1891.
From the COLLEGE.

Hazell's Annual for 1891. From the PUBLISHERS.

Institution of Civil Engineers, Charter, By-laws, and List of Members, 1891.
From the INSTITUTION.

St. Bartholomew's Hospital, Statistical Tables of Patients during 1890. From the HOSPITAL.

Royal Dublin Society, Scientific Transactions, ser. 2, vol. 4, pts. 6–8.

— Scientific Proceedings, new ser., v. 6, pt. 10, vol. 7, pts. 1–2. From the SOCIETY.

Royal Society of Edinburgh, Proceedings, vol. 17.
From the SOCIETY.

Smithsonian Institution, Annual Report, 1889.
From the INSTITUTION.

Stuart (T. P. A.), M.D., Report to the Governments of N. S. Wales, S. Australia, and New Zealand, on the Koch method of treating Tuberculosis, 1891. From the AUTHOR.

Roper (F.C.S.), Flora of Eastbourne, 1875.
From Mr. R. C. CYRIAX.

Jennings (O.), On the cure of the Morphia habit, 1890. From the PUBLISHERS.

Sawyer (Sir J.), Contributions to Practical Medicine, 2nd ed., 1891. From the AUTHOR.

Veterinary Counter Practice.
From the PROPRIETORS OF THE CHEMIST AND DRUGGIST.

Schär (E.), Ueber Einwirkungen des Cyanwasserstoffs, des Chloralhydrats und des Chloralcyanhydrins auf Enzyme, auf keimfähige Pflanzensamen und auf niedere Pilze, 1891.
From the AUTHOR.

Balland (A.), Travaux scientifiques des pharmaciens militaires francais, 1882.
From the COMPILER.

Ordini et capitoli del Collegio de gli Spetiali della inclita Città di Venetia, 1565, reprinted 1891.

Memoria sulle condizioni, sugli statuti e sugli ordinamenti dei farmacisti sotto la repubblica Veneta, dal G. Dian, 1891.
From the ASSOCIAZIONE CHIMICO-FARMACEUTICA VENETA.

Greshoff (M.), Planten et Plantenstoffen, 1891.
From the AUTHOR.

Flückiger (F. A.), Zur Würdigung Theoprast's von Hohenheim (Paracelsus), 1891.

— Review (in German) of G. Watts' Dictionary of the Economic Products of India, 1889.
From the AUTHOR.

Geschiedenis der Pharmacie in Nederland, door W. Stoeder, 1891.
From the NEDERLANDSCHE MAATSCHAPPIJ TER BEVORDERING DER PHARMACIE.

New York State Pharmaceutical Association, Proceedings, 1891. From the ASSOCIATION.

Alumni Association, Philadelphia College of Pharmacy, Annual Report, 1891.
From the ASSOCIATION.

To the Library in Edinburgh—

Alumni Association, Philadelphia College of Pharmacy, Annual Report, 1891.
From the ASSOCIATION.

To the Museum—

Specimen of the false ipecacuanha recently offered in the drug market. From Mr. JOHN MOSS.

Specimen of adulterated pellitory root.
From Mr. W. JACQUES.

Fine specimen of retinite.
From Mr. F. C. J. SPURRELL.

Unusually fine specimens of red cinchona bark.
From Messrs. HEARON, SQUIRE and FRANCIS.

Specimen of an unknown bark from Guayaquil.
From Messrs. JENKIN and PHILLIPS.

Specimen of hyaraga root from Burmah.
Presented by Messrs. CORBYN, STACEY and Co.

Specimens of the Taita arrow poison.
From the Rev. H. WALLER.

Specimens of hydrochlorate and bihydrochlorate of quinine in two forms, and hydrochlorate and bihydrochlorate of quinine-hydrochinon; also coca leaves containing cocamine, and cocamine containing homococamine from truxillo coca.
From Dr. O. HESSE.

To the Herbarium—

Specimen of *Euphorbia Esula.*
From Mr. H. GARNETT.

PRELIMINARY EXAMINATION.

October 13, 1891.

The following are the questions that were set for this examination:—

LATIN.

(*Time allowed—from* 11 *a.m. to* 12.30 *p.m.*)

I. (*For all Candidates.*) *Translate into Latin:—*

1. The father gives a book to his daughter.
2. Is gold more excellent than wisdom?
3. A friend is one whom we love, by whom we are loved.
4. A Roman legion had five thousand foot soldiers, three hundred horse soldiers.
5. It is greatly to your advantage that I should teach you the Latin language.

II. Translate into English either A. (Caesar) or B. (Virgil).

(*Candidates must not attempt both authors.*)

A. CAESAR.

1. Haec quum pluribus verbis flens a Caesare peteret Caesar ejus dextram prendit; consolatus rogat finem orandi faciat; tanti ejus apud se gratiam esse ostendit, uti et reipublicae injuriam et suum dolorem ejus voluntati ac precibus condonet. Dumnorigem ad se vocat; fratrem adhibet; quae in eo reprehendat, ostendit; quae ipse intelligat, quae civitas queratur, proponit; monet, ut in reliquum tempus omnes suspiciones vitet; praeterita se Divitiaco fratri condonare dicit. Dumnorigi custodes ponit, ut, quae agat, quibuscum loquatur, scire possit.

2. Quum ex captivis quaereret Caesar, quam ob rem Ariovistus proelio non decertaret, hanc reperiebat

causam, quod apud Germanos ea consuetudo esset, ut matres familiae eorum sortibus et vaticinationibus declarent, utrum proelium committi ex usu esset, necne ; eas ita dicere, non esse fas Germanos superare, si ante novam lunam proelio contendissent.

Grammatical Questions.—For those only who take Caesar.

1. Decline in full singular and plural) *hanc causam, ea consuetudo* (Par. 2).

2. Give the first singular perfect indicative active, and first supine, of the following verbs :—*pingo, rado, gero, fallo, volvo, sancio, cado, lavo.*

3. Account for the moods of *quaereret, dicere, esse, contendissent* (Par. 2).

4. Give the meanings of the following prepositions, and state the cases they respectively govern :—*ob, coram, tenus, circa, propter.*

B. VIRGIL.

1. Vix e conspectu Siculae telluris in altum
Vela dabant laeti, et spumas salis aere ruebant:
Quum Juno, aeternum servans sub pectore vulnus,
Haec secum ; " Mene incepto desistere victam,
Nec posse Italia Teucrorum avertere regem ?
Quippe vetor fatis ! Pallasne exurere classem
Argivum, atque ipsos potuit submergere ponto,
Unius ob noxam et furias Ajacis Oïlei ? "

2. "His ego nec metas rerum nec tempora pono :
Imperium sine fine dedi. Quin aspera Juno,
Quae mare nunc terrasque metu coelumque fatigat,
Consilia in melius referet, mecumque fovebit,
Romanos rerum dominos gentemque togatam.
Sit placitum. Veniet lustris labentibus aetas,
Quum domus Assaraci Phthiam clarasque Mycenas
Servitio premet, ac victis dominabitur Argis."

Grammatical Questions.—For those only who take Virgil.

1. Decline in the singular *aspera Juno*, and in the plural *lustris labentibus* (Par. 2).

2. Give the first singular perfect indicative active, and first supine, of the following verbs :—*pingo, rado, gero, fallo, volvo, sancio, cado, lavo.*

3. Parse fully—"*His ego nec metas rerum nec tempora pono*" (Par. 2).

4. Give the meanings of the following prepositions, and state the cases which they respectively govern :—*ob, coram, tenus, circa, propter.*

ARITHMETIC.

(*Time allowed—from* 12.30 *p.m. to* 2 *p.m.*)

[The working of these questions, as well as the answers, must be written out in full.]

1. The earth describes in $365\frac{1}{4}$ days an orbit of 597,600,000 miles in length ; what is its average rate of motion each hour?

2. A man's income this year is £896 13*s.* 4*d.* ; he gives to the poor quarterly £13 10*s.*, and lays up 200 guineas at the year's end: how much does he spend on an average each day ?

3. Reduce 2 miles, 7 fur. 30 po. 1 yd. 2 ft. to the fraction of 3 miles 7 fur. 25 po. 5 yds. 2 ft. 8 in.

4. Simplify $\cdot 64176 \times 1 \cdot 1 \div \cdot 012$.

5. If 54·32 Irish miles are equal to 69·14 Engish, how many English miles are equal to $169\frac{3}{4}$ Irish ?

6. If 250 litres of wine cost £5 find the cost of 54 hectol, 5 centil.

7. If by selling cloth at 28*s.* 6*d.* for 5 yards my gain is $6\frac{2}{5}$ per cent., what should I gain or lose per cent. by selling it at 37*s.* 6*d.* for 7 yards.

ENGLISH.

(*Time allowed—from* 3 *p.m. to* 4.30 *p.m.*)

1. What are *defective verbs*? Give the principal parts of the following verbs :—*bid, shrive, rise, raise, wring.*

2. Analyse the following :—
" In lowly dale, fast by a river's side,
With woody hill o'er hill encompassed round,
A most enchanting wizard did abide,
Than whom a fiend more fell is nowhere found."

3. Parse fully :—Noble he was, contemning all things mean."

4. In the following passage supply the necessary capital letters, and put in the stops and inverted commas where necessary :—presently the young man asked his pupil do you know what the constellation directly over our heads is is it not cassiopea she asked a little hesitatingly no it is andromeda you ought not to have forgotten her for I remember showing you a double star the one in her right foot through the equatorial telescope.

*5. Write a short composition on *one* of the following subjects :—

(i.) The power of conscience.

(ii.) The recent visit of the French fleet to Portsmouth.

(iii.) Delays are dangerous.

(iv.) The virtue of prosperity is temperance, the virtue of adversity is fortitude.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

On Wednesday the 7th inst. the first meeting of the newly elected Council of this Society was held in the board room of their house, No. 67, Lower Mount Street, Dublin. The following members of the Council attended :—Messrs. Hodgson, Robinson, Doran, Wells, Beggs, Charles Evans, Whitla, Gibson, Dr. Burnes, and McCormack. Mr. Moore and Mr. Johnston, both of whom were members of the preceding Council, but who had not been elected to the new one, were present.

On the motion of Mr. Hodgson, the chair was taken by Mr. W. F. Wells, who, at the request of Mr. Hodgson, read the report of the scrutineers as to the voting made to the general meeting on the previous Monday night.

Mr. Moore : Well, I presume I am only an intruder here now. I congratulate the late Vice-President on the efforts which he made to put the druggists out. He has been very successful.

Mr. Robinson : I rise to a point of order. Mr. Moore has no *locus standi* here. He has no right to address the Council.

Mr. Moore persisted in speaking.

The Chairman : Really Mr. Moore you are not entitled to address this Council. You can publish it in the journals. I am quite prepared to defend my conduct.

Mr. Moore : I am sure you are. I am glad to see that you are low on the list.

The Chairman : I am obliged to you for your ill feeling.

Mr. Moore then left the room.

Mr. Johnston then said he perceived that he had fallen into a mistake in attending.

The Chairman : We owe an apology to you, Mr. Johnston, but the fact was that the Registrar had to send out the summonses to the members of the old Council on the Saturday before the annual meeting, as required by law. He could not then tell who would be re-elected.

Mr. Johnston : Of course not. It was entirely from ignorance on my part, I assure you, that I came here.

The Chairman : I am sorry you had the trouble of coming, Mr. Johnston.

* This must be attempted by every candidate.

Mr. Johnston: Not at all.

Mr. Johnston then withdrew.

The minutes of the two preceding Council having been confirmed,

The Chairman said, that before business of the meeting was commenced he wished to read a letter that he had received from Surgeon J. Evans. Mr. Wells read the letter, in which the writer, referring to the person who had given him (Mr. Wells) information respecting the letter of the Apothecaries Hall concerning South City Dispensary election said: "You know I am not that person, and I would like you to contradict it." The gentleman, the Chairman continued, who gave him the letter was Sir George Owens, and he should be sorry that anyone thought that he had received any information from Surgeon Evans.

Dr. Burnes: I did not hear Surgeon John Evans' name mentioned at all.

Mr. McCormack: His name was not mentioned the other night at all. The only names I heard mentioned were those of Sir George Owens and Dr. Montgomery.

The Chairman: I wish it to be understood clearly that I had no conversation whatever with Surgeon John Evans in relation to that election, and got no information relating to the action of the Apothecaries' Hall from him.

The Council then proceeded to settle by ballot a rotation list of the members of the Council who will retire in each of the next three years. The results arrived at were as follows: To retire in October, 1892, Messrs. Grindley, Merrin, Hayes, Gibson, Montgomery, McCormack, and W. F. Wells. To retire in October, 1893, Messrs. Hodgson, Baxter, Beggs, Stewart, Whitla, Simpson and Sunner. To retire in October, 1894, Messrs. Lyons, Doran, Tichborne, Robinson, Charles Evans, Dr. Burnes and Boyd.

The Chairman: Gentlemen, your next duty is to elect a president for the ensuing year.

Mr. Robinson said that he hoped the proposal which he was about to make would be unanimously agreed to, and that their decision would be an omen as to the future of the Council. They had a President who was an absentee, not voluntarily, but in consequence of circumstances over which he had not the least control, and no one blamed him for being away. But now that they were about filling the chair for the ensuing year they could not possibly overlook the claims of Mr. Wells. The work that he had done and the devotion that he had shown to the interests of the licentiates of the Society as well as of the druggists who were now members of it, claimed from them that recognition of his services. They all felt that on account of Mr. Hayes's absence the question was a delicate one. He (Mr. Robinson) was not present at the last meeting of the Council over which Mr. Hayes presided, and was only informed of the conversation that took place on that occasion in reference to the present election, but he thought if Mr. Hayes were there now he would be the first to recognize Mr. Wells' services and to insist that as he had done the work so he should have the honour. Mr. Hayes was in every way qualified for the post, there was no doubt about that. He was an old and hard working member of the Society, and a member of most of the committees, and he had no doubt that if he had been with them during the last few months he would have been an ornament to the Society. But he was not able to be with them, and consequently the work fell on Mr. Wells. At the last election Mr. Wells declined an offer of the chair on ground that he could not find time to do the work. That was the reason why Mr. Hayes was elected then, and therefore now, after Mr. Wells had had to do the work he (Mr. Robinson) believed that if Mr. Hayes were there he would be the first to support the present motion. The licentiates were all in favour of it. He had had several letters from licentiates in the country and from members of the Council who were not able to be present to-day, all of which expressed the anxiety of the writers to see Mr. Wells in the chair. They said that he had conducted the business of the Society with the greatest possible credit and honour. The late prosecutions had been a great success owing to his efforts, and they had had a large increase in the number of their members owing to the result of those prosecutions, and because it was felt that the Society was determined to defend its licentiates and to put down illegal compounding. Mr. Wells was one of themselves. He had a pharmacy which was a credit to Dublin, and which he conducted in the best possible manner, and he was thoroughly conversant with the requirements of the licentiates. He (Mr. Robinson) hoped they would pardon him for seeming to dictate to them, but some members seemed to be shy about speaking, and he knew that older members of the Council like Mr. Hodgson, Mr. Doran, and Mr. Evans were anxious that new members like himself should do so. He, therefore, hoped that they would agree with him. It was solely from a desire to place in the chair the man whom he considered best entitled to it that he had been induced to make himself the spokesman of a party in the Council, though he could hardly call it a party, for only one or two had spoken to him.

Professor Tichborne said he had much pleasure in seconding the nomination of Mr. Wells. He knew that there was a certain amount of delicacy about this appointment, because their worthy friend Mr. Hayes, whom they all admired, when he was going away did say in answer to a question put to him, that if he was re-elected President he would serve. He accepted the position in the first instance very reluctantly, and distinctly stated in his (Professor Tichborne's) hearing that he would only take the office for a few months in order to bridge over a gap. Mr. Hayes had to leave the country and had not been acting as President, and they all felt that Mr. Wells, on whose shoulders the work fell, had carried them through a very trying and very arduous time, and had done credit to the Society and himself, and had shown that he knew what he was about. If, therefore, the Council did the right thing they would put Mr. Hayes into the position of Vice-president, and at some future day they would see him—if he should choose to take it—in the President's chair. But they did not know at that moment whether Mr. Hayes would accept the position of President or not.

Mr. Charles Evans said he rose with great diffidence to say that he endorsed nearly everything that had been said by Mr. Robinson and Professor Tichborne as to the suitability of Mr. Wells for the office of President, and that no one would be better pleased to see him in the chair than he would. He did not think anyone present had a better idea than he (Mr. Evans) had of the ability and zeal that Mr. Wells had always shown on behalf of the Society. But considering Mr. Hayes was elected last year, and that he left Dublin under such sad circumstances, over which he had no control, he thought it was but just to him to remember that he expressed, he would not say a wish, but a willingness when he shall return, to take up the office of President. Therefore, he thought that it was their duty under the circumstances to elect him President, and he was sure that the Chairman would not take that motion of his unkindly.

Dr. Burnes said he seconded Mr. Evans's proposition that Mr. Hayes be elected President. He hoped Mr. Wells knew there was no personal feeling in the matter. Not a man at the board entertained a greater feeling of respect for Mr. Wells than he did. At the same time he thought they were in a measure in duty bound to have regard to the unfortunate circumstance of Mr. Hayes absence. If he had been there he was

sure he would have shown himself to be as energetic a member of the Council as he did previous to his departure. No doubt they had been very safely steered by Mr. Wells, but they should give Mr. Hayes an opportunity of undertaking the leadership, and he was sure that they might place every confidence in him, having regard to the honourable way in which he had always acted in every department of life.

The Chairman: Gentlemen, I feel in a rather awkward position, and would ask you to nominate some other person to the chair.

On the motion of Mr. Beggs, seconded by Mr. Robinson, Mr. Hodgson took the chair.

Mr. Gibson supported the motion of Mr. Evans. He was present at the meeting at which Mr. Hayes promised that if he should be re-elected he would perform the duties of the presidential office, and he thought that he would be breaking faith with him if he did not do what he could to have him re-elected now that he was away from them. All Mr. Robinson's complimentary remarks with reference to Mr. Wells applied with equal force to Mr. Hayes, and he was sure the latter gentleman would do honour to the Society and himself if they re-elected him.

Mr. Whitla supported the motion of Mr. Robinson. No member of the board held Mr. Hayes in higher estimation than he did, and gentlemen were aware that in the recent election Mr. Hayes received the heartiest support that he (Mr. Whitla) and other members of the Society through him could give. But he supported the nomination of Mr. Wells because he believed it to be their duty to place him in the chair. The Society was in rather an awkward position at the present, for the certificates connected with the last examination could not be signed in consequence of Mr. Hayes's absence. He believed it to be the wish of a very large majority of members of the Society that Mr. Wells should be in the chair.

Mr. Boyd said that no one had had better opportunities than he had had of studying Mr. Wells' capabilities, but if the question should come to a vote, he would feel himself morally bound to support the re-election of Mr. Hayes. Taking everything into account, the melancholy circumstances under which he was obliged to leave Dublin, his assurance that he would be at their service if they wished it, and his fitness for the position in every respect, he thought that they should re-elect him.

Mr. Beggs: Have we any definite ideas as to when Mr. Hayes will be able to resume duty. It is rather a serious thing for the certificates to be remaining unsigned, and it will be hardly fair to ask the new Vice-President, whoever he may be, to do the work of a President.

Mr. Wells: I believe it was Mr. Hayes's intention to be back by January 1, but there is some talk of his being in Dublin by December 1. He will be back for work at the beginning of the year, at all events.

Mr. Gibson: It was stated in one of the journals last week that he was on his way home.

Professor Tichborne: I think that if we appoint Mr. Hayes Vice-President, and Mr. Wells President, we will be doing the right thing from a practical point of view.

Mr. Wells: Well, gentlemen, I think it only right to say that when I was asked to allow myself to be put forward for the position of President, I said that I would not accept it unless I should be unanimously elected. Therefore I would ask Mr. Robinson to withdraw my name, and allow Mr. Hayes to be unanimously elected.

The Chairman: Very nice taste, indeed.

Mr. Robinson said that it was very sad they could not see their way to unanimously elect Mr. Wells. No one had the least conception of the amount of work that he had done single-handed during the last three months, and they had no guarantee that Mr. Hayes would be back by January 1. He was at present in Australia and was coming home by San Francisco, and might spend some time in America.

Mr. Wells begged of Mr. Robinson not to press the matter. He really did not think he would be doing right in accepting the position.

Mr. Robinson said he was sorry he was deserted in his proposal, for he believed that a majority of the Council would be more than pleased to have Mr. Wells.

The Chairman: Mr. Wells has asked you to withdraw your proposition, and it is for you and Dr. Tichborne to say whether you do or not. If you do not I must put the matter to the vote.

Professor Tichborne said he was only the seconder of the motion; the matter was entirely in Mr. Robinson's hands.

The Chairman: In the face of Mr. Wells's statement that he will not accept the position unless he is unanimously elected I do not well see how we can vote on the question.

Mr. Robinson: If you rule that, I must ask you to produce an understanding from Mr. Hayes that he will act if elected. I have a duty to perform to the licentiates.

Mr. Wells: Well, really, I would ask Mr. Robinson not to press his motion, for if I should be elected I should decline to serve, and at the same time I am very much obliged to Mr. Robinson and to those other gentlemen who have spoken as they have done of me. It was with very great reluctance that I agreed at all to allow myself to be put forward.

Mr. Robinson said he supposed there was no other course open to him but to withdraw his motion, but he felt that he had been very badly treated.

The Chairman then put Mr. Evans's motion for the election of Mr. Hayes as President, and it was agreed to *nem. con.*

Mr. Beggs said he had great pleasure in asking Mr. Wells to accept the position of Vice-president. No doubt it was hardly fair to ask him to do the work of President again, but he was sure he would take the circumstances of the case into consideration. For his own part he (Mr. Beggs) was glad in a way that Mr. Wells was not President for the ensuing year, because they would want his services for fighting, and if he were in the chair he would not have so free a lance as by being Vice-President. There was a little more hard work before them in the coming year than they anticipated, and they could not afford to lose their chief or leader. Therefore, he would ask Mr. Wells to take the Vice-Presidency for the coming year, and the year following would see him in the chair.

Mr. Wells said that before the motion was seconded he must say at once with very great regret that he could not accept the office. He had been twice offered the presidency, and he declined it because he felt that in justice to his own business he could not devote to the duties of the office the time that they were entitled to receive. He continued in the office of Vice-President under Mr. Hayes because he thought that with him in the chair he would have very little to do. But during the last three months he had been placed in an unfair position. He was never consulted by Mr. Hayes as to whether he was willing to do the duty or not, and he did not realize the position he was in until Mr. Hayes had gone, and for the last three months he had had to devote one-half of his business day, and sometimes the whole of it, to the affairs of the Society. It was hardly reasonable to expect him to neglect his own business, which was a young business, and required constant attention. Under the circumstances he would not be acting rightly if he were to accept the office of Vice-President, with the knowledge that for at least three months he would have to

fulfil the duties of the chair. He had been placed in this position, that for three months he had had no one to leave there officially in charge of affairs. Mr. Grindley had very kindly helped him a good deal, and Mr. Evans, the ex-President, had also helped him. He had not had a holiday yet this year, and if he were to accept the Vice-Presidency now he would not be able to get away. Therefore, thanking Mr. Beggs and his other friends who had so kindly spoken of him, he felt obliged to decline the honour, and he had one other reason for doing so, and it was this. A gentleman who was a member of the Druggists' Association thought fit, because he had tried to defend himself, to write to one of the journals asking was he fit to be in the position which he occupied when he did not know better how to behave himself? That gentleman stated a deliberate falsehood in his letter, and anyone who read it would see that such was the case. The editor of the *Chemist and Druggist* answered the remark that was made about him, so that it became unnecessary for him to do so, and he might say that it was the first time in the history of his connection with the Society that the editor of the *Chemist and Druggist* had defended him. He thought, therefore, that he should be able to do more good for the Pharmaceutical Chemists of Ireland by being a free lance than if he were to be tied up by the acceptance of office. He hoped to continue a member of the Society, and while he was in it he would defend the rights of both the pharmaceutical chemists and druggists. Harmony, he knew, had not existed up to the present, but he was satisfied that after January 1 they would be a united Society, for already war notes were being sounded by the druggists for protection.

The Chairman said he was extremely sorry that Mr. Wells did not see his way to accept the Vice-Presidency, circumstanced as they were at present.

Mr. Wells: I wish to say that I was one of those who asked Mr. Hayes would he serve.

The Chairman said he was in England at that time. He would have felt bound to vote for Mr. Hayes had the question as to the Presidency gone to the vote, but he thought that Mr. Wells would better serve the Society by throwing himself into the position he was so well able to fulfil than by declining it. All the members of the Council would give him every possible assistance, and if he would reconsider his decision the Council would unanimously appoint him.

Mr. Boyd wished to say a word. Mr. Wells had alluded to a letter written by a registered druggist or associate of the Society to the *Chemist and Druggist*. On behalf of the druggists he (Mr. Boyd) wished to say that that letter did not meet with their approval in any way. He saw the circular issued by Mr. Wells, and heard the opinions expressed by others on it, and they saw nothing whatever to object to in it, and they should be sorry if Mr. Wells let that letter weigh with him in the slightest degree.

Mr. Wells said he thanked Mr. Boyd for his remarks about the circular. The position of affairs was simply this. All through the country an attempt was made to put him off the Council. Men who did not know him were going about the country asking others to do what they could to put him off. He did not do anything that was not open and above board, and he was not ashamed of anything that he had done. He saw a letter from one of the representative druggists asking the associates to come forward in their strength, and showing them that if they did not do so the pharmaceutical chemists would have a majority. He simply answered that by issuing a circular asking their members to come forward and support him. There was nothing to be ashamed of in that circular.

The Chairman: Well, gentlemen, as Mr. Wells positively refuses to act, it is for you to make some other selection.

Mr. Wells said he had great pleasure in proposing Dr. Burnes for the office.

Dr. Burnes said he must decline it, as it would not be possible for him to attend to the duties.

Professor Tichborne: Then we cannot do better than elect Mr. Robinson. I feel strongly that we ought to have young and active members of the Society in such positions, and if Mr. Robinson will undertake it, we could not have a better man as Vice-President.

Mr. Charles Evans: I have great pleasure in seconding the motion.

Mr. Whitla said he had always understood that one of the two principal officers of the Society should be resident in the city. Mr. Robinson was not.

Professor Tichborne. Practically he is.

Mr. Beggs asked would Mr. Evans step into the breach.

Mr. Evans said it was because he was not able to attend to the duties of the Presidency that he had to retire from it.

Mr. Whitla said that no doubt Mr. Robinson was a very fit member to be Vice-President. It was a great thing to have young blood in office.

Mr. Robinson said he felt there was a great deal in what Mr. Whitla said as to his place of residence, for Kingstown was not Dublin, although it was very near to it. At the same time he would be happy to accept the office, for he took the deepest possible interest in pharmacy.

The motion for the election of Mr. Robinson as Vice-President was then put and carried unanimously.

Mr. Robinson then took the chair as Vice-President and said he really did not know how to thank them for the honour they had bestowed on him. He laboured under the disadvantage of being without a chief, but he would do what he could, and he relied on such members as Mr. Wells, Mr. Grindley and Mr. Evans to give him all the assistance in their power. He hoped that everything would go on harmoniously until their President returned.

Mr. Beggs moved that Mr. Hodgson be re-elected Treasurer.

Mr. Evans said he had great pleasure in seconding the motion. No one could fill the office of Treasurer like Mr. Hodgson.

The motion having been unanimously carried,

Mr. Hodgson, in returning thanks, said he believed he had been their Treasurer for sixteen or seventeen years; in fact, since the establishment of the Society.

On the motion of Dr. Burnes, seconded by Mr. McCormack, Messrs. Simpson and Grindley were re-elected auditors.

Mr. Beggs moved that the Law Committee consist of Messrs. Beggs, Grindley, Wells, Merrin, Professor Tichborne, Montgomery and Sunner.

Dr. Burnes seconded the motion.

Mr. Gibson: I propose that Mr. Boyd be a member of the Law Committee. I think we as druggists are entitled to have a representative on it.

Mr. Wells: If you put Mr. Boyd on that Committee you will place him in a very unpleasant position, for the duty of that Committee will be to deal with druggists or others through the country who break the law.

Mr. Beggs: I shall willingly resign my place on that Committee if Mr. Boyd wishes to take it.

Mr. Gibson: But a part of the duty of the Law Committee will be to protect druggists from persons who sell poisons illegally.

Mr. Wells: Do you think the pharmaceutical chemists on the Committee will not do that?

Mr. Gibson: It is but fair that the druggists should have a representative on that Committee.

Mr. Wells: I think you ought to trust the whole Council.

Dr. Burnes: Will Mr. Boyd act on the Committee if he is elected?

Mr. Boyd: I was going to say that I could not possibly serve on more than one Committee, and that I believe I could do better service on one of the other Committees—the Declarations Committee. If it be the wish of the Council to elect me on that Committee, I would prefer not to serve on any other.

The Law Committee, as proposed by Mr. Whitla, were then elected.

The following gentlemen were appointed on the other Committees, viz.:—

Committee to Inspect Candidates' Certificates—Messrs. Beggs, Evans, Simpson, Sunner, and Grindley.

House and General Purposes Committee—Messrs. Beggs, Boyd, Grindley, Hodgson, Evans, and Wells.

School Committee—Dr. Burnes, Professor Tichborne, Messrs. Hodgson, Grindley, and McCormack.

Declarations Committee—Messrs. Wells, Boyd, Gibson, Montgomery, and Grindley.

A letter was read from Surgeon John Evans thanking the Council for having re-elected him examiner in practical pharmacy.

A letter was received from the Privy Council enclosing copy of their order approving of the amended regulations made by the Council in connection with the examination of assistants to pharmaceutical chemists.

Another letter from the Privy Council enclosed a copy of their order approving of the regulations made by the Council on the 4th of last March relating to the Society's Preliminary examinations.

Mr. Wells: That comes into force on January 1; and one result of it has been that forty-one candidates came up at last Monday's Preliminary examination.

A letter from Mr. E. W. Allsom relating to the case of Mr. Denis Riordan was considered and referred to a committee.

Donations were announced from the Smithsonian Institution of a copy of their Report for 1889, and from the Alumni Association Philadelphia College of Pharmacy of a copy of their Annual Report for 1890–1891.

On the motion of Mr. Evans, seconded by Dr. Burnes, thanks were voted to the donors.

Several persons were nominated for election as members or associates.

On consideration of a recommendation of the House and General Purposes Committee, it was ordered that in future the public office hours at the Society's House should be from 10 o'clock a.m. until 4 p.m. on each day of the week except Saturday, which day the office will be closed.

Mr. Whitla suggested that the Council should take into consideration the expediency of paying some part of the expenses incurred by country members of the Council who had to come up to Dublin to attend its meetings.

Mr. Boyd said the matter would require a notice of motion.

Some financial business having been disposed of The Council adjourned.

PRELIMINARY EXAMINATION.

At the October Preliminary Examination the following passed:—Messrs. J. Bently, R. J. Bethune, J. B. Bolger, W. Burns, S. Carpenter, R. S. Chapman, J. A. Deakin, A. P. Doyle, F. C. FitzGerald, G. B. Graham, W. J. Healy, J. Hill, W. H. Hopkins, U. L. Johnston, Miss Katie Kelly, Messrs. C. Macklin, D. and R. Morrow, T. O'Sullivan, W. J. Pollock, T. J. Rainey, W. Taylor, W. Thompson, J. J. White, and W. Wyatt.

Fifteen candidates were rejected.

LICENCE EXAMINATION.

At the October Pharmaceutical Licence Examination the following passed:—William Burns, 20, Castle Street, Belfast; Wm. Corrigan, 3, Lower Sackville Street, Dublin.

One candidate was rejected.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

The first meeting of the fifteenth session of this Association was held on Thursday evening, the 8th inst., at the rooms, 103, Great Russell Street, when the President, Mr. W. Lloyd Williams, delivered the following:—

Inaugural Address.

BY W. LLOYD WILLIAMS, A.I.C.

Fellow members and gentlemen,—In an age characterized at least by change and in general by progress, it is matter for surprise that introductory addresses should still drag on their hateful length. They whose misfortune it is to make and deliver them must often curse the fashion which yet lingers, and derive but grim satisfaction from the knowledge that the discomfort they experience in the preparation is reciprocated by those who, in virtue of their passive *rôle* as listeners, constitute the objective in more senses than one. The optimist always begins by telling you that this moment is one of the proudest in his life. The pessimist, with equal candour and probably with greater truth, styles it the most uncomfortable. If we agree to regard pride as the father of the passions, the uncomfortable feelings will be the natural offspring, and my personal experience of the close connection of these two sensations will prove more easy of explanation than might at first sight seem probable. Again, the knowledge that I am expected to celebrate the fourteenth anniversary of the inauguration of this Association by explaining its objects and urging its claims through the medium of fresh thoughts and new sentences, places me very much in the position of the man who should find himself between the hero of 'Paradise Lost' and the mighty ocean, for are there not behind me the addresses of all the past presidents, and in front of me many of the past presidents themselves. If in my efforts to discharge one of my obligations I should stray beyond the lines of conventionality in expression or matter, will you believe that it is because I consider such a course is best calculated to interest you, and to further the aims and aspirations of our Association. A Chemists' Assistants' Association must from the very nature of things experience an ebb and flow in its progress. This is true in a double sense in the case of our own Association. Each session we lose some fifty or sixty members and we enrol about the same number, the *personnel* is therefore literally tidal in character. But there is also the more general application of the simile whereby in common with all societies we may expect to meet with checks and obstacles long before high-water mark is reached. Now I have very closely watched the career of this Association for the past four years, and I frankly admit that I consider its condition is decidedly less healthy at the expiration of the fourth year than it was at the end of the first. There is no doubt but that the Association wants a "tonic;" and if you will allow me I will indicate the symptoms which have guided me in my diagnosis, I will demonstrate the causes which appear to me to have given rise to them, and I will endeavour to prescribe the appropriate remedies. There has been recently on the part of members a lack of enthusiasm, a want of energy on behalf of the Association, a

lessening interest in its affairs, no increase in the attendance at the ordinary meetings, and a disinclination for any new members to join in discussing the papers. These symptoms assumed an acute form during the past session. The origin of this listless attitude may be traced to various causes. Indifference, which is the bane of all associations, as it is the hindrance to all progress, is at the root of the evil. The same malady filters its way through all pharmaceutical associations, and the philosophic mind has often occupied itself with inquiring into the reason for the failing energy which invariably overtakes all our organized combinations. I have never been able to find a satisfactory response to such inquiries, and I am inclined to think the oft repeated statement that the small trade makes a small mind is only half the truth. The invertebrate character of the pharmaceutical community may very well be held responsible for the residuum, and until a little more loyalty and *esprit de corps* are apparent in our ranks it is impossible to expect that much progress can be made. To the loss of a very devoted and energetic officer in the early part of the year we may justly ascribe a certain proportion of the disorganization which followed that untoward event; its shadow darkened the threshold of the new Council, but I am happy to tell you that each day sees us further on the way to complete recovery. I trace a good deal of the apathy which exists to the very cold and formal manner which has of late characterized the conduct of business at the ordinary meetings of the Association. Picture to yourselves an assistant fresh to London. Knowing no one in this crowded wilderness, he makes his way to one of the ordinary meetings, in the belief that here, at least, he will meet with sympathy, in the hope that here, perchance, he may find a friend. Alas! there is no sign of sympathy, no cheering word for him. And that, forsooth, is one of the ways in which we "promote intercourse amongst chemists' assistants." It shall be my special charge to rectify such an anomaly as this, and I invite most cordially the co-operation of each one of you in my efforts to break down this unnatural stiffness and reserve. It has been suggested that the efforts, most laudable in themselves, made by some of your past presidents to increase the status and add to the dignity of this Association by raising the standard of the papers read at your meetings, have had the ultimate effect of reducing the attendance at many of the meetings, because the subjects treated of were over the heads of the average chemists' assistant. I am grieved to think this should be true, and as a past secretary I must take my share of blame, if blame there be. One of the objects for which the Association was established was to widen and enlarge our minds; if, however, the pabulum provided has proved too tough for the mental digestion of the majority, the old rule which prescribes the greatest good to the greatest number must again be followed, and simpler and homelier fare must be supplied. There is a section of our members that keenly appreciates these excursions into regions remote enough in concrete form from the dispensing counter, though closely related in the abstract, but we have to remember that the Association is for the majority not for the few. We do not all possess a scientific lining to our skulls, and I cannot see that you are to blame when you do not take kindly to papers on matters which you think are too hard for you. But it is well to remember that the diffusion of knowledge amongst all classes of society makes it more than ever incumbent upon the pharmacist that he should maintain his position as a pioneer on the highway of learning. Unless he recognizes this necessity and trains himself accordingly he will have to submit to the indignity of being dragged through the world at the heels of his fellows, whether he will or not. Personally I have the highest regard for the educational value which this Association is capable of becoming to its members, but it is imperative that the members should be active elements, capable and willing to absorb the nourishment provided, and so acting as stimuli for further and greater effort individually and collectively. I am confident the power of the Association for good is underestimated by nine-tenths of us. It is only by making the most of present opportunities and in availing ourselves of the privileges to our hands that future possibilities become perceptible. I know that I am regarded by some as a fairly well pronounced type of the rabid educationalist; but I may at least be credited with practising my own precepts, which is more than can be said of all preachers, and if I do look at things through the glasses of education, it is because I am a witness to the fact that the better a man is equipped with knowledge the greater will be the chances of his success in life. It is just as well to remember, however, that education of itself will not ensure success in life. The remark may lose some of its pungency by reiteration, but it is ever brimming with truth; and even an association suffers by unbusinesslike administration. In many paths of life success is centred on what may be termed the "personal equation," but in pharmacy everything turns on that pivot. Let me digress for one moment to emphasize my meaning. By a sort of traditional process which is widely recognized the pharmacist has been regarded as an individual whose advice and opinion might be sought with profit upon matters far outside the scope of his ordinary calling. It is our bounden duty to do all that lies in our power to foster this idea. We must lay ourselves out to speak with authority upon the topography, the archæology, the natural characteristics, the fauna and flora of the particular neighbourhood where we may chance to be located. The trouble will be a hundredfold repaid. Our knowledge must appeal as forcibly to the minds of our inquisitors as will our brilliant mixtures and faultless "wrapping" to their eyes. We have to approach the public upon ground which is common to both. As a rule they are quite unable to gauge the extent of our proficiency in the art of pharmacy; but if we can demonstrate the possession of knowledge such as I have indicated, they will by a sort of reflex judgment credit us with qualities and skill, that in other circumstances they would never have thought of. One of the noblest offices of this Association is to instil into our minds the germs of ideas such as these, which may blossom forth in ample fruitage long after the period of assistantship is over and the keener struggle of life has begun. It is interesting to observe the awakened sense of responsibility in matters educational which characterizes the conduct of the scientific and liberal professions, no less than the lay community. The five years curriculum and the post-graduate courses of instruction for medical men will sooner or later raise the level of his scientific attainments, and where our knowledge dovetails in with his we must ensure the absence of inequality as a consequence of our inferior knowledge. I venture to think the Pharmaceutical Society has done something to remove the risk of this in the extended syllabus which it now imposes upon candidates who seek qualification. But the march of science is so rapid that I suppose no man's knowledge is up to date for more than ten years. I must be understood to refer to knowledge which is accepted in a passing fashion as opposed to that acquired by constant and active revision, and I believe the Society might add very greatly to its prestige, as well as to its usefulness and popularity, did it arrange for occasional short courses of evening lectures by men who were acknowledged leaders of their subjects. Every organized community from the village life of the rudest savage to the most highly polished section of society, demands certain duties and responsibilities

on the part of its constituent atoms. Why should the pharmacist act as though he alone was entitled to an abrogation of this universal law? Often comes the query to my mind, after what manner of man will the chemist of the future be? will he perpetuate the signs and tokens of his predecessors, will he be equally narrow in his views and judgments, or will he in virtue of his habits of association, which we in some small way strive to strengthen and encourage, so far outgrow his natural or inherited pettiness as to regard his "brother-chip" as at least a companion in arms rather than a sworn adversary? Time alone will bring the answer. Amongst the phenomena specially characteristic of pharmaceutical life is unquestionably the internecine warfare which never ceases to rage. Anyone who goes about the country with his eyes and ears open knows quite well that there is a widely-diffused undercurrent of feeling which is antagonistic to the Pharmaceutical Society. I would be the last person in the world to maintain that the Pharmaceutical Society was a synonym for infallibility; but I suppose the saying that "the man who never made a mistake never made anything," might without much imaginative force become equally applicable to a society, and I have little sympathy and less respect for those who consider that the prime qualification to howl "What has the Pharmaceutical Society done for us?" consists in the fact that they have never subscribed a penny to its funds. To tip the beam of public opinion and the legislature in our favour it is essential that the Society should have the support of the majority of those who follow our calling, and until such support is afforded the realization of our desires must be a process long, lingering and slow. One experiences mingled feelings of surprise and regret that after fourteen years of its existence this Association should still be subjected to the charge, amounting to a crime in the eyes of those who make it, that there is an organic connection between ourselves as an Association and the Pharmaceutical Society. I fear the constitutional obstinacy of the misguided individuals who make such statements is incapable of palliative treatment, for "none are so blind as they who will not see." Such a charge is ridiculous beyond contempt, and one's natural impulse to treat such statements with silent disdain is incompatible with the fact that these men prostitute the power which is theirs by virtue of being employers to dissuade their assistants from joining our ranks. I venture to assert no employer ever found his assistant less conscientious in the discharge of his duties, or less skilful in the exercise of his art, as a consequence of his connection with us. Nor need we ever fear that so formidable an impeachment may be laid at our doors, so long as we faithfully adhere to the principles which hitherto have regulated the conduct of this Association. On the contrary we believe that the assistants, who do themselves take the trouble to derive their own share of benefit accruing from association, are more useful and valuable to their employers; and we confidently look forward to the time when this shall be so well recognized that an assistant will feel it is a recommendation to say that he is a member of our Association, and the employer will be disposed to regard the statement in a correspondingly favourable light. But that time can never come until the individual member appreciates the privileges and the responsibility of membership. There are certain qualities of the mind which require the stimulus of association for development. I believe the average Anglo-Saxon is comparatively low down the scale; he always bears the reputation of being unsociable; his self-reliance is great; hence, indeed, his value as a colonist. The more gregarious Celtic and Gallic elements, whilst nursing much of our own national stability of character, have developed qualities more ethereal in their character, more acutely sensitive, more highly sympathetic. The peculiar function of association is to develope qualities which remain dormant in the solitary individual. "Iron sharpeneth iron; so a man sharpeneth the countenance of his friend." It is the duty of each individual to contribute his part to the formation of a harmonious whole; it is the privilege of each individual to reap the harvest of the virtues. An association is therefore above all things a constitution dependent for its vitality upon the breath of co-operation. The Council, and especially the executive, are your "labour representatives." Exact from them if you will a faithful discharge of the duties you entrust to them for execution, and on your part cheerfully and ungrudgingly afford them your liberal support by regularly attending the meetings. It is neither complimentary to the authors nor creditable to the Association that so few should attend the delivery of papers, whether of a literary or scientific character; and to my way of thinking it is evidence of a great lack of comradeship which allows one of our own members to address an audience which does not total as many heads as he has fingers on his hands. What and if the subjects do sometimes seem to have little direct bearing upon the calling we profess, how singularly bald and ill-conditioned must be the mind of him who cannot appreciate and applaud the efforts of a fellow-member who, after all, is simply doing his duty and exercising his privilege. The silver medals offered by the Association, and the valuable money prizes which, by the generosity of Messrs. Burroughs, Wellcome and Co. accompany them, deserve infinitely more attention at your hands than they receive. You will find all particulars respecting them on your circular letter and in the 'Proceedings.' The "essay prize" for a record of "recent advances in pharmacy" is open to every member of the Association without let or hindrance. The title is to my mind a little unfortunate, because competitors seem to think a synopsis of the year's doings is the only legitimate subject. As there are published in this country at least five *résumés* of our annual advances in pharmacy, it is difficult to see what a chemist's assistant can find after five "dons" of pharmacy have had their say. The presentation of old facts from a novel point of view, the marshalling of new information that might be applied in pharmacy, unrecorded observations made at the dispensing counter, desiderated improvements in pharmaceutical appliances, are some heads of subjects which occur to me as worthy the attention of those who contemplate sending in essays this session, for I feel confident that there is sufficient latent talent in the chemists' assistants in this metropolis to furnish matter which shall be a credit to themselves and an honour to the Association. The "research prize," as its name implies, is awarded for original work; it is therefore in the nature of things limited to those who have facilities for carrying on investigations. But do not forget that an investigation of a pharmaceutical nature carried out at the dispensing counter may prove more valuable to the trade at large than the elucidation of a purely chemical or physical problem in a fully equipped laboratory. The amount of work still to be done in pharmacy alone is simply appalling. Look at the investigations of Farr and Wright on the tinctures; their patience and industry will revolutionize our accepted ideas on tincture making. Every drug has characteristics and an individuality of its own, which require humouring to an extent which is only appreciated by those who have paid very particular attention to this branch of our art. In fact, the pharmacist is engaged in a study that cannot be exhausted. As he increases the light he widens the margin of the darkness beyond. He must remain a student all his days, and his scientific training will always keep

his mind open for the reception of new facts, the acceptance of new laws and the rejection of old conclusions. Give us the benefit of your thoughts and of your experience. Never mind being a little shy and nervous, most of us have to pass that stage, some of us never get beyond it. It is most essential to be able to put your thoughts into words, for despite the ancient saw that "empty vessels make most sound," the world is only too ready to listen to those who are glib of speech, and not infrequently will estimate a man's worth by the length of his tongue. Fluency of speech and facility of expression can only be acquired by constant practice. Make the most of your opportunities by joining in the discussions, nor fear that your remarks will meet with unsympathetic reception. Demonstrate your awakened interest in the Association by spreading abroad the objects and aims which we have in view for the advancement of pharmacy. If each member would make it a point to enrol one other member, what a magnificent earnest of other capabilities it would be. I urge you with all the emphasis I can command to make the attempt. You have about 70 per cent. of the chemists' assistants in London to draw from. The weekly half-holiday, a most commendable and necessary institution, is almost universally adopted in the metropolitan districts upon Thursday, our day of meeting. The subscription is about the best commercial speculation a man can make, for no other association gives you anything like the return for your 5*s*. that we do. The train is laid, it only requires the smallest spark of enthusiasm on the part of each member to fire the entire Association with redoubled vigour and burning zeal. The period of impeded progress will have passed away because you yourselves will have removed the boulders of difficulty, and the stream of success will once more run with resistless force. Gentlemen, I have a deep sense of the grave responsibility which the assumption of the most honoured post at your disposal entails. It shall be my endeavour to return to your hands the jewel which you entrust to my care, with undimmed lustre, and if you so will it may be even with added brightness.

Mr. T. S. Dymond, in proposing a hearty vote of thanks to the President for his very interesting address, said he (the President) had performed a good office; he had thoroughly rated the members for not supporting the Association as they ought to have done. The address had a very wholesome tendency, but he thought it was too pessimistic. The speaker had watched the progress of the Association for some years, and looking round at the meeting he could not recollect on any similar occasion having seen such a large audience. He hoped a good session would ensue and that all would take the President's words to heart. In other ways the coming year promised to be pleasant and prosperous. He was much pleased with the programme, and thought the innovation of having refreshments before the ordinary meetings admirable.

Mr. J. C. Umney had great pleasure in seconding the proposal.

The President, in returning thanks, said he believed it was the late Mr. Lowell who once remarked that the art of writing lay in knowing what to leave in the "inkpot." In compiling his address he had been sorely tempted to touch upon many interesting topics, but he thought his remarks would not be any the weaker, though he had left a good deal in the inkpot. It was absolutely impossible that the efforts, however heroic, of a President, of the executive, even of the whole council, could ensure to the utmost the success of an association; every member must play his own part, and interest himself in his fellow members, and then their efforts could not but be crowned with success. It was most encouraging to see so large an attendance at the commencement of a new session, and it certainly was an augury of reviving interest which he trusted would continue and increase during the whole of the session.

Provincial Transactions.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

The opening of the seventh session of the School of Pharmacy in connection with the Sheffield Pharmaceutical and Chemical Society took place on Thursday evening, the 15th inst., when the school prizes were distributed, and the following address was delivered:—

Inaugural Sessional Address.

BY ROBERT HAMPSON,

Treasurer of the Pharmaceutical Society.

The invitation of the Council of your Association, which I felt it an honour to receive, reached me at the ancient and historic city of Winchester, where Alfred the Great was crowned and Canute buried. I was on my way through three or four counties in search of health and mental refreshment.

I had, with pain, already heard of the sad bereavement of my good friend, the Vice-President of the Parent Society. It is deeply to be regretted that he is unable to be present to-day; for I am quite sure that his ripe experience and his interest in pharmaceutical education would have enabled him to give you an address of far greater value and importance than anything I can offer for your acceptance and consideration. When I received the request of your Committee, I asked myself the very pertinent and most natural question, "What can you say that is new or unhackneyed upon a theme that is so old and well worn?"

My answer to the question is my address to you to-day. You will doubtless soon discover that it is only a re-statement of some old, yet "eternally young," truths, and world accepted *dicta*, "as old as the hills" and almost as self-evident.

Although my statements with regard to some of the primal factors affecting our lives and conduct are but the same as the foundation stones of almost all ethical theories, they will perhaps bear repetition to-day if I am able to mingle them with a few feeble sparks of genuineness from out my own personality.

In consequence of an unexpected breakdown of my health in early life, my career as a student of medicine was abruptly cut short, and ended when life seemed to me as boundless as the skies and misfortune a far away experience.

Even now, after a lapse of nearly forty years, the remembrance of the time recalls with it an aching sense of disappointment that the opportunity of completing my studies was taken from me. The fates provided for me different things and a different career—perhaps with perfect compensation. I can, however, call back with vividness, the joys, and thoughts, and difficulties of my student days; thoughts and aspirations, and the dangers to be overcome, such as you, my young friends, have felt and may feel to-day, and, therefore, you will perhaps allow me to address you as an elder brother in the craft.

Before proceeding further, I wish to address just a word or two to the prize winners of the last session of the School. You fortunately passed the ordeal with success and came out victors. I rejoice with you most heartily! But a judgment has been passed upon you, and, after a minute search certain talents were found in your possession, which upon examination proved to be your own property. How do you intend to use these talents in the future? These possessions are only a trust to be turned to some good

account for the benefit of yourselves and others. Try to make a wise and noble use of them!

"We live in deeds, not years; in thoughts, not breath;
In feelings, not in figures on a dial.
We should count time by heart throbs. He most lives
Who thinks most; feels the noblest; acts the best."

Those of you who were not successful in gaining the tangible thing called a prize are not without your reward. You tried to succeed, and you have the satisfaction that all honest endeavour gives. I therefore congratulate you just as heartily and sincerely as the friends who are burdened with the prizes.

The inauguration of the work of the new session of the Sheffield School of Pharmacy, so devotedly maintained by the ability of your teachers, and the wise liberality of the chemists of the district, is an event of much importance, when we bear in mind the difficulties and vicissitudes attending the firm establishment of centres of provincial pharmaceutical education.

Long may this School continue to flourish and be the means of good it has already proved itself to be!

I shall not, and it is scarcely fitting that I should, offer any special remark in the way of guidance upon the important subjects that will engage your attention. Your teachers are your best guides. But if you should have any surplus devotion and time to bestow, let it be given to chemistry and physics—the basic subjects of your studies.

The opportunities afforded by your school are, I may with confidence assume, regarded as eventful (in a real and personal sense) by each and all of you. You know that when an opportunity is lost, like the brief hour at noon-day, or shot from a gun, it is gone for ever. An opportunity gained, and used, remains in effect during all time.

You will not simply endeavour to acquire the bare minimum amount of knowledge necessary to ensure the congratulatory shake of hands by the chairman of the Board of Examiners in the Examination Hall at Bloomsbury Square, but as much as you can possibly obtain by the exercise and the full use of all your time and energy. This commendatory greeting, and the licence to practice pharmacy which follows, are doubtless the most immediate objects of your quest, and rightly so. But if you adopt the honoured name of student, a title ennobled and made sacred by the learning of past ages, as well as by that of our own, you will not be content to obtain merely the bare minimum which the Act of Parliament requires.

Knowledge should be valued *for its own sake*. This is not only a trite saying, but an acknowledged truth, especially to the honest and faithful student, who holds in the treasury of his mind some self-sought truth, some hard-earned piece of knowledge, which at length he has made part of himself. Indeed we may fairly say that a man is unworthy of the honoured name of student unless he has felt a real thirst for knowledge, and *for its own sake!*

Let me venture then to urge you to make a full and conscientious use of your opportunities, ere they escape your grasp. "Learning is a superior sight; learning is a livelihood." The bare pass regulation quantity, like the watered milk up to Act of Parliament standard, opens as it were only the outer gate leading to success in life and to the temple of learning. You will find there are many more barriers to pass ere you become competent and worthy students and worthy men. Every particle of seeming unprofitable knowledge gathered by you, if really made integral parts of yourselves, will help you with fitness on the way of life. Before you have begun business for yourselves, you will thus be laying in your most priceless and precious stock in trade, not quoted on any price-list of the wholesale houses and not affected by the ordinary laws of supply and demand.

The attainment of fuller and more thorough knowledge having given you more flexible brains, you will find yourselves better fitted for anything that may befall you, either in or out of business.

An earnest and resolute purpose is, no doubt, required, as well as honest, genuine work. Nearly all the obstacles of former days for getting knowledge are now removed—schools and colleges and other facilities abound, as well as books, and, therefore, excuses are unreasonable and unworthy.

Again, with the advance of elementary and secondary education, both of which are within the reach of the poorest, it is more than ever imperative, especially for him who deals with science as a part of his calling, to be well equipped and ready. More is expected of him than formerly, and it is essential that his mind should be better stored and trained. If you are not so equipped, if you are not so made ready, can you expect, or do you deserve, to succeed?

The mere schoolboy of to-day is able to ask questions in chemistry, and many other subjects, which some years ago many of us, your seniors, would have been puzzled how to answer.

Have you ever tried to estimate the importance of your calling in its relationship with the public and the faculty of medicine? If you have done so, it is impossible that you should undervalue a sound technical training and the acquirement of adequate knowledge.

We are entrusted to prepare and give out the remedies for disease. We are the accredited allies of the physician in his warfare with suffering and death. We should be ready, therefore, personally, from our own knowledge, to guarantee that the medicines we supply are pure, potent, and efficient. This is indeed a great responsibility and an honourable trust, one that requires from us a just and faithful fulfilment.

The only possible and reasonable way of maintaining our position as pharmacists in the public estimation (and adding to it), and in defying the cut-throat competition of the times, is in this better equipment which education and thorough training afford. No Act of Parliament, however valuable or however necessary, can take the place of improved qualification; and, in the public interest, if we desire an adequate recognition by the state, this must be the only plea for such recognition.

If the best hopes for pharmacy are to be realized—I mean the establishment of a right relationship which should exist between the physician and the pharmacist, and the consequent separation of pharmacy from medical practice, resulting in the public good—it is only by an improved and ever improving qualification and fitness of those practising pharmacy these needful and beneficent changes can be brought about.

Be not then satisfied in obtaining the Minor qualification only, but pass forward to the Major; and afterwards, if possible, keep fresh and pliant your partly cultured brains by taking up some special work requiring investigation, or at least by endeavouring to reach a higher standard of knowledge in one or more branches of your studies. Then you will have worthily earned the honoured name of faithful students in science, and fresh lustre will be added to your calling.

The Research Laboratory of the Pharmaceutical Society, so ably presided over by Professor Dunstan, is ready to receive those who earnestly wish to assist in or undertake original research. This most valuable institution, which is already making an important record, is freely open to you without fee; all that is required is special fitness and the necessary zeal.

Success in study and the overcoming of the difficulties which beset the student can only be realized by well sustained and methodical effort and honest work.

To some, pliancy of brain and ease of acquisition come with painfully slow and halting steps. To these I would quote the Persian proverb, "Have patience! All things are difficult before they are easy?" Yes,

be patient, and not faint-hearted; strive, still strive with persistency and hope, and you will at length reap the golden grain of knowledge, for we all know that the race is not always won by the swift of foot.

Do not attempt to take in more mental food than your minds can digest and assimilate, you will thus avoid embarrassing attacks of mental indigestion and bewilderment of mind. Mental assimilation differs in each individual. The advice given by Seneca in the first century of the Christian Era is good even to-day:

"As long as the aliments of which we have partaken retain their own nature and float as solids in our stomachs, they are burdensome; but when they have changed their former state, then, and not till then, they enter into our strength and blood. Let us do the same with the foods which nourish our minds, so that we do not suffer the things we have taken in to remain whole and foreign. Let us digest them! Otherwise they enter our memory but not our minds."

Whilst avoiding everything that is likely to interfere with or withdraw you from the steady prosecution of your studies, obtain, when you can afford the time, needful mental and bodily recreation and change, for reasons of health as well as that of pleasure. It is scarcely necessary for me to prescribe this in set terms. You have each your own prescription. I have great faith in good fun and innocent laughter. These two curative agencies, with the addition of music, might well be added to the 'Extra Pharmacopœia.' In these times of relaxation have thought for the parts of your minds that are lying fallow and are in danger of atrophy, and which may need reminding of their rights of existence. Whether it be the country walk for botanical purposes, as well as for physical exercise and fresh air, or for the scanning of Nature's varied face; a ride on a cycle, or an hour spent in reading a well-written story, or in the reading or re-reading of some favourite author who has endowed our literature with immortal gifts; or in any other way best adapted for individual need, you will need some kind of innocent and welcome change to keep you fresh and ready for renewed effort and concentration of thought.

Having acquired the needful technical knowledge to enable you to pass the Minor and Major examinations, and having in your possession the much coveted diplomas of the Pharmaceutical Society, it is still possible that you may lack much that makes the pharmacist fit for his responsible position, and some of the qualities of a successful man of business.

Have you acquired good business habits—a compound quality of many sides and parts—the demeanour and habits of gentlemen, and the inestimable quality of common sense? There are text-books and treatises to be had upon almost every conceivable and inconceivable subject, for the last-named desideratum, the *vade mecum* is yet unwritten, and if it were written it would not help you much.

Like the accomplished *chef* in the culinary art, are you ready to use your knowledge in a practical manner at the dispensing counter? Can you make a perfectly satisfactory pill? This is not always an easy thing to do, for some pills prescribed are a serious problem for satisfactory manipulation.

When I have observed ill-shapen, soft and doubtfully compounded pills, it has been my habit to describe them as containing a large proportion of original sin, and that it was necessary that they should be made again before they were fit to pass the patient's throats. Alas! I have occasionally seen pills sent out from some pharmacies—considered very reputable—which truly were morsels of iniquity.

It is scarcely necessary to speak of the great importance of promptness and punctuality in delivering medicine to patients after their prescriptions are dispensed. It is obvious that no time should be lost before the patient is enabled to use the medicine he requires, especially when relief of suffering is anxiously sought. I never like the patient to get well before he has taken some of the physic ordered. Remember that an hour's sleep in a critical case may turn the balance against death.

Now, just a word about the necessity of cleanliness, as well as of accuracy in all your manipulations, particularly in the pharmacy proper. There, indeed, "cleanliness is next to godliness." Practise the virtue of cleanliness in all that you do. It is equally salutary at all times and in all places. Of this George Herbert said, "Let thy mind's sweetness have its operation upon the body, clothes and habitation."

One thing I would especially ask you to cultivate—that is a good, clear style of writing; this very often secures an appointment, and decides in the favour of a man. I may tell you quite privately that my style of caligraphy requires much improvement, and is oft en a trouble to my friends. By the bye, I wish I could give a gentle hint to some of our medical friends in this important particular. In a city in the north of England, many years ago, it was currently reported that a certain physician wrote with a dog's tail, so strange and peculiar was the appearance of his written prescriptions.

I have occasionally heard it stated, in sober earnestness, although it is rank heresy, that the "examined man" is often a spoiled man of business. It may be so in some few exceptional instances, when a little knowledge has made a foolish man more evident, but it is wholly untrue as a statement of a fact. It is just as true as the oft repeated saying, "a little knowledge is a dangerous thing!"

Genuine knowledge, the knowledge that makes clear to a man how little he knows, and how little he has gathered from out its vast domain, surely means, and is, in effect increased ability, ability to cope with difficulties, and to make the paths of life smoother, and the judgment better and more effective.

Be ever on the alert to add to your stock of general knowledge about men and things. This personal ingathering of mental stores, this ever present receptivity, with the judgment which comes slowly after the experience of years, will make you worthy to be accounted wise. You will then be able to form just and ripe opinions—opinions truly your own, and not belonging to some one else—opinions to be safeguarded and prized, and which distinguish the select man from the unthinking multitude.

When you begin business for yourselves, and even before, cultivate the feeling of good-fellowship toward all those who practice the same craft. Stand honourably by your fellows! they have the same business trials, the same interests, and the same aspirations incident to an honourable calling. And when the weak or unfortunate fall by the wayside, overcome by trouble or sickness, let the united hand of benevolence be ever ready to give help and sympathy. We live in altered days. We cannot, if even we desired, reestablish the ancient Guilds and Companies whose histories we might profitably read, but we have the Pharmaceutical Society of Great Britain, which is of jubilant age, with its Benevolent Fund. This is our *Alma Mater*. It stands to us to-day in place of the ancient Guilds. It stands as a necessity with us, to represent our views and to carry out our behests. We can—I mean the trade—make it strong and important: we can if we choose guide and govern it, and make it a truly representative Institution, worthy of the loyalty and esteem of all.

I have nearly finished my very discursive address. I dare say it may be likened by some to an unauthorized lay sermon—made up too much of "wise saws" and sage moralities. It tells you nothing new, I know. Let me entertain the hope that it may leave an impression, however faint, not untinged with good.

Life is made up of impressions, none of which can we wholly efface. Our actions, and these include our thoughts, are indelible—cannot be rubbed out or obliterated. Let us, therefore, have guard over ourselves, that we may reverently build up the fabric of our lives, no stone or particle of which can we remove, though we may try wisely to add to the edifice of mind, and heart, and soul.

> "Man is his own star, and the soul that can
> Render an honest and a perfect man
> Commands all light, all influence, all fate,
> Nothing to him falls early or too late.
> Our acts our angels are, good or ill,
> Our fatal shadows that walk by us still."

NEWCASTLE-ON-TYNE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The first meeting of the third session was held in Lockhart's Café, St. Nicholas Square, on the evening of Wednesday, October 7, at 8.15. Mr. G. F. Merson, President, occupied the chair. There was a large attendance. The minutes of last meeting having been confirmed, the President proceeded to deliver his

Inaugural Address.

After a few introductory remarks he continued—

Last two sessions we confined ourselves for various reasons pretty much to papers of an educational nature. We were, so to speak, an experimental Association. We were mostly strangers to each other and to association work. Many of us were apprentices and junior assistants, and being so, we endeavoured to have the papers read at our meetings of such scope that we could all understand and profit by. The goal we have striven to keep in view has been to assist students in some measure for the ordeal which we all hope safely to pass; and this, not so much by set lectures and demonstrations, as by bringing forward matters of general interest and importance and by enabling us to hear discussions on various topics and to take part in these discussions.

And here permit me to emphasise a duty devolving upon each individual member of our Association. We ought to exercise our privilege of taking part actively in the discussions raised, as by so doing we cultivate a habit of being able to express our ideas in a concise, intelligent, and intelligible form. We attain a considerable degree of self-reliance, which is of premier importance in the examination room and behind the counter.

How many of us, when confronted by an examiner, fail to do justice to ourselves and to the knowledge which we possess, simply because we are nervous, and have not sufficient reliance on our power of expression to put our knowledge into words! Take, as an example, a student reading by himself, who becomes, as he thinks—and quite rightly, too—well up in his subject, and who gets a companion to question him upon the ground covered. He understands perfectly well the questions asked, but often cannot express in connected form, the proper answers. You can readily imagine what a drawback this would prove in the examination room. Our Association meetings are intended, amongst other things, to assist our junior members in gaining this power of expression, and it behoves us all to take advantage of the opportunity. We find critics who carp at meetings of juniors as a waste of valuable time, which would be more profitably spent at home in solitary study, but the weight of evidence on the other side is so overwhelming that we can afford to pass over such criticism as unworthy of comment.

Another useful purpose which we may venture to assume is our prize competitions. Through the generosity of several gentlemen we are enabled to offer prizes of considerable value for competition amongst members, and by this means some of our young men have already received a complete outfit of text-books for the Minor examination, while others have obtained copies of first-class books of reference for the dispensing counter and the laboratory.

Entries for these prize competition examinations have been hitherto eminently satisfactory, and I would earnestly recommend the scheme to those who have not yet competed. Useful knowledge is obtained while reading for these examinations and study is made more interesting. Whilst speaking of study and examinations, I may be permitted to touch lightly on the new examination schedule, which will be officially established at the next meeting of the Board of Examiners. In last week's *Pharmaceutical Journal* there is an editorial article upon this subject, which should be read by all students, more especially by those who have not the privilege of systematic class instruction. It has been argued that the syllabus as extended will simply offer a premium upon cramming, and that "cram" text-books will immediately be issued in the form of a 'Minor *vade-mecum*' or 'Complete Enquire Within' upon the Minor examination. I fail to see any reason for such a supposition, though no doubt some will continue as heretofore to obtain their quota of knowledge at a minimum expense of time and brain energy. What scheme can you possibly devise which will thwart these? We may safely leave the matter in the hands of the Examiners, and rest assured that their desire and duty is to "test the knowledge and understanding of candidates, not their memory."

The extended details will prevent students from labouring to acquire a mass of lumber in the shape of unnecessary matter. Not for a moment would I seem to advocate cramming, but it is possible for a man to spend a lot of time over comparatively unimportant details at the expense of points of vital importance. Also it is quite usual for junior apprentices in the city here to attend the Kensington science and art classes, and after passing the elementary stage of chemistry, take up next year the advanced work in this subject. I have no desire to speak disparagingly of the useful work done at these classes, but Minor students, especially apprentices in the first half of their "time," would be far more profitably employed in studying their B.P. pharmacy and materia medica than in spending some hours weekly in learning to analyse complex salts and perform other operations which are prescribed for advanced students in chemistry, and which are never under any circumstances given at the Minor examination.

Being now in a measure firmly established as an association, I think it is time for some of our senior members to undertake in their spare time a little original work. We have sufficient talent amongst us, I am sure, to do some creditable papers in this direction, without in the least detracting from the interest manifested by younger members in the less advanced contributions. We cannot all be Kochs, Pasteurs, or Liebigs—not at the outset, at any rate—but there are numerous matters in connection with our daily duties which are worthy of the best study we can give them, and in their way are of as much importance to us as intricate research is to learned chemical societies. The chief difficulty experienced by many willing workers is the question "What shall I take up?" And here is the point where we most appreciate an honorary President or some other such patron who, with a long period of experience in pharmaceutical work, can draw upon his store of notes—the collection of years—and suggest many undecided points for investigation—points which the inexperienced are apt quite to overlook as being of no importance. We ourselves, too, if we cultivate a habit of noting carefully from day to day any unexpected appearance or abnormal

condition of the drugs and preparations passing through our hands, will find plenty of scope for interesting and useful work in the department of pharmacy proper. Such work, as pharmacists, is our natural and proper sphere. In working strive to work for the sake of science, not for applause.

But we are not to sacrifice ourselves completely on the altar of science. Certain social duties devolve upon us, and as members of a community we are expected to give a degree of attention to such duties. In our meetings we stand on a common level, that of fellow members of a craft. We meet on an equality and discuss mutual troubles and difficulties and otherwise get to know each other as we are when unencumbered by the trammels of business. "Friendships," as Mr. Sidney Plowman said in his recent address to the Victorian Chemists' Assistants and Apprentices' Association, "are formed in our Associations, which are life-long," and I am of opinion that these do more to break down the reserve, and kill the petty jealousies which too often exist amongst us between man and man than any other means.

We all know that the curse of chemists as a class is the want of unanimity amongst the members of the craft, and until some means is found to combine and consolidate the trade, we shall go on, as our fathers have done before us, every man wrapped in his own selfishness, and his knife in his neighbour when he gets the opportunity. Let us then act in every way straightforwardly, as gentlemen, exercising a little self-denial occasionally when we think that so doing will be for the good of the Association we are proud to be members of; and let us, when our turn comes to go into the ranks of those who are in business for themselves, endeavour to carry the same principles with us, so that we may leave the "old trade" at least not any worse than it was when we entered it.

Mr. A. Russell Bennet, in proposing a vote of thanks to the President for his interesting address, strongly urged upon the younger members of the Association to make the best possible use of the opportunities the Association afforded for commencing their studies in earnest for the qualifying examinations.

Mr. F. Park seconded the motion, which was carried amidst loud applause.

The Chairman then called upon Mr. B. S. Proctor, F.I.C., to deliver the prizes to the successful competitors at the examination held in March, whose names have already been published.

The presentation of the prizes was succeeded by the following—

Address by Mr. B. S. Proctor.

The world contains one thousand millions of inhabitants—mostly fools—fools—that is to say, men who think differently from you and me. It certainly is very pleasant to feel that we are the wise men, not like the common run who do not know any better. Does a fellow feel like this when he has just been plucked? or when he has been a year or two in business and finds he has lost all his capital and has to start as locum or manager for some one else? It is by failure that we learn modesty, a valuable mental quality, which is not taught in the schools, though it is sometimes learned in the examination room. What a good thing it is that the board room affords so many Minor failures, from which a man may learn his lesson of modesty without an irrecoverable collapse. A thing which is better still is that you have your trials, your failures, your lessons in modesty, in thought, observation, and accuracy here among your friends, and thus prepare yourselves for the more severe ordeal where the examiners, so filled with the spirit of humanity, are bound to carry out an inexorable law. In any association for helping one another it is fortunate that the helper usually helps himself as much as he helps any one else.

The duty of the teacher is first to master his subject, to know its difficulties and how to make them simple to others who are learning. This necessitates his having them very clearly and very strongly impressed upon his own mind, and if the impressions are clear and strong, they will be permanent and ever ready for his own use. To convey information to his hearers practical demonstration, accompanied with brief but carefully enunciated statement of what has been done, should be followed by a concise statement of the results. This operative demonstration gives a practical character to the knowledge which ensures its being more readily available when occasion arises for the application of the same to the work of life.

But while an experiment may demonstrate a fact, it is necessary to be critical as to what that fact is. It may be supposed to demonstrate a theory, while that theory may prove a false inference. If an experiment really demonstrates a theory the theory must be true, and if the theory be true a number of other experiments may be devised which will confirm the theory, or what is quite as likely regarding a theory based upon one experiment, the theory may be contradicted by the result of a second or third.

This is the reason why theory and practice, thought and work, should always go hand in hand.

Experiment or observation should suggest theory; theory should suggest experiment and direct observation, and the united result should be the progress of learning and the establishment of scientific law. I will endeavour to make this clear by an illustration.

When I was a young chemist I observed that a few drops of tincture of iron in a glass of water deposited ferric hydrate. Had the term hydrolysis been familiar at the time, I should no doubt have simply said "This is a case of hydrolysis." But I did not know such a term or the theory connected with it. I repeated the experiment several times and considered the propriety of investigating and possibly of publishing a paper on the decomposition of ferric chloride by large dilution with water. I remembered the decomposition of solutions of the chlorides of bismuth and antimony when diluted. It appeared reasonable enough to suppose that the iron salt might behave similarly, but require the greater dilution whlch I had noticed,

I remembered a well known lecturer upon chemistry telling his class that brown peaty water was sometimes prepared for washing linen by adding a little alum to it, which precipitates the brown colour, and he was not prepared to explain the nature of its action. Remembering this in connection with the ferric chloride precipitation, I inclined to say that "Alumina has a great analogy to ferric oxide; this is also probably a decomposition of a salt by a large bulk of water."

Unfortunately for these juvenile theories, but fortunately for the truth and for my credit, a more careful observation threw a different light upon the fact which I had at first observed. In my early days the use of distilled water in pharmacy was exceptional, and my experiments were usually tried with the town's water, and when I repeated the experiments with distilled water the precipitation did not take place. The drinking water contained a small quantity of calcium carbonate, enough to take the chlorine from the iron in the one case, and in the other the peaty water contained no doubt a similar impregnation, sufficient to decompose the alumina in combination with the brown matter of the peat. Thus vanished my theory of hydrolysis which I thought my observations had proved. *Sic transit gloria* discovery.

Now I do not want to impress upon you that ferric chloride is not decomposed by dilution with a large bulk of water, but if it is so I have not yet discovered

it. The probability that a faulty observation or an incorrect inference will be corrected by further experiment, gives to experimental science its great value as an educational training, as a means of developing the observing and the thinking powers. Languages, history, geography and natural history are far inferior in their power of developing original thought. Ethics and metaphysics, while they encourage independent thought and speculation, fail from their want of a check upon false conclusions. Mechanics may be classed with the experimental sciences, and it is one in which results may be predicted with great certainty and afterwards proved by experience. In mathematics this power of arriving at conclusions without experimental evidence exists in the highest degree. Truths may be evolved by the power of thought which it is beyond the power of experiment or observation of any kind to throw doubt upon.

As I do not like to think of pharmacists being made entirely of pills and plasters, it gives me pleasure when occasion serves to draw illustrations from my experiences outside of pharmacy, and with your leave I will give in illustration a few odds and ends gleaned from the stubble field of my work where the crop of pharmacy has been already carted away. One of my early lessons in mathematics and in thinking happened in this way. I was a child perhaps ten years of age. My mother was knitting a little woollen shawl for her shoulders which had to be a right-angled triangle when finished. If I remember rightly the two shorter sides had to measure each two feet, leaving the measure of the diagonal to take care of itself. She had commenced at the right-angle, and as I sat one day watching her at work, she told me she had got so far as that each of the short sides measured one foot, and she propounded to me the problem what proportion of the knitting had so far been accomplished, and asked me if I thought she could tell by the measure of the sides when half the knitting was done.

I was too young and naturally too ignorant to understand of myself how either of these points could be ascertained, but not too young to understand her simple demonstration with my slate and pencil. She showed that when the short sides were half their ultimate length, one fourth of the knitting had been accomplished. This lesson, simple as it was, has remained in my mind for half a century, and has not ceased to bear fruit. I do not remember whether or not she solved the other question, that is, how long each of the shorter sides would have to be to indicate that half the work was done, but as all of you are more than ten years of age, it may not be unreasonable if I ask you to follow the reasoning by which it should be ascertained.

If we draw the triangular pattern of the shawl, and then fold it across its longest measurement, we make two patterns exactly the same shape and exactly half the size. The two shorter sides of the smaller triangle now represent the two short sides of a shawl half the size of the one planned, and consequently show the length of the sides would be when half the work of the proposed shawl was accomplished, and this truth is made evident to you, though my diagram is rough and inaccurate. Here is mental work as trustworthy as experiment, and capable of evolving various other mathematical truths with an accuracy so great that experiment can scarcely be compared to them.

If we take a square and draw diagonals across it from corner to corner, we may draw a second square on one of the diagonals, and we perceive at once that the second square is double the area of the first, because half the first square makes a quarter of the second. And we draw a third square, which is evidently just half the area of the first, because a quarter of the first makes half the third square.

Now if we took the measure of the side of the first square and found it 10, the area would be 100; the area of the second square would be 200, and the measurement of the side would be the square root of 200. This is evident enough, though I cannot tell you offhand what is the square root of 200; and the side of the third square would be the square root of 50. We should thus have an experimental demonstration of the mathematical deduction, but the proof would be less reliable than the deduction, because then are the chances of errors in the calculation, and of inaccuracies in the measurements, while the reasoning is sound and convincing even when the diagram is rough and inaccurate.

Even in the present day of skilful and elaborate precautions against error, it is well for us to keep in mind the necessary imperfection of experiment. It is well to remember there is no such thing as a pure chemical, no such thing as a perfectly transparent medium, no such thing as a perfect sphere, a perfectly flat surface or a perfectly straight line. We hear constantly of the perfection of nature. That is cant. The truth is that nature seems to be set against anything that we could truthfully call perfect as we understand the word. All things in the physical world are simply approximations more or less approaching the theoretical perfection which to us is known only in mathematical axioms and deductions.

A ray of light is said to be a straight line, and it may be so while passing through a perfectly uniform medium, but passing through the earth's atmosphere, it is constantly shaken in its course, as we learn from the twinkling of the stars. The rays of light as they come to us from the sun and stars are said to be divergent rays—divergent to an exceedingly small degree, so small that they are accepted as practically parallel, yet I believe that astronomers and opticians acknowledge that as the rays come to earth they have not entirely lost their divergence. But taking note of such very slight departure from absolute parallelism it becomes necessary to consider if there be not any cause interfering with the straight course of the rays—any force or resistance which may affect one way or another their direction, and we are led to ask "what about the earth's atmosphere?" It is a refracting medium with a curvature, having a radius of about 4000 miles. What effect will this have upon the very slight divergent rays of the sun as they enter the atmosphere? In Brewster's optics we find the refractive index of air to be 1·000294, and the rule is given that for the focus of a double convex lens we divide the index of refraction by twice its excess above 1·0, that is by (0·000294 × 2). Now 141·000294 divided by 0·000588 gives 1701 as a quotient, which is to be multiplied by the radius of the curve to give the focus. The radius being taken as 4000 miles, we have the product (1701 × 4000) 6,804,000, and the deduction that the sun's rays passing through the earth's atmosphere, if the earth were out of the way, would converge and come to a focus at something more than 7,000,000 of miles distance—something more than this distance, because when entering the atmosphere they were not parallel, but had that small degree of divergence due to radiation from a distance of more than 95,000,000 of miles. But as the rays reach the surface of the earth they have only passed through the atmosphere which covers that side of the earth which is turned towards the sun, which is the equivalent of a lens of air curved on the side which is turned towards the light. But the rays not having passed out of the atmosphere have not suffered the second refraction, which takes place in passing through the second surface of a double convex lens. The convergence is consequently only half as much, and would suffice to bring the light to a focus at something more than 14,000,000 of miles; this, however, is not the point I wish to note so much as the fact that the rays are not parallel, and

their course is not a straight line, but bent into a curve directly they come within the earth's atmosphere, and the curvature increases with the increasing density of the air as the earth is approached, thus making the direction of the rays not a straight line, but having a gradually increasing curvature.

It is waste effort to aim at getting a perfectly straight line, a perfectly flat surface, perfectly pure water, or anything else that is perfect according to its definition, except the mathematical abstractions which have neither body nor soul.

Give us rather body and soul and the aim to do all the operations of our calling, and all the duties of life better than they have been done before; then, though we have not perfect materials, nor perfect appliances, though we have not perfect masters nor perfect servants, we may answer the purposes of our existence, and leave the world benefited by having lived in it. Now I am quite aware that this is a beautiful platitude that any parson might address to you from the pulpit, and leave no lasting impression or practical result. To be useful I had better enforce some little points more practically. One of the great elements of success in manufacture is to make use of all the waste products. Let me advise you to economise the waste products of cerebration. When you do have a wise thought—a thing which will happen sometimes—note it down for future use, for it is easier to put a peacock's feather into your hat than it is to put a brilliant idea into your head. The man who habitually writes down his observations, his conclusions, and his happy thoughts, and revises what he has written, will learn much of his own imperfection, of his change of opinion, or of his progress in knowledge, and will cultivate accuracy and humility. This will probably save him from sundry collisions with men who differ from him in information or the deductions derived from their facts. The habit of accuracy is most valuable, and should be cultivated in the knowledge of the fact that absolute accuracy is a thing quite unattainable. We still may cultivate that practical accuracy which is free from errors which may mislead. We profess to supply genuine drugs and pure chemicals. Though our linseed meal may contain 0·5 per cent. of foreign seed and extraneous matter, and our bicarbonate of sodium may contain 0·5 per cent. of water which does not belong to its constitution, we are still practically accurate so long as our statements do not mislead. I may describe to you the rounding of pills under a pill finisher as a double rotary motion, like the movement of the moon revolving round the sun, and this would be practically accurate to you so long as it guided you to the kind of motion I wished to describe. But if, on the other hand, I wished to describe to you the annual path of the moon, and were to tell you that it resembled the motion of your hand in the familiar operation of finishing pills, it would be a gross and misleading error. This you would readily see if you were to draw a circle with a radius of 8 feet to represent the path of the earth round the sun, and then draw the path of the moon, which would only differ from the first circle in being very slightly waved, quarter of an inch nearer the centre, alternating with a quarter of an inch further from the centre thirteen times in the course of the representing the earth's orbit. This deviation of $\frac{1}{4}$-inch to one side or other of a circle 16 feet in diameter is so small a matter that if the primary circle were erased, the deviations on the moon's circle would be unnoticeable. The teacher of astronomy who would continue to describe the moon's motion as being the same as the hand in finishing pills, or as more commonly expressed, similar to the motion of a nail in a carriage wheel, is guilty of thoughtless ignorance or of indifference to truth and accuracy.

Looseness of observation and of reasoning lead many men to make statements which are not true, and the same loose habits lead others to accept as true the statements which are in some sense misleading. When you hear statements made which appear worth remembering, accept them with the reservation that they may be at some time corrected or confirmed. Do not accept as true everything which you see in print, and do not accept as facts everything you may be asked the reason of. Remember the wag who found conversation flagging and spoke across the room to an acquaintance who professed to know much about dogs. "I say, Charlie, why do dogs always sneeze thrice?" Charlie, to maintain his reputation as a knowing one, felt bound to have a theory to offer on the subject, and most of the company in turn had something to say upon it, till someone turned to the questioner and said, "Now you have heard what other folks say, and have offered no suggestion yourself, what do you say?" To which he replied, "Why does a dog always sneeze thrice—well, it doesn't." If an anomaly is presented to you for explanation, first consider—Why does a dog always sneeze thrice, and repeat the words with a variation of emphasis and punctuation. "Why! Does a dog always sneeze thrice?" It is very likely the consideration of the question in its second form will cover the whole. You will often meet with complaints. "There is something wrong with my mixture; it is not the same as I had before." Such a statement is not a matter for either contradiction or admission without first looking carefully into it. Your reply will command more respect if it be founded upon an investigation. An amusing illustration occurred to us a few weeks ago when a gentleman who had been abroad had a prescription written for him in one town, but did not get it made up till he had left the neighbourhood of the prescriber. The medicament required was powders of bismuth and naphthol put up in cachets. The patient did not understand cachets, so ate them like biscuits, and became familiar with the taste of their contents. On returning to Newcastle he went to a cheap shop for a repetition. The powders were sent home packed in paper only, and a note accompanied them saying that the only kind of naphthol they had in stock was used for disinfecting, not for internal use, so they had made the powders without it. The patient came to us growling at the cheap man as a swindler, but expecting us to make the powders correctly at the same price, which he was informed we certainly would not do. On questioning him, it turned out that in the first dispensing of his prescription the naphthol had been omitted, which would probably have never been detected if he had swallowed the cachets whole as intended. When he found that in both cases he had received his medicine minus the most important ingredient, he was inclined to curse pharmacists and chemists alike as a set of swindlers. The medicine as we supplied it was not the same as he had before, and it was not wrong. The fact that the powders were ordered to be enclosed in cachets, was accepted as evidence that the nauseous naphthol was intended to be covered, and the fact that the cachets were nearly tasteless when chewed was evidence that it was not there. As to the errors of the cheap shop they were self-evident.

You will find many pharmaceutical myths or superstitions which would afford opportunities for minor investigations of a useful character, suitable for your evening meetings.

It is said that in making cold cream and emulsions the stirring should be all in one direction.

It is said that nitrate of mercury ointment turns black if dug out of the jar with a steel knife.

It is said that an alkaline mixture with acid powders does not effervesce so well at the end of the supply as at first.

It is said that a drop or two of acetic acid is a de-

sirable addition to the lead lotion of the B.P. to make it bright. The statements of solubilities of pharmaceutical solids in pharmaceutical liquids are in some cases discordant and in other cases wanting.

These and a great many other things are said, which it is worth your while to subject to critical examination with a view of having a definite knowledge instead of hearsay information on the point. It is a good work to increase the general stock of knowledge in however small a degree. At the same time you are increasing your own accuracy and experience. The chief happiness of healthy vigorous life is to have plenty to do and an inclination to do it. The next point is that what you do yields results you can look back upon with satisfaction. Both these points are covered in making careful record of careful work. When you come to a conclusion, or when you accept a statement on what you think reasonable ground, hold to it—not as a pig holds to his opinions of which way it ought to go, but with that species of judicial respect which while it acknowledges that all human evidence may be upset, claims that the evidence you have should be respected till superior evidence contradicts it. Be equally careful not to conclude or to say that some one is in error because he says or does what you think is not correct; a heavenly characteristic of humanity is humility. The man that will stick to his own way against reason we call pig-headed. The man who will set others right with too little sense of wisdom we call a puppy. The man who gets into a hot temper when his mistakes are pointed out, we say his monkey is up. A calm and dignified humility is an attribute connecting man with the angels. We are related to the pigs by our obstinacy, to the puppies by our conceit, to the monkeys by our irritability, and to the angels by our humility. If I am uncivil to you, do not be uncivil to me in return. One-half of the ill-feeling of the world is fostered by the tendency to think that an unjust or unkind action should be followed by retaliation of a similar nature, when a sufficient reply would have been to say, "I am very thin-skinned—that hurts me." Such a reply would often bring an apology instead of another thrust.

I recently conversed with a pharmaceutical friend, who had suffered from Somerset House and Bloomsbury Square authorities at the same time, and his temper seemed to be such that he would like to work his business with unqualified assistants for ever after, a conclusion having the spirit of retaliation which was neither witty nor wise.

It is not that I object to fighting. By all means cultivate the art. Fight against difficulties, against errors, against temptation and against indolence, and if you feel that all this struggling involves much struggling and little play, you may take comfort in the thought that when balancing accounts with this world, it is well to feel that you have received less treasure than has been fairly earned, for then you will enter the next world with a balance to your credit.

———

The President, in the name of the Association, thanked Mr. Proctor for the honour conferred on them by his presence at the meeting, and for the pleasure and profit they had derived from his address.

BRIGHTON JUNIOR ASSOCIATION OF PHARMACY.

A meeting of the Brighton Junior Association of Pharmacy was held on Wednesday, the 8th inst., at 9 o'clock, Mr. H. W. K. Pears, President, in the chair.

The rules of the Association were agreed to, and it was decided that the Dinner should take place on October 28. The president then read the following—

Inaugural Address.

Since you did me the honour of electing me your President, the summer has come and gone, the long warm evenings with all their allurements that effectually banished our meetings, with their poor counter attractions from the field have passed, and our Association springs into life again now that the dark, cold, dreary nights favour us in securing your attendance and support. To-night we enter upon our second session, and here at the outset let me express the hope that one and all of you will display that enthusiasm and interest in the affairs of the Association that made the last short session such a success. When the project of forming a junior association was first put forward, I for one was not at all sanguine of its success. The prospect did not seem a hopeful one, there were many prejudices and difficulties to overcome. In no town is the competition in our calling more severe, and that probably accounts for the fact that in few towns could there possibly exist more trade jealousy; and this which has led to the failure of every attempt at organisation amongst our seniors many thought would prove the stumbling block in the career of this Association. I am glad these surmises have proved incorrect. It is singular how assistants become imbued with their master's ideas and prejudices. So far as these concern business it is only right that this should be so, but to let this feeling extend so far as to prevent them associating with assistants in other establishments in the town is, to say the least of it, foolish. I regret that we are not entirely free from this feeling, but I hope that it will yearly become less noticeable. Our Association cannot be termed a complete success until every assistant in our town is enrolled a member, and I trust the day is not far distant when any man who does not loyally support his local association will be regarded as a morose, unsociable fellow who is totally devoid of any feeling of good fellowship. It is not men who possess such little public spirit as he who make a mark in the pharmacutical world. Your committee and officers will spare no effort to make the coming session a success, but they unaided can do but little, the responsibility falls on each individual member; it is bound to be a success if every member does his best to attend not only the social evenings but those devoted to papers, and take part in the discussions. This latter alone is of the greatest importance, and one from which we shall derive benefit that everyone will be thankful for in after life; it is by small efforts like these that we soon learn to cease to be frightened at the sound of our own voice. Our greatest speakers have had their periods of training; in the Eton School Debating Society's records appears one of Gladstone's youthful efforts, a defence of Robert Walpole. Mr. Carteighe a year or two ago said, "it is the positive duty of chemists' assistants to associate with each other and rub down one another's angles. One of the great features of these associations is the training it gives its members in discussion; they are able to practice on each other and thus overcome difficulties due to hesitation and diffidence and learn to speak fairly well on the subject of any paper." Even if this is all we are doing we are carrying on a good work, but I am sure that through meeting here that many of us have made friendships that, in the words of Dido to Æneas, "*Juvabit meminisse olim*," and I am glad there exist amongst our members so much of that good fellowship and public spirit which if only it had been present amongst followers of our craft in bye-gone days, many of our grievances to-day would never have been. I am sorry that we are not yet in a position to place before you a complete programme for the coming session. We still want some of you to come forward with offers of papers, not necessarily long ones, for I am aware that in large towns like Brighton few have sufficient leisure to devote to the necessary study and work which a long paper involves; but your committee have appointed several evenings for the reading of short papers, and

hope that several will make an effort to do something on these occasions, for you must remember that not only do you instruct your audience, but you obtain special knowledge yourself of the subject which you select for your paper, and you become to a certain extent an authority on that subject, and are there not many that an intimate knowledge of would prove of immense service to you in business. It is also to be hoped that those of you who have not yet commenced your studies will not be deterred from assisting us. Many have favourite authors, and a paper on these, with extracts from their works, would afford us many a pleasant evening. Essays on topics of the day, political questions, etc., again would be of interest. Some of you will no doubt remember that Cowper, when at loss one day for the subject of a poem, asked his friend Lady Austen to help to find one. She suggested the sofa on which she was sitting, and far grander poetry was the result than such lofty subjects as Faith, Hope, or Charity inspired him with. Leigh Hunt has written on all manner of subjects racy amusing pages teeming with wit and learning. Two essays he devoted to "sticks," another to "hats," and who that has read Lamb's essay on "Roast Pork" has not thought it classical. I would suggest, too, that we should have one or more evenings for the reading of extracts from books and magazines by different members. I feel sure that such evenings would prove profitable. A pharmacist should be a well read man and should not confine his knowledge to chemistry and allied subjects, and yet I fear that the hard working pharmacist, who conscientiously strives to keep abreast of the times in his knowledge of scientific discoveries has little leisure to devote to general literature, and many I fear would feel like a fish out of his native element were he involved in a discussion outside the domain of science. It is possible that evenings spent in the manner just suggested would prove far from being the least useful and beneficial. The hardest worked member has no excuse for holding back from taking part in the programme. He will not be long in doubt whether his efforts are appreciated or not. He may rest assured that they have been successful and have aroused interest if a general discussion ensues, and to give rise to an animated discussion should not be the last aim, for it is by the interchange of ideas that our views are enlarged and we learn to take broader views. It is usual on occasions such as these to indulge in mournful reflections on the pharmacist's outlook and to suggest some means of remedying the grievances, which, if only they were adopted, would mean the speedy arrival of the chemists' millennium, when there would be no stores, no cutters, very little work, large profits, etc., etc. I do not intend to follow this course, because I have no mournful reflections, and I have no remedy to suggest for the pharmacist's trials except the exercise of common sense and energy. Wiser heads than mine have worried to discover a more grandmotherly means without result. Our trade is not different from other trades and professions; the competition in every one of them is becoming fiercer every day, and it resolves itself into a question of the survival of the fittest. The trade in patents and proprietary articles is fast slipping away from the high class pharmacy. Well, let it go. We do not want it. It is not for the purpose of handing over the counter somebody's pills or syrup that will cure every disease known or unknown that we pass our examination, and it is useless to attempt to compete with companies who can buy at such a much greater advantage than the ordinary trader, for there is not a large percentage of pharmacists that possesses a sufficiently large capital to do so, and these few would probably find a more profitable channel to employ it in. There will always be, I am confident, ample remuneration and employment for the highly trained scientific pharmacist, and there will always be a very large section of the public who prefer to pay a fair price for the skill and services of a reliable man rather than entrust their health and lives to the tender services of firms where cheapness of labour and drugs is the one sole aim. It will be with us, as it is in the medical profession, the man who gives advice and medicine for sixpence and the specialist who requires guineas for fees, each moves in his own sphere. They each supply a want, their interests do not clash, each has his supporters. There are men in certain districts who will cry out that if their patent trade is taken away they lose their all; for such we are sorry, but if a chemist were to open a business in the middle of the Sahara, would he deserve pity if he found trade bad. The fault lies in the case of such men with themselves for opening in a neighbourhood where they are dependent for a livelihood on a trade for which a scientific training and education are not required. I am afraid it is men of this class who fold their hands in despair and sit down to rail at everything in general and the Pharmaceutical Society in particular. Even if the Pharmaceutical Society had, as it ought to have, the support of every member of our craft, it could not create monopolies, control prices or do anything else miraculous; but what it has done and is doing is to raise our position in the eyes of the medical profession by improving our status, and, what comes a little nearer home still to our younger members, it has firmly established and caused to be recognized the important position of men who have passed its examinations. It must be pleasant to know that the benefit derived from the examination is not merely the knowledge acquired and an empty title, but benefits of a more tangible nature also. This small part of the Society's good work would be ample reason why every pharmacist should join it. That the coming generation will be its supporters I have no doubt, for the characteristic features of the old school, apathy, ignorance, stupidity, are quickly becoming things of the past.

At the conclusion of the address a vote of thanks to the President was carried unanimously.

Parliamentary and Law Proceedings.

The Council of The Pharmaceutical Society of Great Britain *v.* Barratt.

Before His Honour Judge Jones: At the Bolton County Court on the 14th inst., the Council of the Pharmaceutical Society of Great Britain sued E. E. Barratt, of 1, Winter Hey Lane, Horwich, to recover four penalties of £5 each, for selling poisons contrary to the provisions of the Pharmacy Act, 1868.

Mr. J. M. Yates, Barrister, appeared for the Council.

Mr. Tomlinson appeared for the defendant.

Mr. Yates stated that the action was brought by the Council of the Pharmaceutical Society of Great Britain to recover from the defendant four penalties of £5 each for selling poisons, namely oxalic acid and laudanum, on different days, contrary to the provisions of the Pharmacy Act of 1868, as he was not a chemist or druggist. Section 1 of the Act enacted that from and after December 31, 1868, it should be unlawful for any person to sell poison unless such person should be a pharmaceutical chemist or chemist and druggist within the meaning of that Act, and be registered under that Act. Then section 2 defined what articles were to be deemed poisons, and the schedule at the end of the Act makes oxalic acid and all preparations of opium poisons within the meaning of the statute. By another section the published register is made evidence, and your Honour will find that defendant's name does not appear therein. Sec-

tion 15 is the important section, and it says that any person who shall sell poisons not being a duly registered pharmaceutical chemist or chemist and druggist, shall for every offence be liable to pay a penalty or sum of £5, and the manner of suing for penalties is to be as prescribed by the earlier Act. Now the defendant in this case is the manager or assistant to a chemist named Lewis, who has a number of shops. A man engaged by the Pharmaceutical Society went to the shop at No. 1, Winter Hey Lane, Horwich, on four occasions, and each time made a purchase of poison from the defendant. On August 13 last the witness whom I will call purchased "oxalic acid," and on August 20, 22 and 26 he purchased "laudanum." It is by reason of defendant having sold these poisons that he has incurred the penalties sued for. He is an unqualified man, and I need scarcely point out to your Honour the great danger there is to the general public through unqualified men selling poison.

John Clark, examined by Mr. Yates: I live in Horwich. On August 13 last I went to the shop at No. 1, Winter Hey Lane, and purchased a pennyworth of "oxalic acid." The shop is styled the Preston Drug Company. On August 20 I purchased laudanum, on August 22 laudanum, and again on August 26 laudanum. Defendant served me each time and I paid him. On September 18 I handed all the purchases now produced to Mr. Moon.

Cross-examined by Mr. Tomlinson: There was not any other person in the shop. I think there was someone behind the screen on one occasion. I know the defendant. He is in charge of the shop at 1, Winter Hey Lane. I pass there eight or nine times a day and he is always there.

Mr. Moon proved obtaining the purchases from the last witness and handing them to the analyst.

Mr. E. J. Eastes, examined by Mr. Yates: I received the packet and the three bottles from Mr. Moon. I have analysed the contents of each. The packet contains oxalic acid; each of the bottles contain laudanum. Laudanum is a preparation of opium.

Mr. Yates: I put in the printed register to prove that defendant is not a chemist and druggist, and that is my case.

Mr. Tomlinson: I was going to submit to your Honour that there was a registered man on the premises and that is all that is required; but upon the authority of the case I now have before me I am afraid that contention is cut from under me. I must ask your Honour to exercise discretion as to the amount of the penalty, and I contend that the Act gives you power to exercise discretion, and this is a case where the whole of the penalty should not be imposed.

His Honour: It strikes me I have no discretion. The statute says a penalty of £5 for each offence. As I am satisfied that the defendant has incurred these penalties I must give a verdict for the amount claimed, £20. I have no discretion as to the amount.

Mr. Yates asked for costs on the higher scale.

His Honour: Yes, I think actions of this kind are for the protection of the public and therefore of public importance.

Verdict for plaintiffs for £20 penalties and costs on the higher scale.

Poisoning by Strychnine.

Mr. John Troutbeck held an inquiry on the 8th inst. at the Board Room, Poland Street, Soho, into the circumstances attending the death of Jennie D'Achu.

Jean D'Arcy stated that he last saw the deceased alive at ten minutes past seven a.m., on Saturday. She was then in good health and spirits. At a quarter to eight he was fetched from business, and on arriving home found her lying on the bed and foaming at the mouth. Before he had left her he had given her some Epsom salts which his mother had given him. It was in a small square packet, sealed on both sides, but not labelled. She complained of its tasting very bitter, and witness then gave her a peppermint pastille. He did not exactly see the "salts," as he opened one end of the packet and let the powder drop into the glass. He only gave her about a quarter of the contents of the packet, and put the remainder on the table.

Louise D'Arcy, a sister of the last witness, stated that she heard deceased scream, and on running into the room saw her in a kind of fit. Witness applied restoratives and, as she did not rally, she sent for a doctor.

By the Coroner: She had often purchased Epsom salts at M. Le Maout's, and the packets had never been labelled.

Madame Louise D'Arcy, mother of the last witness, said that she purchased the packet of Epsom salts at the shop of M. Le Maout. She gave it to her son on Friday night. She had bought it ten or twelve days before. There was no label upon it. She identified the packet produced as the one she had purchased and given to her son. She paid a penny for it, and gave it to her son in the same condition as she received it. The witness added that on Monday, after the salts had been administered, M. Le Maout called at her house with a young man, and asked her where she had bought the powder. She replied that she had purchased it at his shop. He stated that he recognized her; but wished her to deny that she had procured the powder at his shop. He left her to consider the matter, and, returning after a time, asked what she had determined to do. She said that she could do nothing, and he thereupon said that he would blow out his brains. No one had had access to the medicine in her room.

Dr. George Clark, said that he was called to see the deceased. She was foaming at the mouth and breathless. He asked whether she had taken any medicine, and Miss D'Arcy said "No." He looked round the room, but saw nothing suspicious. He then went home to dispense an antidote, but was re-called, and found her in a dying condition. She died at about five minutes past eight. Witness elicited from the first witness that he had given the deceased some Epsom salts, and he handed him the remainder of the contents in the blue paper produced. Witness had since analytically examined the powder and the sediment in the glass, and discovered traces of strychnine. The "salts" were not of the usual colour. He had made a *post mortem* examination, and in the smaller intestine he discovered traces of strychnine. Witness sent a boy to M. Le Maout's shop to purchase a packet of Epsom salts, which was labelled, and found to be perfectly pure. The cause of death was strychnine poisoning.

Auguste Le Maout, of 15, Wardour Street, after being duly cautioned by the Coroner, elected to give evidence. He stated he had no doubt that what Madame D'Arcy had said was the truth; but he thought her statement was exaggerated, and, such being the case, he wished to know whether there was not a bottle of medicine on her mantelpiece which had not been purchased at his shop. He did not prepare his own medicine, but obtained it from a large City firm. He had seen the rest of the powder, and was satisfied that it did not come from his shop. The colour of his wrapper was different to the one produced. Since he sold it, it might have come into contact with poisonous substances, such as vermin-killer; if such were the case and the packet was slightly damp, the poison might have become absorbed by the salts. He wished to explain that it was not his intention to blow out his brains, but what he meant to convey was that he would be ruined. Although in the previous case it was not proved that the salts were purchased at his shop, he had since taken great care

in making up the packets. It was a fatality for which he could not account. As a matter of fact he did not keep strychnine in stock, or vermin killer.

Some further evidence having been given, the jury, after an hour's deliberation, returned a verdict that the deceased died from strychnine administered by Jean D'Arcy, but that there was not sufficient evidence to show how the poison came into the packet.

Poisoning by Laudanum.

Dr. Macdonald, M.P., Coroner for North-East Middlesex, held an inquiry at Tottenham, on Friday, the 9th inst., respecting the death of Emma Stokes.

From the evidence of a daughter of the deceased, aged 16, it appeared that on Tuesday evening the deceased sent her for two pennyworth of laudanum. The shopkeeper sent her back to inquire what it was for, and the girl returned saying it was for an abscess in the face. Previous to this another daughter, aged 7, had also purchased two pennyworth of laudanum at the same shop. About nine o'clock the deceased poured the four pennyworth of laudanum into a tumbler and drank it, going to bed shortly after. About eleven o'clock, when her daughter tried to wake her, she was unable to, and on assistance being obtained it was found that the woman was dead.

William Collett, of 8, The Pavement, South Tottenham, stated that he sold the two separate quantities of laudanum to the girls, but did not know that they were for the same person.

A juror said that he did not think it right that a child of seven should be served with laudanum.

Dr. Hutton stated that he was of opinion that death was due to opium poisoning, and the jury returned a verdict that the deceased took the poison inadvertently to relieve pain.

Correspondence.

Election of Local Secretaries.

Sir,—Is not the present an opportune moment to call attention to the anomalous fact that the city of Manchester and the borough of Salford have but one Local Secretary between them, and to point out the utter inadequacy of such representation? Manchester sends six and Salford three members to Parliament; they are governed by distinct municipal heads and bodies, and are in no sense one town any more than are London and Edinburgh, except as regards the accident of geographical proximity, and yet Salford is without direct representation. Would such be the case if the places were divided by a distance of say ten, or even five miles?

In the circular issued by the Executive the attention of the pharmaceutical constituency is directed to the importance of electing "representative officers" to the responsible post of Local Secretary. My opinion is, that no single individual could efficiently represent so large and populous an area as this, unless he devoted much more time to the duties than could be reasonably expected of him. The fact is (as I have urged in your columns before) we want Divisional Secretaries; then let us elect men who are in touch with the retail trade, who can and will, without too much sacrifice on their own part, look after their immediate district, report breaches of the Pharmacy Acts, push the interests of the Benevolent Fund, and in various ways endeavour to popularize the Society among their fellow-craftsmen. Then I think we might reasonably expect to see some little revival of "the good old times" so many of us look back upon with regret.

Manchester. Chas. Swinn.

Sir,—A great deal of the apathy and antagonistic views that exist throughout the provinces towards the Pharmaceutical Society is largely due to the laziness and indifference of many of our Local Secretaries. In towns that I know personally, and I am sure the same can be said by others, the Local Secretaries are absolutely heavy drags on the wheels of the pharmaceutical chariot, because they are men who have made no effort to help the Society by going around to their brethren in trade, or calling them together to foster a kindly spirit and enlist their sympathies towards each other, and therefore towards the Pharmaceutical Society, under whose banner they fight and struggle for an existence.

In many towns the Local Secretary has been the same man for the last thirty years, and because there was in these good old times little or no need for any exertion on their part, they still think that there is absolutely nothing to be done, when three-fourths of the total number are not connected with the Society. They are very retired in their manner and retreat when there is any approach of the younger members of the craft.

They seem to think that their whole work is merely to collect the annual subscriptions, and frequently they do not stoop to such work, for it is usually allotted to the junior apprentice to collect the subscriptions, and unfortunately for the Society, and especially the Benevolent Fund, the apprentice has to skip three out of every four chemists on the Register, because they are not in connection with the Society.

Now I think that the Society can never prosper, or even hope to hold its own place, while those who represent it are "too big for the job" of calling on the whole of the trade and asking them to support it by their subscriptions and their sympathies. If the Local Secretary calls on every member he can easily get to know if any irregularities exist in the neighbourhood regarding the sale of poisons, and the keeping open shop by unqualified assistants, as well as exert a powerful influence for good on the members by letting them understand that all are working together for the good of the whole craft.

It is only the Local Secretary who can be above suspicion in preventing illegal trading, and that such illegal trading does take place is well known to all in the trade. In this town there is more than one shop open where there has been no qualified chemist for the last two years. And yet our Local Secretary takes no action to stop these illegal proceedings. I have heard the Society roundly blamed by those outside the Society for allowing such cases to go on, and very probably the Society has never heard that these exist. Until we have men representing us who are not afraid to act in these cases, men who are not above calling on every individual member of the craft, and men who are of a broad, kindly and charitable disposition, we who are members of one of the noblest crafts cannot expect the whole craft to flourish when there is such a terrible amount of indifference shown by our Local Secretaries.

I appeal to all the members to give our Society an opportunity of flourishing and doing good work in the future, by each and all of us only voting for men whom we know we can trust to represent our interests in all matters affecting the trade.

Progress, M.P.S.

B.—We understand that it is held authoritatively that the sale of cough tablets by the ounce does not involve liability to medicine stamp duty, unless the tablets are enclosed in a "packet, box, bottle, pot, phial or other enclosure."

Cologne.—No such offer has been made in this Journal.

NOTICES OF MEETINGS.

Western Chemists' Association (of London).—Wednesday, October 21, at 8.30 p.m. Annual Meeting at the Westbourne Restaurant, Spring Street, Paddington.

Brighton Junior Association of Pharmacy.—Wednesday, October 21. Paper on "The Sale of Poisons," by Mr. Marshall Leigh.

Chemists' Assistants' Association.—Thursday, October 22. Paper on "Some Pathology for the Pharmaceutist," by Mr. J. W. Stainer. Mr. E. B. Sherlock will also read the essay for which he was last session awarded the silver medal of the Association and £5 given by Messrs. Burroughs and Wellcome.

Communications, Letters, etc., have been received from Messrs. Hill, Wright, Johnson, Humphrey, Hesse, Andrews.

THE MICROSCOPE FOR STUDENTS.

BY JOHN HUMPHREY.

(*Continued from page* 24.)

Having studied the chief modifications of the cell-wall it is next of importance to devote attention to the cell contents. Of these, considered from a practical point of view, starch presents itself as deserving primary consideration. This substance so continually gives indications of its presence during examinations of vegetable products, existing in these either as a natural constituent or as an adulterant, that it is essential the student should learn at an early stage to detect and distinguish it under all phases. A potato tuber affords ready means of studying the starch grains in a fresh state as well as *in situ* in the cells. A very thin section of the tuber, cut in any direction, is mounted in a drop of water and will be seen to consist of large, thin-walled cells containing little protoplasm but numerous excentrically oval granules. A little of the sap exuded from the cut surface of the potato added to a drop of water on a clean slide and covered with a thin cover glass will show these more clearly, and enable tests to be applied which will prove them to consist of starch. An aqueous solution of iodine causes the grains to assume a deep blue colour, changing gradually to black-blue. This is the most characteristic reaction of starch, and takes place more rapidly when chlor-zinc-iodine is used. In this case, however, there is a secondary reaction, the grains swelling and losing the high refractive properties which they normally possess. Solution of potash induces this swollen appearance without change of colour, and simple boiling with water has a similar effect, in both instances iodine afterwards producing the characteristic blue coloration. The potash must first be removed by washing with water, and it should be noted that except in the presence of water no blue colour appears. Tincture of iodine applied to perfectly dry starch has a negative effect.

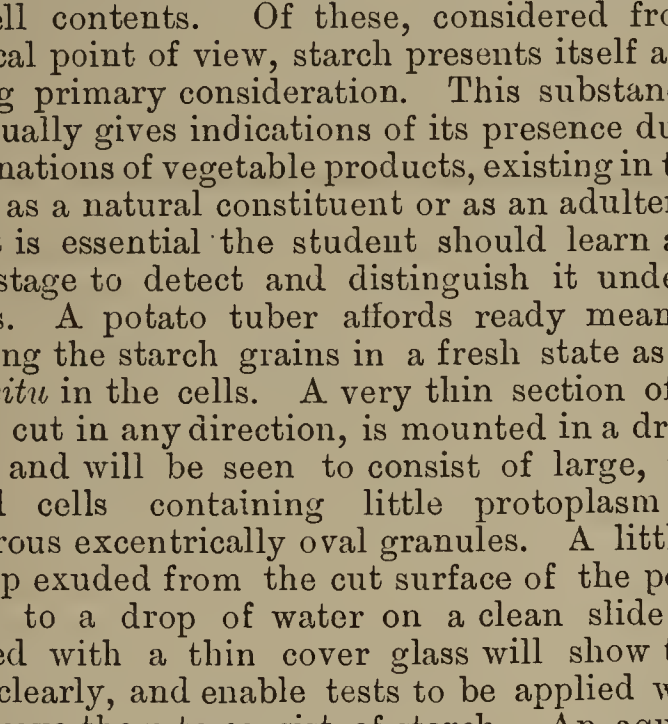


Fig. 5.—Starch grains from a potato tuber, viewed with—A, ordinary light; B, polarized light; h, hilum; c, compound grains (× 150).

The starch grains (fig. 5, A) examined in water alone appear colourless and very bright, being highly refractive. They are somewhat ovoid in shape, and if most of the light reflected from the mirror be shut off by means of the diaphragm, the quarter-inch objective should enable the hilum to be seen as a clear round spot near the narrower end of the grain. This will be surrounded by two or three concentric rings, between which and the margin numerous others, varying in excentricity, will appear. Some few compound grains may be noticed, each portion having a separate hilum and rings, the whole being sometimes surrounded by several rings common to the lot. The rings outline the layers of which the grains are built up, and upon the manner of their arrangement and the position of the hilum in the respective varieties the classification of the starches is based. Muter in his 'Organic Materia Medica' divides the common starches into five characteristic groups:—

Group I.—Hilum and concentric rings visible. Granules oval or ovate. Includes tous les mois, potato, arrowroot, calumba, orris, ginger, galangal and turmeric.

Group II.—Hilum stellate, and almost invisible concentric rings. Bean, pea, maize, lentil, dari and nutmeg.

Group III.—Hilum and rings practically invisible in the majority of the granules. Wheat, barley, rye, jalap, rhubarb, senega, sumbul, bayberry, chestnut, acorn, calabar bean, liquorice root, white, green and black hellebores.

Group IV.—All granules truncated at one end. Sago, tapioca, podophyllum, belladonna, colchicum, scammony, canella, aconite, arum, cassia and cinnamon.

Group V.—All granules angular in form. Includes oats, tacca, rice, pepper and ipecacuanha.

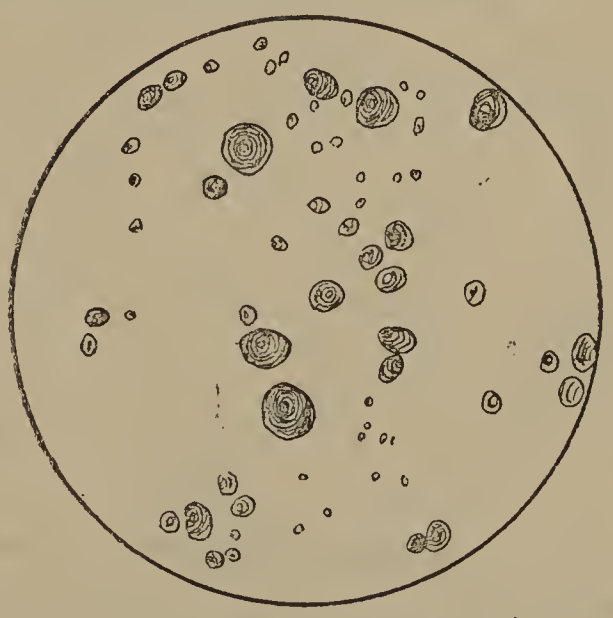


Fig. 6.—Wheat starch (× 150).

Having referred any starch to its group, its individual identification will depend upon slight variations in shape and appearance, careful measurements, and the application of polarized light. To ascertain the shape exactly there is no better plan than sketching the outlines of a number of granules upon thin Bristol board with a hard and sharp pointed pencil. A glass circle ruled into squares and dropped into the eyepiece so as to rest upon the diaphragm will be found a great convenience here in enabling one to fix the relative positions of various points in the different granules. Let the drawing surface be similarly divided into squares. Practise now freehand drawing until approximate accuracy in delineation is reached.

When greater accuracy is required in the drawing the use of some kind of camera lucida is necessitated. Perhaps the simplest to use and most accurate in its results is Zeiss' Abbe camera, costing from thirty shillings upwards. But whatever type is

selected, care should be taken to obtain full instructions for use from the maker. In using the ordinary single prism instruments it is an advantage to have two sources of light, one to illumine the

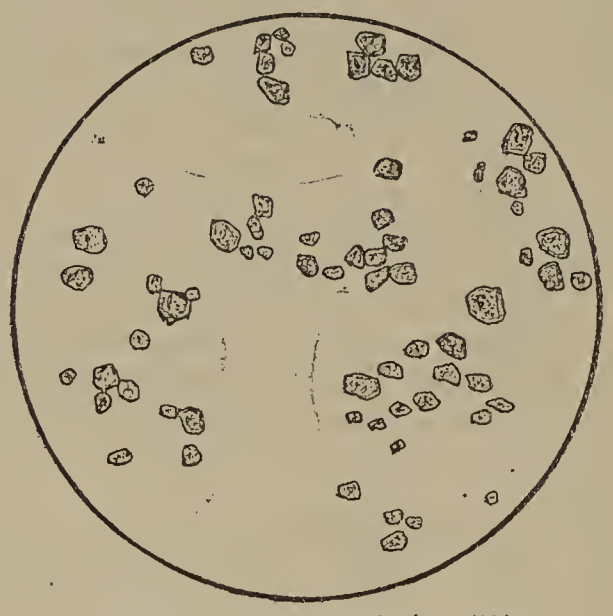


Fig. 7.—Maize starch (× 150).

drawing paper and pencil, the other to supply light to the object in the usual manner. By this means the amount of light on paper and object is more readily equalized than when one source of light only is available. The regulation of the amount of light is the chief difficulty encountered in using every form of camera, and this once overcome a little perseverance will soon settle the rest.

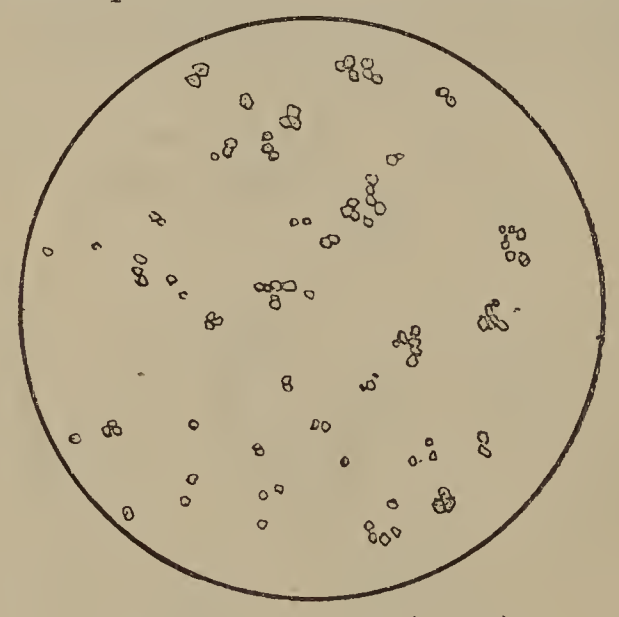


Fig. 8.—Rice starch (× 150).

A simple drawing apparatus may be manufactured at an infinitesimal cost from a pill box and an ordinary thin glass cover. The former should fit closely over the eyepiece and be perforated with a hole of the same diameter as the eye-lens. Below this hole attach a small ledge of cardboard in such a manner that it may support the glass cover at an angle of forty-five degrees with the front of the lens, and the apparatus is complete. To use it, first place the body of microscope in a horizontal position, adjust the mirror and focus the object. Adjust the apparatus on the eyepiece, place the drawing surface on the table, and on looking through the thin glass an image of object will appear superposed on the paper. Shade this slightly until the image and pencil are visible together, then rapidly sketch outlines only of the object. All details should be filled in afterwards from direct observation when camera is removed, and the microscope used in the upright position. There is one point to bear in mind in working with this simple apparatus—the image projected on the paper is *reversed*. It will therefore be of advantage to make the preliminary sketches on tracing paper, which can be turned over and the details filled in at the back, just as they appear in the microscope. With the prism instruments this precaution is unnecessary. Use a higher power eyepiece when adding details, and indicate amount of magnification on all drawings. Measurements may also be effected by aid of the camera lucida. First project the image of object and mark its outline on paper, then, removing the slide from the stage without other alteration, replace the object by the stage micrometer and focus the lines on this. Noting what spaces between the lines cover the image the measurements are directly obtained. The alternative method, avoiding the use of camera, is to use the glass circle with ruled squares or some other form of eyepiece micrometer. The value of the spaces must first be estimated by focussing the lines on the stage micrometer and noting how they correspond to those on the eyepiece micrometer. If the former has lines $\frac{1}{1000}$ of an inch apart and the interval between two of these covers the intervals between *four* lines on the latter, then each space between two lines of the eyepiece micrometer will correspond to $\frac{1}{4000}$ of an inch with that particular combination of lenses. This value will differ with every change of eyepiece or objective, but once estimated and noted it is ready for use at any time. With a magnification of about 225 diameters, Muter states that the normal measurement of potato starch is ·0027 in. to ·00148 in. The value of the

Fig. 9.—Bermuda arrowroot (× 150).

polariscope in examining starch of any kind depends upon the property of double refraction possessed by the latter. Upon rotating the polarizer or analyzer until the field is dark (fig. 5, B) the granules appear brilliantly illuminated, whilst each one presents a distinct dark cross springing from the hilum. A light cross in the same position replaces this when the background is light. The red and green selenite plate used between the polarizer and object shows the relation of the interference colours beautifully. When the field is red, a red cross appears on the starch grain, and of the four segments into which this is thus divided, two are blue and the others yellow. With green field and cross the other colours are reversed.

It will be good practice for the student to examine as many starches mentioned in the foregoing groups as practicable. A practical illustration of the value of the knowledge to be thus acquired is that of amylum, B.P. This is per-

mitted to be either the starch of wheat, maize, or rice, but as there is a considerable difference in the market value of the different kinds it is well to be able to assure one's self that the lowest priced article is not supplied and charged as one of the more expensive kinds.

Fig. 10.—St. Vincent arrowroot (× 150).

As it is well to permanently mount a series of typical starches for reference, instructions will be given here as to the simplest methods of performing this operation. Glycerine in some form appears to be essential if the starch is to retain its characters for any length of time. It is, however, useful to have duplicate specimens mounted dry for comparison, and this method will be described first. Thoroughly clean a glass slide and cover, gently breathe upon the former and sharply touch it as near the middle as possible with a clean and dry glass rod which has been dipped into the sample of starch. Sufficient of the granules will be left upon the slide, and after drawing round them by means of a camel-hair pencil a ring of japanner's goldsize the size of the thin glass cover, this should be placed in position over the starch. Put the slide under pressure by means of a spring clip or a flattened bullet and leave for a few hours. If then the goldsize is set another ring should be drawn round the edge of the cover glass and the adjacent portion of the slide. When this is dry a finished appearance may be given by giving a final coat with black asphalte varnish. Attach a gummed label at each end of the slide after cleaning this thoroughly ; on the upper one write the name of specimen, and give brief particulars of the method of mounting on the other. For the glycerine mount prepare the following medium: "Selected gum arabic, 2 oz. ; glycerine, 1½ fluid oz. ; distilled water, 1½ fluid oz. ; thymol, 1 grain. Place in a wide mouthed bottle, cork well, and put it in a warm place." If the mixture be agitated at intervals perfect solution will be effected in a few days, when the liquid should be strained through fine muslin and allowed to stand until free from air bubbles. When ready for use, drop a little starch on a clean slide as before, cover with one or two drops of the medium, gently breathe upon a clean cover glass and lower this obliquely upon the object. Place under gentle pressure and put aside in a warm place for a few days. A ring of Canada balsam will prevent any risk of glycerine escaping, but no cement or varnish is really necessary when once the cover is fairly set.

The ringing necessary is most simply performed by means of a turntable.

Fig. 11.—Sago starch (× 150).

(To be continued.)

COLLODIUM BELLADONNÆ B.P.C.*

BY MICHAEL CONROY, F.C.S.

This is one of the late additions to the British Pharmaceutical Conference Formulary. The formula is as follows :—

Take of—
Alcoholic extract of belladonna . . . 5 ozs.
Spirit of camphor . . . . . 2½ fluid ozs.
Dissolve and add—
Flexible collodion sufficient to produce 1 pint.
Set aside, and decant the clear liquid.

These directions are simple in the extreme, but, unfortunately, the result is very unsatisfactory. The extract dissolves in the spirit of camphor, but most of it is thrown out of solution on adding the collodion, and the mixture, being of a viscous nature, takes a very long time "to settle." The sample before me, made over a month ago, has not yet cleared. Life being too short for formulæ that take up so much time, the following modification was tried, with the result that a perfectly clear preparation was produced in a very short time.

The extract was dissolved in the spirit of camphor, but, instead of adding the collodion to it as directed by the formulary, ether and spirit, in the proportions used in making collodion, were added. In other words a mixture consisting of three parts of ether and one part rectified spirit was used instead of collodion. This was shaken up at frequent intervals during the course of one hour, and the clear solution poured off. In this perfectly clear solution, the necessary amounts of pyroxylin, Canada balsam and castor oil were dissolved. This produced an article identical with the B.P.C. formula without requiring the inconvenient and tedious settling process. The essential difference between this modification and the original formula is that the pyroxylin is added to an easily obtained and bright solution of the extract instead of the extract being added to the collodion.

I do not claim that this modification turns out a satisfactory preparation. Far from it. All that can be said for it is that it enables one to produce the article within a reasonable time. In other respects it has all the defects of the B.P.C. article. By whichever of these methods the collodion bella-

* Read at a meeting of the Liverpool Chemists' Association.

donnæ is prepared, one is naturally struck by the fact that most of the extract is left undissolved, and it seemed to me desirable to ascertain the quantity and alkaloidal value of the dissolved extract as well as of the undissolved portion. For this purpose I took 5 ozs. of the B.P. alcoholic extract of belladonna, dissolved it in 2½ fluid ounces of rectified spirit, and added sufficient of the collodion solvent (three ether and one sp. rect.) to produce 20 fluid ounces. This was well shaken up at frequent intervals during the course of one hour and allowed to settle for twelve hours. The liquid portion was then decanted and found to measure 15⅛ fluid ounces. The undissolved extract, holding part of the solvent, formed a semi-solid mass measuring 4⅞ fluid ounces, its weight being 5 ozs. 260 grs.

The extract used, on drying at 212° F., lost 12·5 per cent. of its weight.

One fluid ounce of the liquid portion evaporated and dried at 212° F. yielded 16·5 grains, equivalent to 18·8 grs. of the extract used.

From these figures we arrive at the following :—

Total weight of extract used 5 ounces	2187·5 grains.
Weight of extract in 15⅛ fluid ounces of liquor, 18·8 × 15⅛ .	284·3 grains.
Weight of undissolved extract .	1903·2 grains.

On testing the alkaloidal strength of these extracts, by Dunstan and Ransom's process, I obtained the following results :—

The extract used yielded 2·34 per cent. of alkaloid, equivalent on the 5 ounces to . . .	51·18 grains
One fluid ounce of the liquid portion of the preparation gave 1·55 grains, equivalent on the 15⅛ fluid ozs. to . . .	23·44 grains
The undissolved extract gave 1·1 per cent. of alkaloid, equivalent on the 5 ozs. 260 grs. to .	26·92 grains.

The alkaloid from the liquid portion and from the undissolved extract, 23·44 grs. and 26·92 grs., amounts to 50·36 grs., which, allowing for experimental errors, agrees fairly well with the alkaloidal content of the extract used, 51·18 grs.

Taking the alkaloidal content as the basis of valuation, we find that more than one-half is wasted. This being so very unsatisfactory, it occurred to me that probably the B.P. extract was not a suitable one for this preparation. The B.P. extract is not in reality an alcoholic extract, water being used to follow the spirit in extracting the powdered root by percolation. This introduces into the extract substances that are less soluble in collodion, and which to a very considerable extent reduce its alkaloidal value. Accordingly, an extract of belladonna was prepared with rectified spirit alone, and with this extract the same experiments were repeated, with the following results :—

On dissolving 5 ounces of this extract in 2½ fluid ounces of spirit, adding sufficient of the collodion solvent to produce 20 fluid ounces, shaking for one hour at frequent intervals and allowing it to rest for twelve hours, 15½ fluid ounces of clear liquid were obtained. The undissolved extract holding some of the solvent measured 4½ fluid ounces, its weight being 5 ounces, 145 grains.

The extract used, on drying at 212° Fahr., lost 14 per cent. of its weight.

One fluid ounce of the liquid portion evaporated and dried at 212° F., gave 22·7 grains, equivalent to 26·4 grains of the extract used.

From these figures we get the following—

Total wt. of extract used, 5 ozs. =	2187·5 grains.
Weight of extract in 15½ fluid ounces of liquor 26·4 by 15½ =	409·2 „
Weight of undissolved extract =	1778·3 „

The results on testing the alkaloidal strength of these are :—

The extract used gave 3·84 per cent. of alkaloid, equivalent on the 5 ozs. to.	84 grains.
One fluid ounce of the liquid portion gave 2·05, equivalent on the 15½ fl. ozs. to . . .	31·77 grains.
The undissolved extract gave 2·2 per cent. of alkaloid, equivalent on the 5 ozs. 145 grs. to	51·31 grains.

More of this extract was dissolved than of the previous kind, and although more of the alkaloid was taken up. Still the proportion of the whole is less than in the experiment with the B.P. extract.

I quite admit that it is easier to criticise than to originate, but I hope, at an early date to go further into the matter, and with your indulgence to submit to a future meeting of this Association, if I succeed, a better and less wasteful formula for this useful preparation.

I may say, in conclusion, that Dunstan and Ransom's method for the estimation of the alkaloids in this extract is an excellent one, easily worked and yielding reliable and constant results.

NOTES ON ESSENTIAL OILS, ETC.*

(*Concluded from p.* 292.)

ROSE OIL.—The results of the investigation of rose oil that has been going on for some time past in the University of Breslau is briefly summarized. The principal constituent both of the German and the Turkish rose oil is a body represented by the formula $C_{10}H_{18}O$, which has been named "rhodinol." It boils at 216°-217° C., and shows all the reactions of an alcohol. With the anhydride of acetic or benzoic acid it forms an ester, which, however, upon distillation, splits up again into its constituents. Upon treating it with a halogen acid, rhodinol chloride, $C_{10}H_{17}Cl$, rhodinol iodide, $C_{10}H_{17}I$, etc., is obtained. Oxidation with potassium bichromate and sulphuric acid converts rhodinol into an aldehyde, that has been named "rhodinal," and is said to be identical with citral. By phosphoric anhydride rhodinal is deprived of a molecule of water and converted into dipentene.

ROSEMARY OIL.—The examination of eight samples of commercial rosemary oil of the best quality has confirmed Messrs. Schimmel in the opinion expressed last April as to the characters that should be shown by unadulterated French and Italian rosemary oil (see *Pharm. Journ.*, [3], vol. xxi., p. 940). The results are shown in the table on the next page.

All these oils dissolved clear in half to one and a half parts and more of 90 per cent. alcohol. The requirements set forth in the previous report were a specific gravity not below 0·900, solubility in half to one and a half and more parts of alcohol and rotation to the right. Referring to the notes upon

* From the October report of Messrs. Schimmel and Co.

No.	Source.	Sp. gr. at 15°.	Rotation in 100 mm. tube.
1. .	French oil, Drôme department	0·904	+9°48′
2. .	French oil, Drôme department	0·900	+2°19′
3. .	French oil, Drôme department	0·899	+2°40′
4. .	French oil, Gard department	0·905	+4°50′
5. .	French oil, Gard department	0·903	+7°10′
6. .	French oil, Gard department	0·907	+5°52′
7. .	French oil, Alpes maritimes department	0·913	+5°30′
8. .	Italian oil	0·905	+0°42′

rosemary oil communicated to this Journal by Mr. Cripps (vol. xxi., pp. 937 and 1150), Messrs. Schimmel reply to the criticism therein contained by pointing out that the characters they gave were expressly stated to be for French and Italian rosemary oil, whereas samples 1 to 3 of Mr. Cripps were oils of English origin, a kind that does not play any important part in commerce. For no. 4 Mr. Cripps gave the constants sp. gr. 0·8835, optical rotation —33°, and said that in fractianol distillation about 78 per cent. of the oil passed over below 170° C. In doing so Messrs. Schimmel state that Mr. Cripps involuntarily furnished a proof that the oil was adulterated with turpentine oil to such a degree as scarcely to deserve any longer the name rosemary oil. After referring to the ancient literature quoted by Mr. Cripps, Messrs. Schimmel complain of the false conclusion drawn by him that in describing the requirements for a genuine French or Italian oil of rosemary they were guided solely by the characters of the distillate prepared by them from dried material, and they conclude, not too courteously, by advising Mr. Cripps that in future he should examine somewhat more exactly what he intends to criticise.

Sandalwood Oil.—Refering to the characteristic oil from South Australian sandal wood mentioned in the last report (*Pharm. Journ.*, xxi., 941), it is stated that the wood has not yet been forthcoming in large quantity, the transport from the interior of Australia taking a long time. According to Müller, in 'Select Tropical Plants,' the tree from which it is derived, *Santalum Preissianum*, Miquel, is known in Australia as "quandong" and the fruit as "native peaches." A crystalline body has been separated from the oil from this species in a pure condition; it forms colourless prisms that melt at 104°–105° C., and in chemical constitution appears to be an alcohol.

Sassafras Oil.—The article sold in the United States under the name "artificial oil of sassafras," sp. gr. 1·070, is stated not to be, as might be supposed from its name, a product of synthesis, but a distillate from ordinary camphor oil.

Spike Oil.—The oil coming into commerce from France as spike oil has proved to vary so much in character that a closer examination of it was deemed necessary. The table in the next column represents the results obtained.

Oils similar to nos. 10, 11 and 12, both in respect to odour and physical properties—specific gravity, rotation, and solubility—can be obtained by adding to one of the oils nos. 1 to 9 40 to 50 per cent. of French oil of turpentine. Nos. 10, 11, 12 are therefore considered to be, without doubt, spike oil adulterated with turpentine oil. Upon the ground of the results obtained Messrs. Schimmel consider that genuine spike oil should possess the following properties:—

(1) The specific gravity should be over 0·900.
(2) One part of spike oil should dissolve clear in three parts of 70 volumes per cent. alcohol at 20° C.
(3) Spike oil should rotate the beam of polarized light slightly to the right.

No.	Department and year.	Sp. gr. at 15°.	Rotation in 100 mm. tube.	Solubility in 70 p. c. alcohol at 20°.
1.	Alpes maritimes, 1889 . . .	0·914	+1°40′	soluble
2.	Gard, 1889 . .	0·911	+2°21′	soluble
3.	Drôme, 1889 .	0·911	+0°20′	soluble
4.	Drôme, 1890 .	0·909	+1°4′	soluble
5.	Drôme, 1890 .	0·910	+0°13′	soluble
6.	Gard, 1890 . .	0·903	+0°40′	soluble
7.	Gard, 1890 . .	0·909	+1°36′	soluble
8.	Gard, 1890 . .	0·911	+2°2′	soluble
9.	Gard, 1890 . .	0·910	+2°24′	soluble
10.	Alpes maritimes, 1889 . . .	0 897	—8°12′	insoluble
11.	Gard, 1889 . .	0·894	—9°3′	insoluble
12.	Gard, 1890 . .	0·890	—1°30′	insoluble

Wintergreen Oil.—It is stated that the wintergreen oil at present in the American market is no longer distilled from *Gaultheria procumbens*, but probably exclusively from the cheaper material available in the wood and bark of an American birch, *Betula lenta*, or "sweet birch." In the American pharmaceutical journals a test has recently been published for the detection of the synthetically prepared wintergreen oil, in which the greater solubility of fuchsin in the artificial oil is alleged to be due to the presence in it of methyl alcohol. Messrs. Schimmel point out that fuchsin is soluble in the methyl ether of salicylic acid, and that it is less soluble in the natural oil in proportion as the latter contains besides, methyl salicylate, other bodies, such as terpenes, in which fuchsin is insoluble. The difference, however, is not considered to be sufficiently great to allow of its being used as a practical test between the two oils, to say nothing of a mixture of them. Only oils adulterated freely with petroleum, kerosene, paraffin oil, or turpentine oil would show a markedly smaller solvent power for fuchsin.

Novelties.

The following are mentioned under the heading "Novelties":—

German Rose Pomade.—The experiment is being made of using the material afforded by the cultivation of roses by the firm in Germany to prepare rose pomade, an industry hitherto confined exclusively to France. The petals, carefully separated from the calyx, are added to fat melted at a moderate temperature, and maintained continually in intimate contact with it by suitable mixing arrangements. After a certain time the contents of the pan are run into a specially constructed centrifugal machine beneath, where in the course of a few minutes the separation of the impregnated fat from the petals is effected in the most thorough and cleanly manner. The advantage of this method of separation over expression between hot plates is said to be evident; all contact with the hand is avoided and other constituents from the rose petals do not get into the fat. The fat thrown off runs direct from the centrifugal into a vessel, from which it is brought back automatically into the first pan, where it is brought into contact with a fresh quantity of rose petals and the process is repeated until the desired concentration is obtained.

Golden Rod Oil.—In the New York factory the "sweet scented golden rod," *Solidago odorata*, is distilled. The oil is described as having a powerfully aromatic, but not specially agreeable smell, and a specific gravity of 0·963. It is said to be used in the United States as a corrigent of taste and odour.

Catmint Oil.—In the same establishment are distilled also the leaves of the "catnep" or "catmint" (*Nepetaria Cataria*), a labiate indigenous in North

America. The oil is heavier than water (sp. gr. 1·041), and has an odour resembling mint and camphor and not agreeable.

RESEDA OIL.—A large quantity of fresh mignonette flowers have been distilled as an experiment. The distillate is described as being solid and of a waxy character, and it is noteworthy that during the distillation an abundance of sulphuretted hydrogen was evolved.

EUCALYPTUS ROSTRATA OIL.—A distillate from the *Eucalyptus rostrata*, or "red gum tree," has been received from Algiers, where this species is said to stand the heat better than the *Eucalyptus Globulus*. The leaves of *E. rostrata* have not hitherto been used for distillation. The oil is said to recall in odour and taste that from *E. odorata*. Messrs. Schimmel found it to have a specific gravity of 0·924 at 15° C., and a rotatory power of +12° 58′ in 100 mm. tube. It has a strong odour of valeric aldehyde and contains a considerable quantity of cineol.

EUCALYPTUS ALBA OIL.—An oil said to have been distilled from *Eucalyptus alba*, a species not mentioned in Australian works, has been received from Professor Treub, Director of the Buitenzorg Botanic Gardens, Java. The oil is colourless, very volatile, and has an agreeable nutmeg odour.

ANDROPOGON OIL.—A distillate from the leaves of *Andropogon Schœnanthus*, also received from Professor Treub, is said not to at all recall the odour of citronella oil, which has hitherto been considered to be a distillate from this species, but to resemble more closely the lemon-grass oil of commerce, hitherto ascribed to *Andropogon citratus*. On the other hand, an oil forwarded as from an undetermined species of *Andropogon* agrees perfectly in odour with the citronella oil of commerce.

PEPPERMINT OIL.—A peppermint oil received from Java is said to have a pronounced poley-like odour and flavour of mint, with a disagreeable, bitter after-taste.

CINNAMON-LEAF OIL.—A distillate from the fresh leaves of *Cinnamomum Zeylanicum*, received from Java, is described as a beautiful limpid oil, having an agreeable odour and taste of cloves.

NUTMEG-LEAF OIL.—Another distillate received from Java is from the leaves of *Myristica fragrans*. It is said to be a colourless, extremely thin oil, having a fine and agreeable nutmeg taste and odour.

BACTERIOLOGY.*

BY J. LEFFINGWELL HATCH, B.SC., M.D.

(*Concluded from page* 292.)

CLASSIFICATION.

The classification of bacteria has been the subject of considerable controversy for a good many years. Over two hundred years ago Leeuwenhoeck recognized and described micro-organisms in putrid water and saliva, which probably corresponded to the vibrios and leptothrix of modern times. Existing as they do upon the very borderland of the vegetable and animal kingdoms, they not only have been transferred from the one to the other, but it has been even questioned whether the smaller forms are living beings or not.

We can safely say to-day, however, that these microscropic organisms are members of the vegetable kingdom, ranking among the lowest forms of fungi. The fungi are divided into: 1st, the Schizomycetes, or cleft fungi; 2nd, the Hyphomycetes or mould fungi; 3rd, Saccaromycetes. The bacteria belong to the first of these groups and have been classified by different authors upon different grounds, some basing their classification upon morphological distinction, whereas others have classified them upon physiological grounds. Of all the classifications that we have yet received, we are probably most indebted to Cohn. We are indebted to him, not only for work that is exhaustive and has extended over a great length of time, but also for a system which has been nearly universally used and adopted.

Another classification, which has received considerable attention, is that of Flügge, who followed Rabenhorst, retained the term Schizomycetes, and dividing them as follows:—

* Lecture delivered before the Alumni Association of the Philadelphia College of Pharmacy.—From the Annual Report.

CELLS ROUND OR OVOID.

- Isolated, or in chains, or united in amorphous gelatinous families . . . . . *Micrococcus.*
- Forming gelatinous families of definite form . . . . .
  - Colonies solid, filled with cells
    - In large numbers, in irregular colonies . . . . . *Ascococcus.*
    - In small but definite numbers, in regular groups . . *Sarcina.*
  - Colonies, with simple layer of cells at the periphery . . . . . *Clathrocystis*

CELLS, CYLINDRICAL.

- Short, isolated, or in small heaps loosely united, or in irregular gelatinous families . . . . . *Bacterium.*
- Long cylindrical forming filaments. . .
  - Filiments, isolated, interlaced or in bundles.
    - Without ramifications. . .
      - Straight filiments . .
        - Short distinctly jointed . . . . *Bacillus.*
        - Long, indistinctly jointed. .
          - very thin . . . *Leptothrix.*
          - thicker . . . . *Beggiatoa.*
      - Wavy, or in spirals . .
        - Short rigid . . . . . *Spirillum.* (*vibrio*).
        - Long flexile . . . . . *Spirochæte.*
    - Pseudo-ramifications . . . . . *Streptothrix.* / *Clathrothrix.*
  - Cells shut in roundish gelatinous masses . . . . . *Myconostoc.*

Another classification, and one which is followed by Professor Guiteras, is that of Hueppe, who bases his classification upon fructification.

HUEPPE'S CLASSIFICATION—COCCI FORMS.

Arranged in chains	Zoöglœa moderate	Spores endogenous (?)	*Streptococcus* (?).
		Arthropores or spores unknown	*Arthro-Streptococcus.*
	Zoöglœa strongly marked		*Leuconostoc.*
Arranged in fours	With small chains		*Merista.*
Arranged in fours	Without small chains		*Sarcina.*
Arranged in eights			*Sarcina.*
In irregular heaps	Zoöglea interminate		*Micrococcus.*
In irregular heaps	Zoöglea united in balis		*Asococcus.*

ROD FORMS.

Smaller or longer threads, without distinction of base and apex. Threads flexible or rigid	Threads straight or wavy, no endogenous spores		*Artho-Bacterium.*
	Threads straight, wavy or screw form, no endogenous spores		*Spirulina.*
	Threads, straight or wavy, spores endogenous	Without change of the cells	*Bacillus.*
		With change of the cells, spindle rods	*Clotridium.*
Threads with distinction of base and apex	Threads without divisions	Without presence of sulphur	*Leptothrix.*
		With presence of sulphur	*Beggiatoa.*
	Threads with divisions	Unbranched	*Crenothrix.*
		Branched	*Cladothrix.*

SCREW RODS.

Screw-like threads, flexible or rigid	Formation of arthrospores or fructification unknown		*Spirochæta.*
	Endogenous spores	With change of form	*Vibrio.*
		Without change of form	*Spirillum.*

The classification that Dr. Formad uses is based upon that of Cohn, and not only relates to the morphology of the different forms, but also has to with their relation to different diseases; it might therefore be called a pathological classification.

FUNGI, THEIR CLASSIFICATION AND OCCURRENCE. (FORMAD.)

I. Saccharo-mycetes (yeasts).

1. *Torula cerevisiæ*, common yeast.

II. Hypho-mycetes (moulds).

1. *Oidium albicans*, produces thrush.
2. *Penicillium glaucum*, simple mould fungus.
3. *Aspergillus glaucus*, found in many diseases of external ear and sordes.
4. *Trichophyton tonsurans*, produces ringworm, sychosis, *tinea tonsurans.*
5. *Achorion Schœnleinii*, produces favus.
6. *Microsporon furfur*, produces pityriasis, etc.
7. *Mucor mucedo*, found in potatoes. In India produces "Madura," a foot disease.
8. *Actinomyces*, produces actinomycosis.
9. *Ustilago carbo*, produces ergot on rye.

III. Schizomycetes (cleft fungi, bacteria, microbes).

1. *Sphero-bacteria* (synonyms: micro-cocci, monades, staphylococci, asco-cocci, cocci). *Round.* In pairs, diplo-cocci; in fours, tetragonous, micro-cocci, sarcina; in chains, strepto-cocci; in masses, zooglœa. Found in and supposed to be the cause of all forms of fatty degeneration, suppuration, acute atrophies, sewage poisoning, erysipelas, variola, rubeola, scarlatina, gonorrhœa, diphtheria, pneumonia, septicæmia, pyæmia, osteo-myelitis, ulcerative endocarditis, puerperal fever, pyelo-nephritis, yellow fever, typhus, milk poisoning, silkworm disease, fowl-cholera, hydrophobia, hæmophilia, mumps, goitre and serpents' venom.

2. *Desmo-bacteria* (bacilli) *long rods.* Found in and supposed to be the cause of anthrax, hog-cholera, tuberculosis, glanders, lupus, leprosy, pearl-disease, syphilis, typhoid fever, meat poisoning, malignant œdema, Jequerity bean, ophthalmia, perhaps carcinoma and sarcoma.*

3. *Micro-bacteria, dumb-bell shaped or rods.* (Simple bacteria of fermentation), bacterium termo. Cause of putrefaction, acetic, lactic, butyric and digestive ferments.

4. *Spiro-bacteria* (spirillii), *screw bacteria.* Causes of relapsing fever, cholera Asiatica (Koch's comma bacillus), cholera morbus, cholera infantum, dysenteries (vibrio).

5. *Leptothriciæ* (water fungi) *giant bacteria*, leptothrix buccalis. Found in sordes. Crenothrix and beggiatoa grow so rapidly in water, that they may fill water pipes or wells, occur in coated tongue.

There are many other forms of classification, and excellent classifications from a botanical point of view, but for the student of medicine this last classification will be found the most practical and useful.

* Malaria, formerly thought to be due to a bacillus, is now supposed to be called by the plasmodium, an infusorium.

KOCH.

Robert Koch was born December 11, 1843, at Clausthal, where he received his earlier education. In 1862 he entered the University of Göttingen, where he studied medicine until 1866, when he received his degree; after that he practised for a while at Posen, and from there was called to Berlin as professor. In 1888 he was sent by the German Government to investate cholera and discovered at that time the cause of cholera, which he found to be a spiro-bacterium of a comma shape, which he called the comma-bacillus, and which to-day bears his name, the comma-bacillus of Koch.

For this service the German Government presented him with $25,000.

He also was appointed as head of the Institution of Hygiene.

Another of his brilliant discoveries was the cause of tuberculosis, which he found to be a desmo-bacterium, which he designated as the bacillus tuberculosis.

Ever since he discovered the cause he has been seeking for a means of removing it, and with an untiring patience has been following out, first with one substance and then with another, line after line of attack upon this dread Nemesis.

He found that certain of the aniline dyes and cyanide of gold were able to stop growths of the tubercle bacillus on cultures of acid agar-agar, but when administered to animals suffering from tuberculosis, were of no avail. He was not discouraged by these results, as a less hardy investigator might have been, but redoubled his efforts, and with a zealous energy

pushed on into a hitherto darkness which he has caused to become brilliantly illuminated.

At the International Medical Congress, which met last summer at Berlin, he made an announcement that he had found a substance which was capable of arresting tubercular processes in animals. He was not willing at that time to state his methods or the substance used, for purely scientific reasons—namely, that he wished to collect more evidence before he made public as a truth what he gave to the profession with great hesitancy as a veritable possibility.

On the 13th of November last, in the *Deutsche Medicinische Wochenschrift*, under the title "Weitere Mittheilungen überein Heilmittel gegen Tuberculose," he described a method of inoculating patients with a potent fluid, giving a description of the symptoms produced by this inoculation, and stating that in those persons inoculated the disease was arrested, and that time alone would suffice to settle the question whether or not they were cured permanently.

The *modus operandi* and the symptoms we are all familiar with from the newspaper accounts, so I shall not reiterate them here.

We learned, in speaking of the secretions and excretions of bacteria, that they are capable of producing toxic substances that are known as ptomaines, and that where these ptomaines are secreted to any great extent they hinder the further development of the organism which produced them.

These alkaloids are extremely poisonous and potent in very small doses. They may be separated from the bacteria by means of filtration through a porcelain filter under atmospheric pressure.

The bacillus tuberculosis finds an admirable nidus in the tissues of the guinea pig, where it can be grown rapidly.

From Koch we learn that he employs guinea pigs in the production of his virus, which is used in extremely minute doses, thus giving a slight clue to its nature.

From these data I think it is a possibility, if not a probability, that the lymph of Koch consists in the ptomain of the bacillus tuberculosis, which is abstracted from a growth obtained in the guinea pig by means of filtration through a porcelain filter under high atmospheric pressure.

This ptomain may be held in solution in some indifferent vehicle in which it is found to be soluble.

If what Koch has done seems to be particularly wonderful, all I advise you to do is to look at the early training of the man, and your wonder will change to that of surprise that you could have believed anything else of a man so educated. He is the thorough German scientific observer that has had the peculiar advantage of an educational system that is not excelled nor equalled anywhere on the face of the earth, and, as an additional aid, he has had an appreciative government and a sympathetic Emperor, who sees that science is of as much use to a government as its departments of state interior, or its army or navy.

If, in these few cursory remarks, I have been able to elucidate this mighty maze, which seems without a plane, and have been able to drop a few seeds of the science of bacteriology upon ground where it will bring forth such fruit as merely an understanding reading of a science that is becoming every day more popular, I shall at least think my effort not in vain.

A COMBINATION OF IODINE WITH GLUCOSE.*

BY F. P. MANN, M.D., SAN FRANCISCO.

The remedial value of iodine is well known. But it is also a fact that full doses cannot be administered internally except in the form of iodide of potassium. As a rule, in the various forms of disease to which free iodine is applicable any combination having an alkaline base is not desirable. In order to secure the specific action of a remedy adapted to relieve chronic disorders—and it is to this class of diseases that iodine is chiefly applicable—it is important that it should be to a certain extent cumulative and retained in the circulating blood for a sufficient length of time to exert its specific action upon diseased tissues. In glucose we have an agent capable of absorbing, or rather of occluding, free iodine so that this metalloid cannot be detected by either odour or taste, and thus combined can be administered in much larger doses than formerly employed without producing unpleasant symptoms. Another advantage in giving iodine occluded by glucose is found in the fact that as this substance occurs normally in the contents of the small intestine, in the chyle after the use of amylaceous and saccharine food, in the blood of the hepatic veins, and in the tissue of the liver in the form of glycogen, it is probable that glucose in thus occluding free iodine is itself protected from chemical change during the process of digestion by the antifermentative quality of the latter, and hence may be readily absorbed into the circulation, carrying in its embrace the iodine to be liberated during the morphological changes that occur prior to the formation of new blood corpuscles. In the formula, 30 grains of iodine are dissolved in 4 ounces of water by means of 150 grains of potassium iodide; to this solution are added 12 ounces of syrup, as prepared by the sugar refineries and sold by grocers under the name of golden syrup, or sugar-house syrup or molasses. This syrup contains glucose in combination with organic matter, and answers the purpose quite as well as glucose manufactured from starch by the action of sulphuric acid, or other glucosides furnishing this substance in an isomeric form. The exact formula as above should be given to the druggist with special direction that simple syrup must not be substituted; this, containing entirely crystallizable sugar, will not take up the iodine, and the result will be a strong solution of iodine, which cannot be taken without serious inconvenience. To avoid mistake, I direct as follows:—

℞ Iodinii	℥ ss.
Potass Iodidi	℥ ijss.
Aquæ Puræ	℥ iv.
Syrup. Fuscus	℥ xij.
Ess. Gaultheriæ	℥ ij.

M. Fiat. sol. Sig.: Take teaspoonful between each meal with a little water. (Syrupus simplex must not be used.)

I have succeeded in producing the most satisfactory, I may say remarkable, results where potassium iodide, Lugol's solution, and Syrup. ferri iodidi had signally failed. It is better, in prescribing this formula, to advise commencing the use of the medicine the day following that on which it is ordered, as some hours, about six to ten, are required in which to completely occlude the free iodine. I do not know the exact limit of this occlusion, but, if desired, a much larger proportion of iodine can be used than already named, and still remain odourless and tasteless so far as free iodine is concerned; though where a stronger combination is employed it would be advisable to commence with a smaller dose and increase it gradually.

* From the *American Druggist*.

COD-LIVER OIL AND CASTOR OIL EMULSIONS.

Instead of the usual method of preparation with acacia, P. Van Aspern recommends the use of a 20 per cent. solution of potash soap, by which means it is possible to prepare an emulsion containing 80 per cent. of oil; the emulsion is stated to be tasteless if taken in milk or warm coffee; if necessarp, syrups, creasote or flavouring substances may be added.

Castor Oil Emulsion.—Potash soap 2·0 dissolved in distilled water 10·0 and mixed with castor oil 40·0; flavour by addition of 6 drops of oil of peppermint.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, OCTOBER 24, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE ADMINISTRATION OF THE BENEVOLENT FUND.

THE approaching election of annuitants upon the Benevolent Fund of the Pharmaceutical Society furnishes an appropriate opportunity for the reconsideration of the conditions under which that fund is administered, and for bringing forward any suggestions as to alterations or improvements that may appear desirable. It is therefore natural that when the report of the Benevolent Fund Committee was presented to the Council at its last meeting, Mr. HAMPSON should have made use of the occasion to express his opinions in regard to the mode of election which now obtains. And we venture to assume that our readers will so far agree with us in the belief that Mr. HAMPSON'S protest against the present mode of election was instigated by the most benevolent and worthy motives as to make the consideration of his particular views and suggestions necessary as well for the interest of the Benevolent Fund as on the ground of respect for their proposer. The objection urged against the present mode of electing candidates for annuities has reference to the practice of canvassing for votes. That practice, as Mr. HAMPSON regards it, has the effect of converting the election into a contest in which the competitors are not upon a fair and equitable footing. The election of the successful candidates may be a consequence of their being able to command other means of support in their candidature than those attaching to the intrinsic merits of their claims upon the Fund. It cannot be denied that from an abstract point of view there is justice in this objection. The candidates selected by the Benevolent Fund Committee to be placed on the list for election, are chosen after very careful consideration of the claims and circumstances of the entire number of applicants, solely on the ground of their eligibility. But though the members of the Committee may be fully convinced that among the number of those selected some are more eligible than others, their function does not extend beyond the selection of a certain number of candidates who are so far placed on an equality. The Committee has no power to give effect to any opinion that may be formed as to the relative claims of the selected candidates. It is not until after that stage in the administration of the Fund has been passed that the circumstances come into play against which Mr. HAMPSON'S protest is directed. Those circumstances arise from the freedom of action of the candidates and of the subscribers to the Fund. If it happens that out of seven candidates selected as eligible only six annuitants are to be elected it may be that the candidate who is in the greatest distress, perhaps physically disabled and with few friends, fails to be elected as an annuitant, simply because his fellow candidates have been able, by personal solicitation, or by the aid of friends to secure more votes than he could. Hence, Mr. HAMPSON characterizes the election as a race or even a scramble in which those most in need of assistance are handicapped against candidates better able to help themselves or having greater support from friends. It is this condition of things which Mr. HAMPSON terms "barbaric." In his estimation it is not, properly speaking, an exercise of charity, because something is associated with the charity which is hurtful and reprehensible.

From a purely ethical point of view there is perhaps little room for disapproving of the sentiment underlying Mr. HAMPSON'S objection to the present mode of electing annuitants from the Benevolent Fund. But while sympathizing with him, as we are sure many will do, it seems necessary to ask whether that sentiment is not a little too extra-mundane to be applied in practice. The law that the weakest must go to the wall is a cruel one, but it is an influence so universal in nature as well as in human society that we must bow to the necessity, however much we may deplore its consequences. Even in the administration of charity it must be recognized to some extent, although it is the object of charity to mitigate its effects. And then comes the further question whether it would be reasonable even in the administration of charity to require its recipients to be reduced to an absolutely passive condition. Does the award of charity in a spirit of perfect impartiality demand that a candidate for its benefits should be debarred from having the aid of an energetic and courageous daughter, by whose exertions in collecting votes his election may be secured? Surely in the award of charity it cannot be desired to extinguish in its recipients all effort to assist the benevolent intentions of the donors. Such, however, would be the effect of any alteration of the present mode of election, by which candidates would be debarred from using their own ability to obtain votes, and from receiving assistance of the same kind from their relatives and friends. There is in addition to these

considerations the important point of interest in the elections to the Benevolent Fund on the part of subscribers. It is not every subscriber to the Fund that takes such interest; but many do so, and it is to be feared that they at least would be less disposed to continue their contributions if they were debarred from promoting the election of particular candidates. And lastly, if Mr. HAMPSON'S suggestions are fairly considered it appears that the evil of which he complains results rather from the action of the Benevolent Fund Committee in placing all the selected candidates upon the same footing for election. It is there that a remedy should be applied if one be really required. For that purpose the function of the Committee would have to be entirely changed. It would not consist, as it does now, in the mere consideration of claims and the recommendation to the electors of a certain number of eligible applicants; but it would also involve a determination of the relative claims of the selected candidates and approach towards if not be almost equivalent to an election of those considered to be most deserving. The more this question is examined the more difficult does it become to effect a perfect amalgamation of purely ethical views and practical requirements. We will not attempt to deny that the practice of canvassing may sometimes lead to abuse. It may in some few instances prejudice a deserving candidate; but we fail to perceive that the removal of those evils which may attach to it in some measure, would not result in the substitution of others at least as serious.

At the recent meeting of the Naturforscher Society Dr. Thoms mentioned some of the results of a comparison of the various pharmacopœias, made by Dr. B. Hirsch and himself with a view to drawing up propositions for securing uniformity of composition and characters in medicinal preparations in general use. The number of names of drugs, chemicals and galenical preparations contained in all the pharmacopœias at present legally authorized was stated to be 3762. Of these 2069 occur in only one pharmacopœia and 613 in two, whilst no more than 154, or about 4 per cent., are included in all. But if the calculation be limited to the six pharmacopœias issued recently, those for Austria, Germany, Hungary, Japan, Netherlands and Russia, the approximation to uniformity appears to be greater, for out of the 1162 articles made official in these works, 224, or 19·28 per cent., are included in all of them. With a view to the promotion of further uniformity, Dr. Thoms suggested, among other things, that solutions or dilutions of acids and bases which are used in medicine should be made "equivalent," so that the same weight should represent a neutralizing equivalent of the acid or base, as the case may be. Further he recommended that concentrated solutions of iron salts should uniformly contain 10 per cent. of Fe; that tinctures of all powerful drugs should be made of the strength of 1 : 10, and those of milder drugs 1 : 5; and that all aromatic waters and spirits should be prepared by distillation and not by mixing.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The second general meeting of the forty-second session was held at the Royal Institution, Colquilt Street, Liverpool, on Thursday evening, October 15, the President, Mr. C. Symes, Ph.D., in the chair.

The minutes of the previous meeting were read and confirmed and the donations announced. A vote of thanks has been accorded to the respective donors. Messrs. S. Stephenson, T. Kenah and F. Walker were elected members of the Association.

The Hon. Treasurer, Mr. R. Parkinson, remarked that the last edition of the 'Liverpool Price List' is selling very rapidly; three-fourths of the edition published in August last being already disposed of. Mr. Parkinson also observed that the "earlier closing movement" is working well in his neighbourhood.

The election of President for the next session now took place, Mr. R. Parkinson being appointed scrutineer, who reported that Mr. J. S. Ward, F.C.S., was unanimously elected.

The President now called upon Mr. M. Conroy, F.C.S., to read his paper on "Collodium Belladonnæ, B.P.C." The paper will be found at p. 327.

The President in opening the discussion said:—Mr. Conroy's paper was very interesting and instructive. It showed that in making the preparation, although a large portion of the extract remained undissolved, about one half of the alkaloid present was taken up in solution. When a purely alcoholic extract was used, possessing greater alkaloidal strength, more of it was dissolved, but the increase of alkaloid in the clear liquid was comparatively small. To him it seemed to indicate that the liquid as prepared by the B.P.C. formula was an almost saturated solution of the alkaloidal salt in its natural condition. He had no doubt but further investigation would enable Mr. Conroy to furnish a formula more satisfactory than that now recognised. This preparation was originally made with the green alcoholic extract from the leaves, which was more soluble in the menstruum employed.

Mr. T. F. Abraham, in proposing a vote of thanks to Mr. Conroy, said that his very interesting note showed that if the product was to be judged by the percentage of alkaloid found in it, the process given is undoubtedly wasteful, troublesome and inelegant. He apprehended, however, that the compilers of the formulary would hardly be prepared to admit this. If they were, then surely they would have ordered the alkaloid itself. The fact that they had not adopted this plan was to his mind strong presumptive evidence that there was good reason for not doing so.

Mr. J. S. Ward, in seconding the vote of thanks, said it was the first time he had seen the preparation, and he certainly was disappointed with it. He considered it a poor specimen of pharmaceutical art, and one that did not reflect any credit upon the authors of the formulary. He agreed with Mr. Abraham that if its value is dependent upon its alkaloidal strength the process given is crude and wasteful. He thought, however, that this could scarcely be the case, but that it was desired to have some extractive matter in it, and if so, he would suggest that it be prepared from the root by exhausting it with the alcohol-ether of the collodion, and then dissolving the camphor, pyroxylin, castor oil, and Canada balsam in the product. He was very glad to hear that Mr. Conroy intended to continue his work on the subject, and he looked forward with pleasure to his next communication.

Messrs. A. C. Abraham, J. Bain, and R. Parkinson joined in the discussion, and the President having put the vote to the meeting, it was carried unanimously.

The President said the next business was "A Note on the Coating of Iron Pills," by Harold Wyatt, jun.,

and as Mr. Wyatt was unavoidably absent he would call upon the Honorary Secretary to read his paper for him.

Note on the Coating of Iron Pills.

BY HAROLD WYATT, JUN.

The coating of iron pills by whatever method performed, pearl, sugar or gelatine, is open to several objections, which are first, the necessity of damping or varnishing the pills to make the powder adhere in the pearl and sugar processes, second the use of heat, as in the sugar and gelatine coating, and third the thickness of the coating varying according to the skill of the operator.

There is no doubt that the use of varnish syrup or heat tends to oxidize the iron salt the pills may contain, whilst the thickness of the coating, though of no consequence with sugar or gelatine coating, becomes of some moment where such an insoluble substance as talc is used, for although we are apt to look upon it as a harmless, insoluble silicate, medical authorities are far from being satisfied that its action, physiologically speaking, is *nil*, especially when it is taken into the stomach in the quantity it is where a number of pearl coated Blaud's pills are administered for any considerable length of time.

What is required of an ideal coating or protective is, shortly, that it shall have no action on the ingredients of the pill or digestive economy of the patient;

It shall allow the pill to disintegrate rapidly in the stomach;

It shall not materially increase the size of the pill; and finally,

It shall be easily applied and be capable of a high finish.

The coating I have used for iron pills for some years past seems to me to possess many of the above advantages, and consists of a thin film of graphite or plumbago applied in the following manner:—The pills are shaken up in a box containing powdered graphite until they are uniformly black, after which they are transferred to a covered glazed ware pot, or for large quantities to a Symes' coater, and rotated with some force until a bright metallic lustre is obtained.

So finished Blaud's pills are effectually protected from oxidation, are not materially increased in size, and look as if they are literally "*steel pills.*"

Another variety of coating I have used as a change where the pills are small and a thick coating is not objectionable, can be obtained by shaking them up in a warm covered pot containing a melted mixture of cocoa butter 1 part and chocolate powder 2 parts, throwing them out on to a slab greased with cocoa butter, and when cool finishing off by rotating in a Symes' coater, the inside of which has been covered thinly with a little of the cocoa mixture.

To obtain good results with either the graphite or chocolate coating practice is required, but the appearance of the pills when finished pays well for any expenditure of time or trouble to which one is put.

Owing to Mr. Wyatt's absence very little discussion ensued; but a vote of thanks to him for his communication, proposed by Mr. R. Parkinson and seconded by Mr. Everett Evans, was carried unanimously.

This concluded the business and the meeting terminated.

SHEFFIELD PHARMACEUTICAL SOCIETY.

The seventh session in connection with the School of Pharmacy was inaugurated on Thursday evening, when Mr. Robert Hampson, Treasurer of the Pharmaceutical Society of Great Britain, delivered an address to the students in the lecture room of the local Pharmaceutical Society. There was a good attendance, and the chair was occupied by Mr. C. O. Morrison, the President.

The Chairman briefly referred to the origin of the school, and said each session showed that greater interest was being taken in it. He was of opinion that pharmaceutical education, like every other education, should be one of habit. Formerly, assistants who desired to pass their examination never prepared for it until it was time that they were about entering into it. Such a process could be nothing else than cram, with the inevitable explosion in the examination room. This Society preferred that young men who chose the chemist's career should be trained from the time they became apprentices.

The Secretary read the lecturers' report, which was of a very satisfactory character, and stated that the average attendance showed a very considerable improvement on past sessions.

The Chairman next distributed the prizes gained during the last session and afterwards.

Mr. Hampson, who was very cordially greeted, delivered his address, which has been printed at p. 314.

Mr. Humphrey (senior Vice-President) moved a vote of thanks to Mr. Hampson for his presence and address.

Mr. Yardley seconded the motion, which was warmly carried.

Mr. Hampson, in acknowledging the compliment, said it had afforded him great pleasure to attend, and his only regret was that he could not attend one of their classes. There had been great changes, both as regards chemistry and botany since he was a young man, and then he had forgotten a good deal. He, however, made it a point always to pick up information as he moved about, and he hoped the students would do the same.

The Annual Dinner.

The annual dinner of the above-named Society followed, being held in the old banquetting room of the Cutlers' Hall. Mr. Morrison, the President, occupied the chair, and among those present were Mr. Hampson, Dr. Dyson, Dr. Littlejohn (Borough Medical Officer), Professor Arnold (Technical School), Councillors J. T. Dobb and J. M. Furness.

Mr. Hampson, in proposing "Success to the Sheffield Pharmaceutical and Chemical Society," said he was glad to find that the usually incompatible elements of chemists were able to combine in the town, that they were not afraid of each other, and that they were associated in the name of brethren. They were doing a great and good work in connection with education; that, he understood, was the keynote of all the music of the Society. One cause of their success was that they had excellent officers. They had been very fortunate in their presidents; they were fortunate in the occupation of the chief chair that night, and especially fortunate in having such a jolly Secretary. The parent Society was formed years ago for self-protection; the doctors had something to do with it, for in those days they wanted everything for themselves. The chemists succeeded, and he did not think the medical profession thought any the worse of them at the present time. This local Society was doing what the parent Society had done, standing on education; they were "casting their bread upon the waters," and there could be no doubt about the result. He assured them that they had the hearty sympathy and goodwill of the chief Society in their endeavours. He went on to contend that they must have pharmacy work.

The President in responding said the Society had the progress of pharmacy at heart. They aimed at giving education and producing a brotherly feeling within the craft, and the result must be a higher respect from the public and also the medical profession. He was glad to say the feeling of the medical profession towards the pharmacists of the town was growing

better and better. Dr. Dyson was a good friend to the Sheffield chemists.

Mr. G. Ellinor submitted the toast of "The Pharmaceutical Society of Breat Britain."

Mr. Newsholme in responding said he was not anxious to apply to the Pharmaceutical Society for a grant to assist education. It was sometimes said that the parent Society existed only for London men, but it was growing more universal year by year. He felt somewhat disappointed about their Bills not getting on as well in the House of Commons as they ought to do, owing to "blocking." He agreed with Mr. Carteighe that if they could carry out this system of local societies they could succeed with any Bill they chose to put forward.

Mr. Ward, as Local Secretary, also responded, and he took the opportunity of bringing forward the claims of the Benevolent Fund.

Mr. C. Thompson (Birmingham) also spoke about the fund, and mentioned that during the last twelve months he had secured many new subscriptions.

Mr. Bradwall proposed "The Medical Profession," and in doing so referred to the important duties in the present day of the doctor, and of the increased responsibility which rested on the dispenser of medicines.

Dr. Dyson, who was very warmly greeted, said speech making was not in his line, he was more accustomed to the sick room, to the small class of students, and to clinical teaching at the bedside. Societies like this did an immense amount of good, and one thing they did was to foster that *esprit de corps* which was so necessary nowadays in all professions. As to the medical men dispensing, it certainly was open to criticism, but at the same time there was something to be said in favour of it. Doctors were servants of the public, and so long as patients demanded that the doctor should dispense for them, and preferred the surgeon to the chemist, so long would the medical man continue to dispense. Many doctors would only be too glad to get rid of their dispensing after going a long, arduous round. He was sometimes asked by patients whether he had confidence in certain chemists. He could only say that the education of the modern pharmacist was of such a high standing that his very diploma and the way in which he was hedged about by the law and other ways was a guarantee that he was able to make up any bottle of medicine that was prescribed.

Dr. Littlejohn, who also responded, said it was well known there was a connection between the medical profession and the chemists, and the work the local School of Pharmacy was evidently doing was calculated to bring that connection closer still.

Professor Arnold, in replying to the toast of "Kindred Societies," said pharmacy stood as a real and living science amongst scientists. With regard to their education, he urged that a little work done well was better than a large quantity done superficially.

Mr. Pearson responded, and the other toasts honoured were "The Lectures to the School of Pharmacy," proposed by Mr. E. Learoyd and responded to by Mr. Humphrey, "The President and Council of the Local Society," given by Mr. Ibbit and acknowledged by the President and Hon. Secretary (Mr. R. Watts), and "The Visitors," submitted by Mr. Rhoden.

Mr. Arthur Neal (solicitor), in replying for the latter, expressed the opinion that the chemist's profession was not nearly sufficiently protected by law. There was trades unionism in the highest walks of life, and it was the greatest safeguard the public could have against unscrupulous men. He looked with very great disregard on all things in the nature of cutting down in prices, particularly in professional prices.

The musical entertainment provided by Mr. Watts was of a high-class character, and altogether the dinner was a great success.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

The annual general meeting was held in the rooms of the Chemical Club, Victoria Hotel, on Wednesday, October 14, Mr. H. Kemp, Vice-President, in the chair. The Hon. Sec. presented the report of the Council, which was as follows: "During the past session six ordinary monthly meetings have been held with average attendance. Your Council view with satisfaction the visit of Mr. Carteighe to this city in October last, and cannot but feel hopeful that the address which was listened to by over 200 persons will have a beneficial effect upon the pharmacists of the district, and serve to cement still closer the bond which exists between members of the trade and the Pharmaceutical Society. Your Council regrets to have to refer to the death of Mr. W. Scott Brown, who had held the office of President for a great number of years. Although prevented by illness from attending the meetings, his valuable advice and aid when sought were freely given, and your Council desires to place on record its deep sense of the loss the Association has sustained by his death. Your Council refers with satisfaction to the scholarship which has been founded by an anonymous donor in connection with this Association, and it is hoped that employers in the special districts mentioned in the conditions may stimulate their pupils to an effort for this valuable prize. Your Council would also draw attention to the following. An entrance exhibition of £10, a scholarship of £10, and a prize of £5 given in connection with the pharmacy classes at Owens College, and the Council hope that these prizes, two of which have been given by members of the Association, will stimulate the efforts of students of the district. Your Council further desires to call attention to the unusual facilities granted by the authorities of the Owens College to students of pharmacy, and hope that these may be largely taken advantage of.

Mr. G. S. Woolley presented, as Treasurer, his report, which showed a balance to the General Fund of £17 10*s.* 2*d.*, to the Library Fund £5 8*s.* 2*d.*

Both reports were adopted.

A vote of condolence was passed to the family of the late Mr. W. Scott Brown, and the senior Vice-President was desired to forward to them this vote, expressing the appreciation in which Mr. Brown was held by the Association.

The following form the Council for the ensuing session:—Messrs. G. S. Woolley, F. B. Benger, W. Wilkinson, J. Botham, W. Bowden, W. Arrandale, W. Stones, H. Wilson, G. Westmacott, H. Kemp, W. Kirkby, G. Booth.

NOTTINGHAM AND NOTTS CHEMISTS' ASSISTANTS' ASSOCIATION.

The annual soiree of the above Association was held at the rooms of the Sunday School Institute, Shakespeare Street, on Friday evening, the 16th inst. The chair was taken by Mr. Ashby, and the programme included a number of songs and recitations that were delivered in an excellent manner. The attendance was very good, and the soiree was unanimously pronounced the most successful the Society has yet held.

BRIGHTON ASSOCIATION OF PHARMACY.

Last Monday evening a special meeting was held in Mr. Histed's arch under King's Road, the following chemists being present:—Messrs. Histed, Gwatkin, W. W. Savage, Williamson, Smithson, Blacklock and Leigh.

The first matter brought forward was in regard to the appointment of local secretary. Great satisfaction was expressed with the past services for many years of Mr. J. R. Gwatkin, and on the motion of Mr.

Histed it was unanimously decided to recommend his re-appointment.

A letter was read from the Junior Association suggesting that the promised prizes of £1 1*s.* and 10*s.* 6*d.* "should be competed for by the unqualified members of the Junior Association, and the subject to be theoretical inorganic chemistry, as required in the Minor Examination of the Pharmaceutical Society."

On the motion of Mr. W. W. Savage this suggestion was approved.

In the further conversation it was thought desirable that if the prizes produce a good competition, other prizes for botany should also be offered.

It was next decided to have the copies of the *Pharmaceutical Journal* presented to the Association bound and placed in the library at the School of Science and Art.

The question of having another annual ball also came in for discussion, and was adjourned till next meeting.

MEETING OF CHEMISTS AND DRUGGISTS AT PLYMOUTH.

On Friday evening, the 16th inst., a meeting was held at 106, Old Town Street, Plymouth, and the following local chemists were present: Messrs. Allen, Balkwill, Barge, Breeze, Davey, Maurice, Netting, Sloper, Sloggett, Tirney, Weary, and Hunt, Local Secretary. Letters and messages were received from Messrs. Bailey, Cocks, Goodwin, and Park of their inability to attend. The chief objects of the meeting were to discuss the advisability or otherwise of the introduction of more synonyms into the B.P., to consider the meaning of the word "seller" in the present Pharmacy Act, and to choose the local secretary for the ensuing year.

Mr. A. P. Balkwill having been unanimously elected Chairman, it was proposed by Mr. Sloggett and seconded by Mr. Barge, "That the local secretary should write to Mr. Bremridge asking him to tender to the Council at the next meeting the thanks of the chemists of Plymouth and Stonehouse for the re-establishment of Plymouth as a local centre for the Preliminary Examination."

Discussion was then invited upon the synonym question, and the local secretary mentioned a number of familiar and popular names in everyday use, asking for opinions whether or not it would be productive of much good in adding them to those already in B.P. After remarks from nearly all present it was resolved, "That Dr. Attfield be written to upon the subject, giving him an account of the proceedings, and enclosing a list of synonyms mentioned, comprising Dover's powder, Goulard extract, black wort, paregoric, Friar's balsam, laudanum, etc., at present not included in B.P." Upon the word "seller" there was a good discussion, but it was decided that the subject was a most difficult one to decide, and therefore it would be better to defer giving an opinion for the present.

The chosing the local secretary for coming term was then proceeded with, and a vote of thanks to the Chairman brought the meeting to a close.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The opening meeting of the fourteenth session was held in the Pharmaceutical Society's House, 36, York Place, Edinburgh, on the evening of Wednesday, October 7, at 9.15, Mr. John Lothian President, in the chair. There was a large attendance.

The minutes of last meeting having been read and approved, apologies for absence were read from Mr. Storrar, Kirkcaldy; Mr. Watt, Haddington; Dr. Inglis Clark, Mr. D. B. Dott, and Mr. Hoseason, Vice-President.

The President then proceeded to deliver the following—

Inaugural Address.

Gentlemen,—My first duty to-night is to thank you for the high honour you have invested me with in electing me your President for this session. The honour is one which I heartily appreciate, though I have doubts as to my being a fitting successor to the presidents who have previously so ably filled the chair. It shall be my endeavour, however, during my tenure of office to further the interests of the Association to the utmost of my power. Nevertheless, I must remind you that I am only a unit like every other officebearer and member, and it is only by the hearty co-operation and united effort of every individual member that the progress of an association such as this is assured.

The history of our Association has been already so well told that it is quite unnecessary for me to recapitulate. I need only say that, though there have been occasional vicissitudes, its record, in the main, has been one of continuous success. The mere fact that to-night we enter on the fourteenth session of our existence, is sufficient proof that we have emerged from the embryotic stage, and I feel confident, from the syllabus we have before us, that our prosperity and vigour are increasing because it contains the material for a most successful session.

Like my predecessors I had difficulty in choosing a suitable subject on which to address you to-night. My difficulty was not the dearth of material, but rather the reverse, and I was afraid that if I took up one particular theme I would inevitably bore you. I therefore propose to make a few general remarks on pharmacy, past, present, and future, but I must crave your indulgence if I should be tempted to digress a little even from this head.

This session is a noteworthy one from the fact of this year being the jubilee year of the foundation of the Pharmaceutical Society. It will be remembered that our Association presented an address to the Pharmaceutical Society on the occasion of the Jubilee celebration, which I am sure testified to our loyalty and appreciation of the progress which has been made by it during the past fifty years. What a revolution has taken place in pharmacy during that period, and yet one cannot avoid the impression that we are rapidly approaching a crisis of some sort, and that the closing years of this century may bring forth as great a revolution as the past fifty years.

However uninviting the field of pharmacy may be now, it must have possessed considerably less attractions a century or two ago, when the remedies used—we can scarcely call them remedies—were snails, vipers, urine of men and animals, hare's brains, and such like obnoxious stuffs, though the prices appear to have been more remunerative then than now.

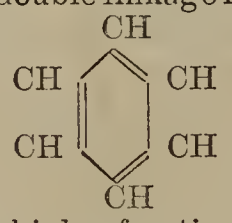
The Society of Apothecaries is of very ancient date, but chemists and druggists remained a very disunited body, in spite of repeated efforts at combination, until the Pharmaceutical Society was founded by a number of most unselfish men, who sacrificed a great deal of time and money to accomplish their object, and for whom we cannot but entertain the highest respect. Then we have the first institution of a British School of Pharmacy under the auspices of such honoured names as Pereira, Redwood, Fownes, Ure and Bell, and the proceedings which culminated in the Pharmacy Act of 1868, which secured to the Society the right of instituting compulsory examinations and restricting the sale of poisons to qualified chemists. It is a matter of great regret that this was the only privilege secured, for it has all along been the aim of the Pharmaceutical Society to have compulsory education as well as compulsory examination. A generation has passed since then, which may be said to mark an epoch in the history of pharmacy in this country

Formerly the sale of poisons, etc., was open to all and sundry, and at that date those engaged in the practice of pharmacy consisted of all sorts and conditions of men and women. But to a very large extent the chemists and druggists of to-day have entered by the examination gateway, and the result has been a more thorough consolidation of those belonging to the pharmaceutical craft. And when we review the work done of late years by pharmacists we see that this educating influence has been productive of the happiest results. We cannot but regard with pride the proceedings of the British Pharmaceutical Conference, the work done in the Society's Research Laboratory, not forgetting our own Association, for several suggestions emanating from it have found their way into the Pharmacopœia and the Addendum.

Although the art of the apothecary is a very ancient one, reaching back to the earliest times, the science of chemistry is a very modern one. It is little more than a century since Priestley discovered oxygen and Lavoisier showed its relationship to combustion and animal life. Davy next showed that the alkalies were compound and isolated the alkali metals. Little did they think then that we should now be able to analyse the chemical constituents of the sun and stars just as accurately as those of terrestrial matter. Professor Huggins, in his address to the British Association this year, gave an interesting review of what has been done in this direction. It was shown that no less than thirty-six terrestrial elements are present in the solar spectrum. He says: "It is worthy of remark that as our knowledge of the spectrum of hydrogen in its complete form came to us from the stars, it is now from the sun that chemistry is about to be enriched by the discovery of new elements." Stas has shown that a great number of chemical elements, such as calcium, lithium, silver, etc., retain their individuality under all conditions. On the other hand an allotropic form of silver has lately been discovered, and cobalt and nickel have been alleged to be different physical conditions of the same element. This forces us to the conclusion that a number of elements may yet be shown to be one kind of matter presented to us in very diverse physical states. And here it is interesting to note how intimately the sciences of chemistry and physics are related. Where, indeed, would the modern chemist be without such instruments as the microscope, the polariscope, and the spectroscope. The combustible nature of the diamond was predicted from its high refractive power long before its chemical nature was suspected. We also find that organic liquids of high refractive power, such as ethylene—

$$\begin{matrix} CH_2 \\ \| \\ CH_2 \end{matrix}$$

usually have double linkage of the carbon atoms, and Kekulé's theory of double linkage in the benzene ring—



is supported by the high refractive power of that liquid. Simultaneously with the advance in physical science, there has been a corresponding advance in chemical science. Thus is was by the very careful determination of the density of oxygen by Regnault that its specific gravity, and therefore its combining weight, was shown to be 15·96 and not 16. Pictet has also recently devised a method by which a temperature of – 100° C. and ultimately – 200° C. is attained. A large number of interesting experiments have been performed at this low temperature, and it has been shown that the specific gravity of pure chloroform is 1·51. The phenomena of dissociation and Van't Hoff's theory have also thrown a great deal of light upon chemical structure. We find, in fact, that every chemical change is accompanied by an alteration of physical energy in the disengagement or absorption of electricity, heat, etc. Thus when hydrogen and oxygen combine, a large amount of heat is liberated, and exactly the same amount of heat is required to effect their separation; on the other hand, when hydrogen and iodine combine, great absorption of heat takes place, and their separation is accompanied by a corresponding disengagement of heat. It is, however, the changes produced by chemical action that differentiate chemistry from all other sciences. Camphor only differs from turpentine by an atom of oxygen, yet physically they are very different. Apomorphine differs from morphine only by the elements of water, yet their physiological effects are diametrically opposite, and probably the molecular arrangement has been entirely altered.

As a result of the advance of chemical science, we find that now-a-days our most important remedies are being drawn, not from the storehouse of Nature, but from the laboratory of the chemist. Hence, a knowledge of organic chemistry is more than ever incumbent on the youthful pharmacist. Victor Meyer has termed organic chemistry "That vast ocean of the unknown," and it is very happily defined in these words when we reflect on the multiplicity of compounds therein, and the endless possibilities which they contain. The important effects and infinite varieties of the molecular arrangement of the same elements are the principle reasons of its extraordinary fecundity in chemical treasures. It is in the aromatic series that this obtains to the greatest extent. For instance, we have no less than ten different acids isomeric with salycylic acid. Among the earliest triumphs of organic chemistry was the production of artificial dyes from aniline, and the artificial production of the natural dyes, alizarin and indigo, discoveries which have entirely revolutionized that important industry. Since then a very large number of chemical substances formerly only obtainable from animal or vegetable tissues have been artificially produced in the laboratory. Perhaps the most interesting of these to pharmacists is the synthesis of the natural alkaloids. For instance, caffeine and theobromine have long been known to be intimately related to the urea group, being di- and tri-methylxanthine. Xanthine being obtained by the reduction of guanine, which in turn is derived from guano. Lately we have had conine, sparteine, pilocarpine, nicotine, cocaine, etc., synthesized, and the constitution of a large number more has been established from the identity of their oxidation and reduction products with those of pyridine and quinoline. Natural drugs would appear at present to be displaced to a certain extent by those synthetic bodies which are showered upon us before their therapeutic merits have been at all properly established. Several of them, however, have stood the test, notably antipyrin, and a few others which might now almost be termed household remedies. So rapid is the advance of science in this direction that the research chemist would need to have a motto something like that of Frederick the Great—

"A soul of fire,
No dangers fright him, and no labours tire."

I have already said a knowledge of organic chemistry is incumbent on the youthful pharmacist of to-day, and I venture to say there is no more fascinating study. He need not be dismayed to find that antipyrin rejoices in the euphonious name of phenyldimethylpyrazolone, or that artificial indigo is obtained by the reduction of orthonitrophenylpropionic acid, for in reality this nomenclature is at once the most simple and expressive, presenting as it does a mental picture of the constitution and derivation of the substance.

This is a branch of science which the average medical man rarely has time to cultivate, and therefore he generally appeals to the pharmacist for enlightenment on such subjects.

We hear a great deal in these times about the hard lot of the pharmacist, that the game is not worth the candle, and so forth. In spite of this it is very gratifying to find such a large increase in the number of aspirants to the higher qualification. I think this is a very healthy sign, which shows that we are awakening to a sense of our responsibility, and I would endeavour to impress upon every young man the necessity of holding up before himself a high ideal, and looking upon the Major examination as the very minimum of what he should do. It is unfortunate that some should look upon the examination room as a sort of Dante's Inferno, with "All hope abandon ye who enter here" emblazoned on the portals. Those who look upon the examinations as the aim and goal of their studies will be miserably undeceived, for they will find themselves the greatest losers if their studies should have been so mis-directed. They may have got the hall-mark of qualification, but they have not got the true gold. Rather should they look beyond examinations altogether, regarding them only as turnstiles by the way and mere incidents in their career. In the words of the poet—

> "I would not waste my spring of youth
> In idle dalliance; I would plant
> Rich seeds to blossom in my manhood,
> And bear fruit when I am old."

The advantages of the new examination schedules were so ably expounded in a previous address, and are indeed so obvious to us all, as to call for no special comment from me. I think they will be a great boon to teacher, student, and examiner alike, for in the past one was frequently much perplexed as to what should be "got up," and a common question was, "Do you think the examiners will take us on this or that?" I think the same may be said of the proposed curriculum. Whatever drawbacks it may have, it is certainly for the greatest good of the greatest number. There is, however, no royal road to learning. It is only by his own individual exertions that the student can succeed, and his future position in life may, to a large extent, be gauged by his determination and resolution now. I am aware that, although Edinburgh is a city of very great educational advantages, some of us have long hours and poor opportunities of embracing them. To these I would say do not despair. A very great deal can be done, notwithstanding long hours and the worst opportunities. If we are imbued with perseverance and a thorough spirit for our work, I venture to predict that no one will be more surprised than ourselves at the result of our efforts, and our success will prove a powerful incentive to future endeavours.

> "Strive, endeavour; it profits more
> To fight and fail than on Time's dull shore
> To remain an idler ever.
> For to him who bares his arm to the strife,
> Firm at his post in the battle of life,
> The victory faileth never."

With regard to pharmaceutical politics, I have nothing to say. That is a subject which we advisedly eschew here. My own impression is that we should not expect too much from legislation in the future, except from an educational point of view. It has been pointed out that Acts of Parliament are very dangerous weapons to deal with, and we may do better to "bear those ills we have, than fly to others that we know not of." Our best course is to win the respect of the medical profession and the public by conducting our business on good principles, and with a conscientious regard for our own position and reputation. This is now very well termed pharmaceutical ethics. A large number of preparations, euonymin, for example, are of very indefinite composition, and now that we have a standard article in the Pharmacopœia, it will be the duty of chemists to supply that. With regard to the B.P. synonyms, however, unless commercial qualities of some chemicals are recognized, it will be very perplexing to the chemist to know what he is to supply. Pharmacy is year by year becoming more of an exact science, as is evident when we consider the work done in the standardizing of drugs. I expect that the next Pharmacopœia will contain processes for standardizing a great many more preparations than we have at present, especially those containing alkaloidal principles. If we standardize tincture of nux vomica, why not standardize tincture of belladonna, or conium, or colchicum, which contain principles almost as potent?

In conclusion, I would endeavour to impress on all, and especially the younger members, the advantage of being connected with such an Association as this. I might say that in the main these advantages are of three kinds, viz.:—intellectual, moral and social. Our prize schemes are intended to give a stimulus to study on the part of apprentices. I think we have a very good illustration of their usefulness in the subsequent careers of those who have taken part in these competitions, and from which, in all probability, they derived their first incentive to study. A great number of friendships are formed through these meetings, and a sort of good fellowship is engendered. Although our meetings are scientific the social element is well represented in the annual conversazione, which we hope will be as great a success this year as it has been in the past. Some of you may have thought from my remarks to-night that all our spare time should be filled in with hard study. I hope, however, they have not been so misconstrued, for I would be very far from advocating such a course. In fact, I would say do not study at all unless you feel inclined for it and can interest yourself in it, for otherwise it will do you no good. The importance of physical recreation cannot be too highly rated. For those of a botanical turn "there is a pleasure in the pathless woods." And above all there is a recreation of the mind which is perhaps the most refreshing, for have we not all got our special hobbies and our favourite authors.

Mr. Donald McEwan, ex-President, moved a cordial vote of thanks to the President.

Mr. J. L. Ewing, Chairman of the Executive of the North British Branch, in seconding the motion, said he had great pleasure in being present at their opening meeting, and regretted that another engagement had prevented his getting to the meeting in time to hear the whole of the interesting address to which they had just listened. He had to congratulate them on the large attendance. He had also to congratulate them on having as their President a gentleman who had succeeded in gaining one of the medals in the Council Prizes Examination. He was sure that they all felt proud to see a Scotchman take so distinguished a place. He had further to congratulate them, though it was a loss, on the fact that their Vice-President, Mr. Hoseason, had been selected to fill an honourable position on the staff of Owen's College, Manchester. He believed the work he did as a member of that association had influence in indicating his fitness for such a post. The President had referred to the evolution of pharmacy. Quite recently the speaker chanced to read an address by Sir Robert Christison delivered at a meeting of the North British Branch, about forty years ago, and he was much struck by the great change that had taken place in the practice of pharmacy since then. This was well illustrated in the great advance in the use of such active principles as morphine, quinine, and cocaine. But within the last

few years the use of synthetic remedies had introduced them to a new world which was wholly undreamt of by Sir Robert Christison. How marvellous it was that a repulsive waste product like coal tar should be transformed, as by a magician's art, into those substances which play so great a part in assuaging human pain and soothing the anguish of the soul. It was when one contemplated this development of modern pharmacy, that the mind seemed to pass into the region of romance. But side by side with this great advance, they had to deplore the retrograde movement indicated by the great increase in the consumption of patent medicines. He never could think of the great increase of the imperial revenue from this source without a feeling of sorrow. He trusted this evil would be taken in hand by the Government, and no noxious remedies be allowed to be sold under cover of the patent medicine stamp, and that their true nature and properties should be publicly declared, and put upon the packet containing them. He agreed with the opinion that not much was to be expected from legislation, and from what he had seen of the condition of pharmacy in foreign countries, he was reluctant to call in state aid. It was rather by perseverance and the cultivation of superior knowledge that pharmacists were most likely to protect themselves. He would cordially endorse what the President had said as to the value of a hobby. The nature of their profession tended to cabin and confine both body and mind. As a counteractive to the degradation of mere toil, it was well to participate in manly sports. They might find refreshing recreation, too, in the pursuit of natural science; and then they had a glorious literature, and in their Free Library they might, for nothing, become acquainted with all the wisdom and glory of ancient Athens and ancient Rome. To relieve the tedium of toil and the worry of life, there was nothing so effectual as a book which would fascinate the imagination, and for that purpose he knew nothing superior to one of the works of their great countryman, Sir Walter Scott.

Messrs. J. B. Stephenson, W. Gilmour, P. Boa, C. A. Macpherson and C. F. Henry also supported the vote of thanks, which was passed with acclamation.

The Chairman intimated that the Annual Conversazione would take place in the Literary Institute, on Friday, December 11, and after some formal business had been disposed of, the meeting closed.

GLASGOW CHEMISTS AND DRUGGISTS' ASSISTANTS' ASSOCIATION.

The opening meeting of the session took place in the Waterloo Rooms on the evening of Wednesday, 14th inst. There was an excellent attendance, the President, Mr. James Robb, presiding. He remarked that the Association was at the beginning of a new session, the syllabus of which was in the hands of the members, and he hoped would give pleasure and profit in the carrying out. Since last session several vacancies had occurred among the office bearers; the Committee had, however, filled them up from amongst themselves, so that the syllabus might be complete when issued, and he hoped that course would meet with the members' approval. In introducing the lecturer for the evening, Dr. David Lees, Ph.C., the President remarked on the unnecessary nature of such a task, as Dr. Lees, on account of the esteem he was held in as a teacher, was well known to pharmacists in Glasgow and the west of Scotland.

Dr. Lees then proceeded to deliver his lecture on the "Adaptations in Flowers for Intercrossing," which he illustrated by means of sketches. At the outset he drew attention to the simple parts of the flower, then proceeded to its functions, described the disadvantage of self-fertilization and the means provided for preventing it, remarking that Darwin proved the failure of self-fertilization by keeping plants free from insects, in which case they did not produce a single seed. He went on to refer to the two great divisions, viz., wind-lovers and insect-lovers, the former being minus showy parts, odour and nectar, pollen very light and in large quantity. As an example, he said, if a fir tree were shaken when in blossom, the enormous quantity would then soon become apparent. The flowers in the insect class seem to rival with each other in gaudy blossom, so as to attract insects pollen: in much less quantity, odour and nectar present. He then referred to the different likings or tastes of insects. Bees, for instance, seem to prefer blue or violet coloured flowers, while moths have a liking for white, they, as a rule, being open at night. By means of diagrams Dr. Lees proceeded in an exceedingly interesting manner to describe the process of insect visitation and adaptations for intercrossing in the Rosaceæ, Primulaceæ, Labiateæ, Orchidaceæ, Violaceæ and other orders.

On the motion of the Chairman an enthusiastic vote of thanks was awarded the lecturer.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The opening meeting of the third session was held on Thursday evening, 15th inst., in the Gilfillan Memorial Hall, Dundee. Mr. Charles Kerr, Honorary President of the Association, occupied the chair, and there was a large attendance.

The inaugural address was delivered by Mr. Thomas Maben, F.C.S., Hawick, Vice-Chairman of the Executive of the North British Branch of the Pharmaceutical Society.

The Chairman, in introducing Mr. Maben, said that he had to thank the Association for the honour they had done him in electing him Honorary President, and he assured them that he appreciated their confidence. He had pleasure in presiding on that occasion, and congratulated the members on the progress which had been made during the past two sessions. He well knew the difficulties to be met with in keeping together such associations, but judging from the programme of work for the third session they showed no signs of decay. He had to congratulate the Executive and the Secretary on securing Mr. Maben for the opening address. Mr. Maben was widely known to their profession for his scientific attainments and his literary work in their journals—a true example to the coming generation of pharmacists. He was known to some of them with a happy sense of relief, and to those who hoped to have a closer acquaintance with him he thought the present introduction would clear away their notions as to what sort of a dreadful fellow he might be. All examiners were horrid men—he thought so once himself—but he was confident that this impression would that evening pass out of their minds, and they would go with a lighter heart to that home of the "Bogie Man," York Place, Edinburgh.

Mr. Maben then proceeded to deliver his address as follows:—

Inaugural Address.

It was with considerable reluctance that I consented to come to Dundee on this occasion, but now that I am here I propose to address myself more particularly to the younger members of the Association who may be present.

It so happened that the very day on which I received your invitation was the centenary of the birth of Michael Faraday, and as I had at that time been interesting myself in the biography of that distinguished scientist, it occurred to me that I might find a useful introduction to the business of our meeting in a few remarks on his career.

Many years ago there came into my possession a copy of Dr. Gladstone's 'Life of Faraday.' I was then

an apprentice, and like most boys was particularly fond of biography. This biography of Faraday must, however, have been in some way different from other works of its class, for it appealed to me in a manner in which the others had never done; and while I have forgotten almost all I read at that period about many other historic names, the name of Faraday and the record of his life have never faded from my memory. I am tempted to think that the name of Faraday is not so familiar to-day as it ought to be, for I cannot otherwise account for the extraordinary fact that the centenary of his birth has been allowed to pass by without, so far as I am aware, a single comment by the leaders of scientific thought. Our own journals might appropriately have noticed the event, but apparently it has altogether escaped their notice.

Michael Faraday was born near London on September 22, 1791. His parents were in very humble circumstances, his father being a working smith and too poor to give the lad more than the mere rudiments of education. From his childhood he was gifted with a keen perception and eagerness for knowledge, a peculiar anecdote being told of him, that when very young he once squeezed himself half way through between the bars of an iron railing and then asked himself which side of the fence he was on. At thirteen he was apprenticed to a bookseller, and some scientific treatises there fell into his hands, the perusal of which whetted his desire to penetrate into Nature's secrets. He made some simple pieces of apparatus and taught himself much from the experiments they afforded. By and by he was enabled, through the kindness of a patron, to hear some of the lectures of Sir Humphrey Davy, then at the height of his fame and the greatest scientist of the day. These only increased his love for science, and he wrote to Davy, enclosing the notes he had taken of his lectures, and expressing his desire for scientific employment. To his delight the great chemist requested an interview, and the result was that he received the appointment of Laboratory Assistant at the Royal Institution. This was the beginning of Faraday's long and brilliant career, which only terminated with his death in 1867. As he rose in eminence the universities and learned societies of this and other countries showered their honours upon him, and in 1835 the government then in power conferred on him a pension of £300 a year. But amid all these manifestations of respect he ever remained a humble and modest worker, content to add his quota to the great store of truth for which good men have laboured in every age, and for which, too, in less enlightened ages, the best men have suffered hardship and even death, men who to-day occupy the most honoured niches in the temple of fame. How true it is that—

> "The hooting mob of yesterday with silent awe return,
> To glean up the scattered ashes into history's golden urn."

This noble life reads to us a wonderful lesson and supplies a bright example, which even the best of us might imitate. Here was a man, the son of a poor working smith, and with very little education, rising by sheer force of his innate talents and perseverance till he reached the highest position a scientific man could attain, and though it may not be given to all of us to be discoverers in the higher walks of science, it is possible for us to emulate Faraday in his thirst after knowledge, his patience and fortitude in the midst of difficulty, his indomitable perseverance, and in the modest nobility and integrity of his character.

It is no part of my intention to deal with the discoveries of Faraday, or even to refer to the wonderful benefits reaped by the nineteenth century from his labours, in so far as regards the myriad forms in which electricity is now made to do service to humanity, but rather to take as my text the way in which Faraday made use of his opportunities, and thereon to deliver a homily to the younger portion of my audience.

I quite believe that Faraday was a man of exceptional gifts, that in fact he was a genius, but we know geniuses by the dozen who have missed their mark, men who were intended by nature to take a high place among their fellows; but who have become mere hewers of wood and drawers of water, and who will go down into the grave "unwept, unhonoured and unsung." Although Faraday was a genius he had no advantages to start with; perhaps everyone within sound of my voice started life much better equipped than he; yet by seizing the opportunities when they came to him, and where they did not come making them for himself, he became what he became. Each of us has in our sphere opportunities which come and stay or come and go. If we embrace them and make use of them they remain, if we may so speak, as permanent residents, and not merely as guests or friends, but they become part of ourselves, are woven into the warp and weft of our being, and are thus ours for ever; if we neglect them, they depart and we see them no more. This is life.

I pass rapidly over a few thoughts that suggest themselves as applying to one or other of us, and beginning at the lower rungs of the ladder, I would say to the apprentice, that while he is an apprentice, and particularly during the early years of apprenticeship, he has the opportunity of becoming neat, dexterous and accurate in his work.

You may be a genius, but all the more is it necessary that you should be on your guard. Being a genius, and bursting with the greatness that you feel is in you, you may be tempted to use your wings rather than your fingers, and to regard all these grosser materialities as of small account, but beware! A slovenly, sluggish, inaccurate pharmacist will be a complete failure as a pharmacist, even though he has the brains of a Newton and a Faraday rolled into his one, while one who is skilful, neat, dexterous, and accurate, will always command respect, and in most cases success, even though he failed half-a-dozen times for his "minor." The public know nothing about that, and even if they did, the chances are they would think that such a persevering man deserved to be encouraged. The qualities of which I am speaking, do not depend on intellectual ability or scientific attainment, but on carefulness and practice. You have in the daily exercise of your calling the opportunity of becoming neat-handed, quick-handed and accurate, and if you cultivate these, habituate yourself to them, they will become part of your natural inheritance, and be always with you, but if you fail to take advantage of them and are content to do your work any way, the chances are that you will contract slovenly habits that will cling to you through life.

The ordinary routine of an apprenticeship supplies us with unlimited opportunities in which we can bring our faculty of observation into play. Are you making seidlitz powders, or supplying a seidlitz draught? What is the meaning of the blue paper and the white? Why not have only one paper? Why does the mixture of the two in solution effervesce? What is formed? What is given off? If you ask yourself these questions you are at once ushered into the mysteries of chemistry, and having got the answers to them, if you make the information so gained your own, you will have learned a number of important chemical facts that you will never forget while memory remains. On the other hand, if you go through your two years, more or less, mixing the rochelle salts and the soda, and weighing out the acid, without troubling yourself further about them, and similarly with other things, you will find when you come by and by to attend a class in chemistry that you will have to spend many a

weary hour trying to learn what you might have been far more effectually learning, during all these years. Bring your faculty of observation to bear on your work all round, for by so doing, you will develope into an intelligent as well as a skilful workman; neglect this and you may be useful as a machine, but no more.

But the time comes when you get beyond the wrapping up of seidlitz powders, and when the manufacture of the more important galenicals is entrusted to you, for I trust that the good people of Dundee have not learned the pernicious habit of purchasing their galenicals ready made, pernicious in the sense I mean that it defrauds you of what ought rightly to belong to you. Notwithstanding your interests, however, I think that most of those who have gone into the question will agree with me when I say that if we leave out a few preparations, such as the extracts, the great majority of the galenicals in the Pharmacopœia can be just as well prepared on a small scale as on a large one. In the first place, if the B.P. directions are followed out the result is, in the one case, as good as in the other, then we can be absolutely certain of the quality of the ingredients employed, and lastly, they can be prepared more cheaply than they can be brought. If in reckoning up the cost we charge for our own time the manufacturer of twenty gallons would certainly have the advantage over the retailer, who makes a pint or a quart; but we do not reckon our time or that of our apprentice, for the simple reason that in most cases this work is the filling up of time that would otherwise be unoccupied, and besides it is part of the duty we have undertaken towards the apprentice. There are a few tinctures in which the hydraulic press will yield a slightly larger product, and there are several preparations for which a vacuum pan might be useful; but these constitute but a small proportion of the whole, and as a general rule I submit that it is better for the pharmacist to be his own manufacturer. So far as I can gather there appears to be a disposition in favour of getting back to the good old custom, and this is especially to be commended in view of the changes about to be introduced in the mode of conducting the Minor examination. If our young men are to be examined in practical pharmacy, they must have some opportunity for doing practical work, and their apprenticeship is surely the natural time for acquiring that practical knowledge. It appears to me that the rising generation of pharmacists will have just cause for complaint, if in the future the conditions under which pharmacy is carried on in this country are such that no opportunity or little opportunity is given for them to become familiar with the practical work, with which they will require to show an intimate acquaintance in the examination room.

Having got beyond the mere manual work of the shop, you are promoted, and now you begin to make a closer acquaintance with the Pharmacopœia. Let me advise you to make that acquaintance an intimate one, and not simply formal and casual. The Pharmacopœia is our guide, take it also for your "philosopher and friend." I do not regard the work as inspired or infallible, but this I do say, that the more we know about it, the less likely are we to find fault with it. We may not all agree that the best processes have been adopted, but of this we may be quite sure, that no process has been adopted before it has been fully considered and fairly tried. And if this is true of the present edition it will be no less true in future, for the editor is devoting himself to the work of perfecting our national Pharmacopœia with an energy and a method that cannot fail to effect the desired result. Make friends then with the 'Pharmacopœia' and with other books as well, for in them you have one of the most important means by which you can make your own opportunities. Look at poor Faraday, who was enabled to see such books as he did see, only through the accident of his being in a bookseller's employment, and compare your position with his. Every book, practically, that is of any use to you, can be had for any reasonable length of time for the simple postage; that is, assuming that you are connected with the Pharmaceutical Society, or are employed by those who are. This is a boon, the value of which is but faintly realized, for to all of us the libraries of the Society are invaluable, and it would be for the benefit of pharmacy were the facilities they offer for obtaining books much more largely taken advantage of. In addition to the standard works on subjects relating to pharmacy, with which you ought to familiarize yourselves, we have an excellent periodical literature that deserves your attention, and you would do well to subscribe to one of the three journals that are published every week. Each of these has its good points, and in each you will find much that will be useful to you in your studies and also in connection with your business.

I would further strongly counsel you to join the Pharmaceutical Society the moment you have passed your Preliminary examination. The subscription is not very large, but even if you have to pinch yourselves in other directions to save the half-guinea, you will value all the more the privileges it brings you. My object in recommending this course is that by associating yourselves early with the Society, you grow up with it, read its transactions, understand the reason of its existence and the details of its working, and become interested in the splendid benevolent fund administered by it, a fund not only administered gratuitously but at very considerable cost to the Society. You thus feel yoursef identified with it and in a position to defend it in those quarters where it is sometimes the fashion to speak of it in anything but flattering terms. For rail against the Society as we may, one fact is clear, namely, that pharmacy in this country is inextricably bound up with it, and if we are ever to move one step out of the spot, the Society, and no other, must lead the way. What is needed, therefore, is that it be made a strong Society, and thoroughly representative of the pharmacists of the country. With a membership of 15,000 in place of 5000 its power and moral force would be enormously increased, and the executive being simply what the members make them, there is no saying what beneficent forward movements such a united body might be enabled to make with success, and with enormous advantages to pharmacists at large.

Your work in the shop, the observations you there make, the experiments you perform, if you are so inclined, at home, and the study of your books, must all be supplemented by outside agencies if they are to be properly focussed, brought to that point of perfection that is desirable before you go up for your examination. Of these agencies you must not neglect the one under whose auspices we are met to-night. I am delighted to find your Association in such a vigorous and healthy condition. It is reaching a very critical point in its history, for the first flush of youth has passed, and for a time it will become increasingly difficult to keep up the enthusiasm. But you have a fairly large field to draw from, and if you can provide such attractive programmes as that for the session on which you are entering, the meetings ought to be well attended and the interest well maintained. After business hours, which I regret to hear are rather long in Dundee, the work of the Association will occupy a certain proportion of your time, and the lectures, essays, discussions, and excursions will all be of great use in helping you to improve yourselves, and equipping you for your life work. The classes carried on in connection with the Association, taken along with those in the University College, will be of great assistance in your studies in view of your examinations, and if you

devote yourselves with diligence to these and make the most of the opportunities that are now presented to you there need be no fear for the future, so far as you are concerned. Our calling is, like most others, rather overcrowded just at present, but first class men are scarce enough, and there is plenty of room at the top. There is always a crowd at the bottom of every hill, and if you are content to stay there you must mingle with and struggle with the crowd, you must elbow and jostle your neighbours on every side. But there is no reason why you should stay there, for if you are determined to rise step out and ere long you will breathe, far up the mountain side, a purer air, and with every breath receive fresh strength for higher endeavour and greater achievements. I have endeavoured to outline what, in my humble opinion, is a course you may profitably follow, and in concluding my remarks, I repeat it in brief and with emphasis. Make yourselves in every possible way masters of the manual duties of your craft, cultivate the faculty of observation, and thus become acquainted with the numerous facts that are daily being pressed on your notice; make yourselves familiar with the Pharmacopœia, with text books, and with periodical literature, thereby storing up scientific and professional knowledge; take advantage of the various aids that arise from association with your fellows in societies, classes, and otherwise; and having taken the highest possible qualification within your reach, if you combine with these good business habits, energy, courtesy, trustworthiness, and perseverance there is no position in pharmacy in this country to which you may not aspire.

The Chairman said they had listened to a very practical address. Mr. Maben's remarks on the various points were just his own sentiments. He thought it on the whole detrimental to the interests of the young men that so many ready-made preparations were in vogue. He thought that they should avail themselves to a greater extent of the Society's libraries in the way Mr. Maben had indicated, and he endorsed his remarks with regard to increasing the membership. Legislation would never be brought to bear until this came about. He thought it was a pity so few in that district went forward to the Major. He should like to see a great many more pharmaceutical chemists. It would give a better tone to the whole trade. In the meantime the public knew little difference, but he sometimes thought that "chemist and druggist by examination" might look a little higher than plain pharmaceuticl chemist. Mr. Kerr then made an earnest appeal on behalf of the funds of the Association. The annual expenses were considerable, and he hoped that the subscriptions would be forthcoming.

Mr. Wm. Doig next made a few remarks. He remembered with pleasure a visit which Faraday had paid to Dundee many years ago, as a member of the Glassiter body, the founder of which was the parish minister of Tealing, in their own county. He remembered the remark of a friend who had heard Faraday preach in Dundee, that of all the addresses he had heard on the raising of Lazarus, that by Mr. Faraday was the best. He wished pharmacists had more opportunities for study, no class deserved it more. He had to express the great obligation they owed that Society for bringing Mr. Maben to Dundee. He was sure that the address would be a very fruitful one, and that Mr. Maben would carry back with him the best wishes of the pharmacists of Dundee.

Mr. Frank W. Young said that he had also to express his gratitude to Mr. Maben for the address. Mr. Maben struck a chord at the beginning of his address in mentioning the name of Faraday, and he could say that that life more perhaps than any other was one of the things that directed his own steps in the way they have been directed since. He should like to point out one feature of the early life of Faraday, which more than any other gave hope to most of them at the present time. Faraday's first coming in contact with the science of chemistry was in the evenings, after the day's toil was over. He did not merely attend lectures, but he did what we know to be a most desirable thing in lads who attend any course of lectures—he took most elaborate notes and made sketches of the apparatus, and it was these notes and sketches, which afterwards presented to Sir Humphrey Davy, led him to the laboratory.

The Secretary then read the report of the adjudicator—Mr. J. Rutherford Hill—in the summer excursion competition for prizes presented by Mr. P. MacEwan, of London, an honorary member of the Association. The results were as follows:—1st, "Pinus sylvestris," Mr. Wm. S. Adams; 2nd, "Vinculum," Mr. Thos. S. Irons; 3rd, "Magnesium," Mr. D. McNaughton. Extra prizes "for merit" were also awarded to "Quanti est Sapore," Mr. Thos. G. Cathro; and "Nemo," Mr. W. Paterson.

Mr. Maben having presented the prizes—

The President (Mr. James A. Kinnear) proposed a vote of thanks to Mr. Hill, remarking that he was indebted to him for his services on this occasion.

The Assistant-Secretary (Mr. H. J. Hunt) had pleasure in proposing a special vote of thanks to Mr. MacEwan for his continued interest in the Association.

The Secretary was instructed to convey the respective votes of thanks.

Parliamentary and Law Proceedings.

Poisoning by Aconite.

Mr. Hodgkinson resumed on Wednesday, at the Shoreditch Infirmary, the inquest upon the body of Eliza Burley, aged 59 years, an inmate of the Shoreditch Workhouse, who died on Sept. 20 from the effects of aconite poisoning, taken from a medicine bottle dispensed on the premises, and which should have contained nux vomica. The inquiry was adjourned for the purpose of an analysis of the contents of the various bottles and the stomach of the deceased to be made by a Government analyst.*

John W. Lane said he was the permanent dispenser of the infirmary. He was away for his holiday at the time of the deceased's death. An inmate named Turner was in the habit of assisting witness in the dispensary. Occasionally Turner assisted witness to fill the bottles which witness handed him from the shelves. Turner never had received authority from him to fill bottles in witness's absence. Witness asked for assistance from the guardians, as the work was very heavy. He did not consider Turner an incapable man. He did not consider that the dispensary was properly lighted in the corner where the poisons were kept. Two years ago he asked for an alteration in the lighting arrangements, which was not granted. The bottle now shown and containing aconite, might have been mistaken for nux vomica, and if so, he should attribute it to the deficiency of light. When he went away all the stock bottles were left in their proper places. Witness had paid for assistance out of his own pocket, as the Guardians had refused to allow him help. He filled up the nux vomica bottle two days before he went away.

John Turner, an inmate of the workhouse, said he had been in the habit of assisting Mr. Lane in the dispensary. He had to fill the patients' bottles with water as they were given to him. He never filled the dispensing bottles without Mr. Lane's orders; whenever he did so it was in Mr. Lane's presence. After Mr. Lane went for his holiday, witness never touched any of the bottles. All the bottles were filled and put

---

* See *Pharm. Journ.*, Sep. 26, p. 263.

in proper order by Mr. Lane before he went away. Witness could not see without spectacles, but when he had them on he could see the labels on the bottles by turning them round to the light. Witness's previous occupation was that of a shirt and collar dresser.

At this point the jury decided to visit the dispensary, and having returned, Dr. T. Stevenson, of Guy's Hospital, and Government analyst, said that he had received a jar represented as containing the stomach of the deceased together with a small piece of intestine, one kidney and a piece of liver; another containing the heart; a bottle labelled "Tinct. Nux Vomic.;" a bottle labelled "9, 9, 91, Shoreditch Infirmary, Eliza Burley," with a prescription, and a bottle containing urine. The heart showed signs of disease, but not in a very advanced stage, and the other organs showed no morbid appearance. No poison was detected in the viscera, but the urine (1½ fl. oz.) yielded an extract that acted physiologically like aconitine. The dispensing bottle contained about 10½ fluid ounces of a solution much darker in colour than tincture of nux vomica, which it purported to contain. Besides strychnine, brucine and alcohol, the essential constituents of that tincture, it contained aconitine, camphor and methylated spirit, the constituents of methylated aconite liniment, a virulent poison of which twenty minims was perhaps a fatal dose for an adult. He believed that a greater part of the liquid was aconite liniment. The medicine marked as for Eliza Burley, measured 7½ fluid ounces and was in a 10 ounce bottle. It was such a mixture as would result from dispensing the prescription and using the impure tincture of nux vomica in the dispensing bottle instead of the genuine tincture. It contained, besides the ingredients ordered, aconite, and as much in each dose as corresponded to about nine minims of the impure tincture. He extracted enough aconitine from three fluid drachms of the medicine to give chemical tests, kill a mouse within two minutes, and produce very marked effects upon himself lasting several hours. He estimated the aconitine in a dose as approximately one-thirteenth of a grain, and that was about half the quantity that had proved fatal to a healthy adult, but it might be a fatal dose to a person suffering from heart disease, as aconitine acted as a powerful depressant upon the heart. In his opinion death was caused by aconitine poisoning.

The jury found that the deceased died from heart disease, accelerated by aconite poisoning from misadventure. They expressed their opinion that the dispensary was improperly lighted; and they also considered that the dispenser ought to have the services of a fully paid and qualified assistant.

Supposed Poisoning by Morphine.

Dr. G. Danford Thomas held an inquest on Thursday, the 15th inst., at Paddington Coroner's Court, on the body of Annie Sophia Tanqueray, aged 36.

The deceased resided with her mother, Mrs. Nuttall, a widow, who said her daughter had been in very delicate health for twelve months past and suffered from insomnia. Deceased had given her a lozenge which she said she took to induce sleep; but, although he witness watched her daughter very closely, she had never seen her administer any narcotic to herself. Witness and her daughter slept together, and on Sunday morning she found her quite dead. The deceased had never threatened to commit suicide, and was afraid of death. For two nights prior to her death she had little or no sleep.

Dr. Sheldon stated that when he saw the deceased on Saturday afternoon she seemed rather dazed, and there was a suspicion that she might have taken a narcotic to "soothe her." He asked her what she had taken, and she produced a bottle containing a little rose-water that could have done her no possible harm. Witness was called after death, and the appearance which the deceased presented was that of death from a narcotic. The lozenges to which the mother had alluded, one of which witness had examined, were simply cough lozenges and perfectly innocuous. A *post-mortem* examination revealed traces of morphine, from the effects of which poison he had no doubt she died. The poison he found was insufficient to cause death. He found no bottle of any kind in the room which had contained morphine, but it was his belief that the deceased had taken one or other of the many patented medicines and soothing syrups sold for coughs, of which morphine was an ingredient, in a sufficient quantity to produce death. Morphine lozenges contained the 36th of a grain of that poison, and half-a-dozen of these might have occasioned death.

The Coroner stated that there was no restriction upon the sale of patent medicines however poisonous they might be.

The jury returned a verdict of "Death from misadventure."

Obituary.

Notice has been received of the death of the following:

On the 3rd of September, at Melbourne, Mr. Alfred Brady, Pharmaceutical Chemist, formerly of Gateshead. Aged 44 years.

On the 27th of September, Mr. George Buxton Howorth, Chemist and Druggist, High Street, Irthlingborough. Aged 43 years.

On the 30th of September, Mr. George Thompson, Pharmaceutical Chemist, Alston, Cumberland. Aged 71 years. Mr. Thompson had been a member of the Pharmaceutical Society since 1853.

On the 13th of October, Mr. John Slater, Chemist and Druggist, Malvern Road, Beeston Hill, Holbeck. Aged 43 years.

Correspondence.

Re Oil of Rosemary.

Sir,—In the October issue of Messrs. Schimmel's report, I notice a reference to my papers on the above subject, lately published in the *Pharmaceutical Journal*.*

Had the remarks of Messrs. Schimmel assumed a more courteous tone, I should have considered them worthy of detailed reply, but under the circumstances I will only refer those of your readers who may be sufficiently interested in the subject to my note published on June 20 last, where they will observe facts are recorded which Messrs. Schimmel have completely ignored, and which prove that the sample in question could not have contained more than 10 or 12 per cent. of turpentine, and more probably none at all. They will also observe that my note was not written with the object of showing that Oil of Rosemary never possesses the characters assigned by Messrs. Schimmel, but rather to show that those characters are too restrictive; an oil of very fine quality being liable to rejection as adulterated with oil of turpentine if that standard be adopted.

R. A. Cripps.

P.S.—I have some of the oil now in my possession and shall be happy to forward a sample to any pharmaceutical chemist who may wish to examine it.

NOTICES OF MEETINGS.

Glasgow Chemists and Druggists' Assistants' Association.—Wednesday, October 28. Paper on "The Future of Pharmacy," by Mr. Alexander Laing.

Chemists' Assistants' Association.—Thursday, October 29. Paper on "B. P. Standards of Purity, Drugs and Chemicals," by Mr. T. A. Ellwood.

Communications, Letters, etc., have been received from Messrs. Pickering, Kennedy, Wright, Kirkby, Hanhan, Cope, Apprentice.

* See before, p. 328.

"THE MONTH."

Tuberculin.

Considerable interest has been excited during the past few days by the publication of a further communication upon tuberculin, in which Dr. Koch makes known the results of his attempts to obtain the active principle in a purer form (*Deut. med. Wochensch*, Oct. 22, p. 1189). In Dr. Koch's first attempt to purify tuberculin it was mixed with five times its volume of absolute alcohol, which caused a separation of a brown resinous mass that adhered to the bottom of the vessel. Both this deposit, however, and the clear supernatant liquid showed the tuberculin action to nearly the same degree. When a greater excess of alcohol was used instead of the resinous mass a fine granular precipitate was thrown down, which after being washed repeatedly with absolute alcohol and dried in a vacuum over sulphuric acid gave an almost white powder. But in this powder the tuberculin was still contaminated with extractive matter insoluble in alcohol, and many fruitless attempts were made to remove it. Either, as when ammonium sulphate was used, the tuberculin was thrown down still contaminated with other matters, or it lost its activity, or it could not be separated in an active condition from its precipitant. For instance, tannin threw down all the active principle from tuberculin, and the precipitate brought into solution by the addition of sodium carbonate possessed still its full activity, but the active substance could not be again separated from the tannin. Eventually it was found that by using a much smaller proportion of absolute alcohol (two parts to three of tuberculin) no separation of brown resinous substance was caused, but that at the end of twenty-four hours a white flocculent precipitate was formed. The brown supernatant liquid was decanted and replaced by the same quantity of 60 per cent. alcohol, the whole stirred and allowed to stand, and this was repeated until the alcohol remained uncoloured, when the precipitate was washed once with absolute alcohol and dried in a vacuum exsiccator. The product was a snow white mass, which after drying at 100° C. appeared when powdered of a light grey colour, and was considered to represent the pure or nearly pure active principle of tuberculin. It dissolved fairly easily in water, but an aqueous solution appeared to lose some of its activity in a fortnight. The evaporation of such a solution also was found liable, as the concentration increased, to cause the separation of curdy flocks, which did not redissolve when more water was added. On the other hand a 50 per cent. solution of the purified tuberculin in glycerine appeared to be very stable. From a consideration of its chemical reactions, and the results of three elementary analyses, it would appear that tuberculin is closely allied to the albumoses, but differs from them, and especially from toxalbumen, by its resistance to high temperatures; it also differs from the peptones in several respects, especially in being completely precipitated from a solution by ferric acetate. From the results of a number of physiological experiments, made first upon guinea pigs and afterwards on human patients, Dr. Koch has arrived at the conclusion that the purified tuberculin does not differ markedly in the nature of its action from the crude tuberculin, but that the former has, in fact, diagnostically and therapeutically the same effect as the latter when it is used in such quantities that the reaction symptoms, especially that of temperature, attain the same degree of intensity. In respect to this point it has been found that whilst the action of purified tuberculin upon guinea pigs is about fifty times as strong as that of the unpurified, upon human patients its action is at most forty times as strong. From these results therefore it would appear that Dr. Koch and his coadjutors have not been so successful in the attempt to purify tuberculin as Dr. William Hunter, who claims to have succeeded in removing from it the constituents giving rise to fever and inflammation, leaving a product which in the hands of Dr. Watson Cheyne has proved capable of inducing local reaction, followed by healing change around tuberculous lesions, unaccompanied by any constitutional disturbance (see before, August 1, p. 82).

Preparation of Tuberculin.

In an appendix to the communication referred to in the previous note, Dr. Koch gives some further information as to the method adopted in preparing tuberculin. It is generally understood that tuberculin is a product of the cultivation of tubercle bacilli obtained in the form of a glycerine extract. As may be supposed, a principal difficulty has been the cultivation of the bacilli free from admixture with other organisms. Originally the tubercle bacilli were sown upon "glycerin-peptone-agar," and when the culture had attained its full development it was washed off, collected on a fine wire gauze, extracted with a 4 per cent. glycerine solution, the solution evaporated to one-tenth, filtered, and the filtrate used. When a large demand arose for tuberculin the agar cultivation was found unsuitable, as it gave relatively small results. A previously abandoned attempt to cultivate the bacilli in a liquid medium was therefore resumed, but at first without success, until some small flat pieces of cultivation which had been left dry and unmoistened in the upper part of the flask were observed swimming on the top of the liquid, where they developed most luxuriantly. In the course of a few weeks they formed over the entire surface a tolerably thick whitish skin, dry on the upper side, which eventually became moistened, broke up and sank to the bottom. The product from such a culture proved considerably greater than that developed on solid media. The cultivation liquid used is an infusion of veal made faintly alkaline and with 1 per cent. of peptone and 4 or 5 per cent. of glycerine added. The bacilli sown give practically the same results, whether taken from fresh or old cultivations, from a tuberculous patient, or after passing through a series of animals. When the culture is quite mature, which occurs at the end of six or eight weeks, and has been ascertained to be absolutely pure, it is extracted by means of the cultivation liquid itself, and the extract is evaporated on a water bath to one-tenth of its original volume and filtered through porcelain. It then contains from 40 to 50 per cent. of glycerine, and is tested as to its activity by experiments upon guinea-pigs.

Methylene Blue in Malaria.

A short time since the affinity shown by "methylene blue" for nerve tissue suggested its use as an anodyne (*Pharm. Journ.*, [3], xx., 1057). Similarly the observation that it is the best agent for staining the plasmodia of malaria has suggested that it might exercise a curative effect upon mala

rial disease (*Pharm. Post*, Oct. 11, p. 839). The results in two cases treated by Messrs. Guttmann and Ehrlich appear to have confirmed the expectation, the fever disappearing in the first two or three days and the plasmodia from the blood within a week. The methylene blue was administered in capsules containing 0·1 gramme, repeated five times in the day, continued for eight days and after the disappearance of the fever. Whether the quantity of 0·5 gramme daily can be exceeded without injury has not yet been ascertained. The treatment is followed by an increase in the secretion of urine, which is coloured intensely blue, and some strangury has been observed, but no albuminuria. The strangury is considered of no importance, and it is stated that it can be treated by giving several times a day as much powdered nutmeg as will lie on the top of a knife, a remedy that is frequently used in South Germany to relieve the inconvenience following the drinking of new beer in excess. The fæces appear to contain the methylene blue in a reduced form, but become blue on exposure to light. Some remarks upon the nature of the "pure methylene blue" used will be found in the notice in this Journal to which reference has been given.

Amylene as an Anæsthetic Pental.

Professor v. Mering, who a few years since introduced amylene hydrate as a hypnotic, has recently found that the corresponding hydrocarbon can be used as an anæsthetic for minor operations (*Pharm. Presse*, Oct. 12, p. 3). Of the five isomeric amylenes, having the general formula C_5H_{10}, the compound in question is the trimethylethylene $\begin{matrix}CH_3\\CH_3\end{matrix}>C=CH-CH_3$. It is obtained by distilling ordinary fermentation fusel oil from zinc chloride after digestion with it for twenty-four hours. As fusel oil consists essentially of isoamyl alcohol, $(CH_3)_2:CH\cdot CH_2\cdot CH_2\cdot OH$), it might have been expected that the amylene principally formed as the result of this treatment would be isopropylethylene $(CH_3)_2CH\cdot CH:CH_2$), which after being used for a short time as an anæsthetic about thirty years ago was abandoned as unsatisfactory. But this is not the case, molecular rearrangement taking place and the final product being a mixture of about 50 per cent. of trimethylethylene with methylethylethylene, $(CH_3)(C_2H_5)\cdot C:CH_2$, pentane and other compounds. These are separated by first agitating the mixture at a temperature not above −20° C. with sulphuric acid (2 vol. H_2SO_4 to 1 vol. H_2O), then pouring off the acid layer that separates on standing, adding water to it and distilling. The distillate contains the trimethylethylene and some tertiary amylic alcohol, which latter is also converted into trimethylethylene upon being heated with sulphuric acid (equal parts H_2SO_4 and H_2O) to a temperature of 100° C. This compound is now being sent out, at the suggestion of Professor v. Mering, as "pental," but the name is hardly satisfactory in the second syllable. Pental has a sp. gr. at 0° C. of 0·6783; it boils below 38° C., and therefore as it is very inflammable requires care in storing. According to Professor v. Mering, 20 c.c. is sufficient to produce in three or four minutes an anæsthesia which though not deep is complete enough for minor operations, such as extraction of teeth. Its administration is claimed to be perfectly free from danger and unaccompanied by any unpleasant symptoms.

Salicylamide.

The pharmacology of salicylamide is the subject of a preliminary communication from Dr. W. R. Nesbitt, of Toronto (*Ther. Gaz.*, Oct. 15, p. 686). As the result of a number cf experiments the author expresses the opinion that for therapeutic purposes salicylamide presents advantages over salicylic acid and its salts in being free from taste, more soluble than salicylic acid, acting more promptly and in smaller doses, having greater analgesic properties and being pharmacologically safer. Salicylamide $C_6H_4<\begin{matrix}OH\\CO\cdot NH_2\end{matrix}$ was first prepared by Limpricht, by treating gaultheria oil with concentrated solution of ammonia, a method preferred by the author as avoiding the possibility of introducing foreign toxic compounds, as might be the case when an artificially produced methyl salicylate is used. When ammonia and gaultheria oil have stood together in the cold for some days, the liquid assumes a deep reddish-brown colour, and separation takes place in brown crystals that can be easily purified by recrystallization. From a saturated solution rapidly cooled it separates in an acicular form, otherwise it occurs in thin long plates or bunches of plates. By treatment with charcoal Dr. Nesbitt found it easy to obtain perfectly colourless, thin transparent plates, melting at 142° C., soluble in alcohol, ether, chloroform and about 250 parts of water. Salicylamide is quite tasteless, but produces a gritty sensation between the teeth. It is excreted in the urine partly unaltered, but chiefly as salicyluric acid. It possesses decided germicidal properties, and it was found that both diastatic and peptic changes are retarded by it, but not to the same extent as by salicylic acid.

Gallacetophenone.

Some time since pyrogallol attracted some attention as a remedy for psoriasis and other non-syphilitic skin affections, but it has practically fallen into disuse on account of its highly poisonous action. As a substitute for it, Dr. Pekowski recommends the use of "gallacetophenone," a compound which is already known in technical industry (*Pharm. Zeit.*, Oct. 7, p. 628). Pyrogallol, it will be remembered, is a trihydroxybenzene, $C_6H_3(OH)_3$, and gallacetophenone may be represented as a trihydroxybenzene with a fourth hydrogen of the benzene nucleus replaced by an acetyl group $C_6H_2(CH_3CO)(OH_3)$. Over pyrogallol it is said to have the advantage that it is oxidized slowly even in alkaline solution and relatively non-poisonous. It is described as a yellowish powder that can easily be crystallized from water in yellow needles melting at 70° C. In cold water it is almost insoluble, but it is freely soluble in hot water, alcohol and ether, and in all proportions in glycerine. If sodium acetate be added to a hot aqueous solution, about 4 per cent. may be retained in solution on cooling. A 10 per cent. ointment of gallacetophenone, which does not stain the linen, is said to have produced a perceptible improvement in twelve hours.

Concentrated Borax Solution.

Herr Jaenicke calls attention to the value in surgical practice of the compound produced by heating together equal parts of boracic acid and borax (*Pharm. Post.*, Oct. 4, p. 809). He states that this compound scarcely differs from boracic acid in its

antiseptic and pharmacological properties, but that it is much more soluble, the hard crystals dissolving in water at ordinary temperatures to the extent of about 16 per cent., at blood heat to 30 per cent., and at 100° C. to over 70 per cent., the solution being neutral. It therefore allows of the preparation of an aqueous solution containing four times as much antiseptic material as a cold saturated solution of borax, and therefore correspondingly more active. Such a solution, which may be prepared by simply boiling equal weights of boracic acid and borax in water, has been found especially useful in the treatment of affections of the ear.

Pharmacology of Oxalic Acid.

The observation made by Kobert and Küssner in 1879, that oxalic acid and its salts produce glycosuria, has been so often discredited as to induce Kobert and Krohl to repeat and extend the earlier experiments. At the recent meeting of German scientists and physicians in Halle, Professor Kobert maintained that not only the ingestion of free oxalic acid, but also of the neutral sodium salt by rabbits and cats in non-poisonous doses is followed by the appearance of a fermentable sugar in the urine. In 1883 Sarganeck also detected glycosuria in human beings in cases of oxalic acid poisoning, and apparently the observation is as valuable in the diagnosis of oxalic acid as of carbon monoxide poisoning. Kobert and Krohl have also investigated the action of sodium malonate on warm-blooded animals, and found, as did Keymans with frogs, that it is inactive even when injected into the blood in large doses. Salts of oxaluric acid, however, produced prolonged glycosuria, whether introduced into the system by the mouth or blood, but it is quickly controlled by dosage with an extract of *Syzygium jambolanum*, an observation that is the more valuable because it is not improbable that in some cases of diabetes the primary cause is the formation of excess of oxaluric acid, which always occurs in the urine in small quantities. Oxamide, though less active on account of its insolubility, also produces glycosuria. These results indicate that the activity of the above substances is attributable to the $-CO-CO-$ group, which fails in malonic acid, and that this group, like free CO, retards oxidation processes in the body. Incidentally, Professor Kobert recommended the employment of hydrogen peroxide, internally and subcutaneously administered, as an antidote in cases of poisoning with prussic acid, with which it reacts to form oxamide. Under this treatment animals survived poisonous doses of prussic acid, whilst normal animals died from the administration of hydrogen peroxide.

Helenin in Tuberculosis.

Helenin has now for some time been before the medical public as a remedy in phthisis, but without any apparent progress in its use. Dr. T. J. Bokenham has published an account of numerous experiments made by him as to the real value of the substance, and so far as can be gathered from the account given in the *British Medical Journal* (Oct. 17, p. 838) it would appear that the crystalline bodies occurring in *Inula Helenium* are difficult to separate on a large or commercial scale, and that consequently alantic anhydride was the only substance procurable commercially for his experiments. The other crystallized bodies were, however, obtained in sufficient quantity for laboratory experiments. These experiments showed that any of the crystalline bodies would prevent the growth of the tubercle bacillus if present in the proportion of 1 in 10,000, and in any ordinary cultivating medium for this bacillus. The effect of the administration of the alantic anhydride appeared to be to prolong life for a time in the animals experimented on, but not to prevent a fatal result. Helenin has also been lately given with good results in leucorrhœa in the dose of 2–4 centigrammes (*Rép. de Pharm.*, Oct., p. 481).

A New Vermifuge.

Attention has recently been directed by Mr. Heckel to a Scitamineous plant, which he has named *Ceratanthera Beaumetzi*, and which under the names "dadigogo" and "balancofouna" is employed on the west coast of Africa as a tænifuge and purgative (*Bull. Gén. Thérap.*, Oct. 15, p. 336). The part used is the fresh rhizome, from which M. Schlagdenhauffen has separated a resinous substance, soluble in ether and petroleum, and an essential oil. The resinous extract administered in doses of 1·20 gram acted only as a purge. On the other hand, 20 drops of the essential oil, given in a gelatine capsule, followed by a dose of castor oil, caused the complete expulsion of the tænia. This result is supposed to explain a previous want of success by Dr. Beaumetz, when using the rhizome in a dried condition.

Artemisia herba-alba.

In an article in *Nouveaux Remèdes* (Oct. 8, p. 454) M. Battandier remarks that although *Artemisia Herba-alba*, Ass., is extensively used by the Arabs in Algeria as a vermifuge under the name "chili," he has failed to obtain santonin from it. He has found in it two uncrystallizable resins, easily saponifiable by potash and soluble in alcohol, but when ether is added to the alcoholic solution one of the resins is precipitated and is not again soluble in alcohol even when boiling. On evaporating the ether-alcoholic solution a very bitter resin is left. The plant also contains a large quantity of essential oil. The species appears to be a very variable one and the variety *Sieberi*, Besser, has been stated to yield Santonica. It is to this species (*A. Herba-alba*) that M. Battandier attributes the Barbary wormseed formerly imported from Morocco.

Cactus grandiflora.

A communication upon the value of preparations of *Cactus grandiflora* in the treatment of cardiac disease, by Mr. P. W. Williams, of Bristol, has appeared in the *Practitioner* (Oct., p. 266). The preparation generally employed by Mr. Williams was a tincture apparently prepared by macerating four ounces of the fresh stems of flowers for one month in one pint of strong alcohol, the maximum dose given being about half a drachm every four hours. Mr. Williams reports the remedy to be useful in functional disorders of the heart, especially in the distressing palpitation arising from reflex irritation in dyspepsia. It was found to be safe, free from cumulative effects or gastric disturbance, and beneficial in just those conditions in which it is desirable to avoid the use of cardiac remedies of the digitalis class. In comparing it with aconite and digitalis Mr. Williams says that whilst digitalis stimulates the vagus nerve-endings and the cardiac muscle, thus prolonging the diastole, and aconite is a

powerful depressant of the heart, rapidly paralysing the cardiac muscle and lowering arterial tension by depressing the vaso-motor centres, cactus acts chiefly upon the accelerator nerves of the heart and sympathetic ganglia, shortening the diastole and stimulating the spinal vaso-motor nerve centres.

Ilex Paraguayensis.

An account of the histological structure of mate leaves is given in the *Journal de Pharmacie et de Chimie* (Oct. 15, p. 337), by the well-known microscopist, M. Eugene Collin. He points out that by boiling the crude mate powder in alkaline solution the structural details by which it can be recognized are easily brought into a condition observed under the microscope. These details, which are the subject of two excellent figures, do not, however, present any one feature peculiar to mate alone, but rather a series of characters by the combination of which it is distinguished from other similar leaves.

Greening of Etiolated Leaves.

The rapid formation of chlorophyll in etiolated leaves exposed to sunlight is a well-known phenomenon, but the exact conditions under which the process takes place have not yet been definitely determined. Herr Palladin publishes (*Berichte d. d. bot. Ges.*, ix, p. 229) the results of a series of experiments made upon etiolated leaves of wheat and field beans (*Vicia Faba*) grown in river sand. The leaves were detached from the petiole and laid in diffused sunlight upon water or solutions of different substances. Leaves of *V. Faba* died in distilled water after the second day, without formation of chlorophyll, and this also occurred with calcium nitrate solution. In a ten per cent. solution of cane sugar, all the leaves had become green after two days, though the growth was inconsiderable ; but in a mixed solution of calcium nitrate and sugar the normal colour was attained in twenty-four hours, vigorous growth ensued, and the leaves were still healthy after three days. The result of this experiment confirms the conclusion of Böhm with regard to the favourable influence of calcium salts upon the growth of etiolated leaves. Palladin also argues from the never failing presence of iron in the ash of etiolated leaves of *V. Faba* that no chlorophyll can be formed by the action of light in the absence of iron, though iron alone is not capable of producing the green colour, as etiolated leaves laid upon solutions of different iron salts of various concentrations remained yellow even when exposed to light. The absence of soluble hydrocarbons in the etiolated leaves of *V. Faba*, as determined by analysis, also indicates that chlorophyll is not formed in the absence of sugar. But though detached leaves remained yellow in distilled water, the formation of chlorophyll in the leaves of entire plants took place at the expense of sugar conveyed by the transpiration current from other parts of the plant. The last results are by no means vitiated by analogous experiments with the etiolated leaves of wheat, which became green after twenty-four hours in distilled water, since analysis showed the presence of 2·67 per cent. soluble carbohydrates in the fresh leaves, whilst leaves kept in the dark four days after detachment no longer retained the property of greening.

Thyroid Gland Juice.

The use of the secretion of the thyroid gland has recently come into notice in the treatment of myxœdema, a disease which has lately been shown to be due to loss of function of the thyroid gland, and which has hitherto been supposed to be incurable. Dr. G. Murray in the *British Medical Journal* (Oct. 10, p. 797) has given full directions for the preparation of this juice from the thyroid gland of the sheep. It seems quite possible that ere long the well-educated pharmaceutical chemist may be called upon to prepare this animal juice, just as already he has been required to produce a good peptic and pancreatic juice.

Salol as a Pill Coating.

Taking into consideration the fact that salol is not dissolved in the stomach and is only attacked by the pancreatic juice, Dr. le Ceppi has suggested its employment as a coating for pills intended not to act until they reach the intestine. For this purpose M. Yvon publishes the following formula (*Union Pharm.*, Oct. 1, p. 436) :—

Salol	2 grammes.
Tannin	50 centigrammes.
Ether	10 grammes.

The pills are varnished with this solution several times, until the protecting layer is sufficiently thick. The operation is said not to take longer than varnishing with tolu resin.

Cupreine and Quinine.

Although recent investigations of the cinchona alkaloids have indicated that cupreine bears the same relation to quinine as does phenol to its methyl ether, the account of the actual conversion of cupreine into quinine by Grimaux and Arnaud (*Pharm. Journ.*, xxi., p. 978) by the action of methyl chloride has been received with much criticism. The experience of previous experimenters was that addition rather than substitution products result from the action of methyl iodide upon cupreine. O. Hesse considered that the apparent ease with which the asserted synthesis of quinine from cupreine was effected by Grimaux and Arnaud was to be attributed to the employment by these investigators of cupreine still contaminated with quinine, or even of the molecular compound of quinine and cupreine known as homoquinine. The formation of quinine dimethyl-iodide from cupreine is, however, now admitted by Hesse, but he points out that the reaction does not furnish more than a third or one-half of the quinine compound that would be equivalent to the cupreine operated upon. Moreover, he asserts that this is the case only when cupreine in methyl alcohol solution is heated with sodium and a large excess of methyl iodide in a sealed tube to 60–100° C. Only the mono- and di-methyliodides of cupreine are formed, if the same conditions obtain as in the preparation of the corresponding derivatives of quinine.

Action of Hydriodic Acid upon Quinine.

The results of Arnaud and Grimaux's researches on cupreine appear to have stimulated other chemists to renewed investigations of the cinchona alkaloids in the hope of fathoming their chemical constitution. During the month two papers, from the chemical laboratories of the Vienna and Graz universities respectively, have been published (*Monatshefte*, xii., 327, 431) concerning the action of hydriodic acid upon various cinchona alkaloids. Compounds of three molecules of hydrochloric or hydrobromic acid with one molecule of cinchonine have been observed and described by Zorn and Skraup, and analogous compounds of quinine, $C_{20}H_{24}N_2O_2\,3HBr$ and $C_{20}H_{24}N_2O_2\,3HCl$,

have been prepared by Königs and Comstock. It is assumed in every case that two molecules of acid are attached to nitrogen as in the acid salts of the bases, but that the third has ruptured the double bond between two carbon atoms in the molecule and that its constituent atoms have combined with the two liberated affinities. As the quinine molecule is regarded as made up of two complex groups, $CH_3O-C_9H_6N$ and $C_{10}H_{15}NO$, and neither quinoline nor its derivatives are known to react with haloid acids in the above manner, the third molecule of hydrochloric or hydrobromic acid must enter into the hydrated group $C_{10}H_{15}NO$, a conclusion supported by Baeyer's classical researches on partially hydrated acids like dihydro- and tetrahydro-terephthalic acids, which have shown that such acids behave as ordinary unsaturated acids towards halogens and halogen hydrides. Lippmann and Fleissner have therefore studied the action of hydriodic acid on quinine in the expectation that the third molecule of acid would be less firmly combined to the two carbon atoms, and therefore more easily eliminated by alcoholic potash, than in the corresponding chlorine and bromine compounds. The hydriodoquinine hydriodide, $C_{20}H_{25}IN_2O_2 2HI$, which formed readily, lost a methyl group by the further action of hydriodic acid, yielding hydriodoapoquinine hydriodide, $C_{19}H_{23}IN_2O_2$, 2HI. By the action of alcoholic potash upon these two compounds quinine and apoquinine were not regenerated, but two new isomeric bodies were obtained. Isoquinine gives the quinine reaction with chlorine water and ammonia, is lævorotatory, and its solution in sulphuric or nitric acid is fluorescent, but the new base differs considerably from quinine in other properties. Isoquinine crystallizes readily from anhydrous ether, melts at 186° C., yields an oily chromate and a very soluble neutral sulphate and neutral hydrochloride, whilst the acid hydrochloride is not so soluble and can be easily prepared. Skraup simultaneously publishes a preliminary report of a more extended investigation on the action of hydriodic acid upon quinine, quinidine, cinchonidine, and cinchonine, which confirms the above results and extends the observations to compounds of the other three alkaloids with three molecules of hydriodic acid. Whilst the compounds with quinine and cinchonidine, $C_{20}H_{24}N_2O_2(HI)_3$ and $C_{19}H_{22}N_2O(HI)_3$, lose two molecules of halogen hydride by treatment with alkalies in the cold, the isomeric compounds from quinidine and cinchonine only part with one molecule, yielding the bases $C_{20}H_{26}N_2O_2I_2$ and $C_{19}H_{24}N_2OI_2$, which do not behave as periodides. This is the first important constitutional difference discovered between quinine and quinidine, as well as between cinchonidine and cinchonine. The hydriodo derivatives of quinidine and cinchonine, like that of quinine, also yield isomeric products upon regeneration, and Skraup further mentions that the compound described by Lippmann and Fleissner as isoapoquinine is isomeric and not identical with cupreine. By the reduction of the hydriodo derivatives with zinc dust liquid volatile bases, free from iodine and probably also from oxygen, have been obtained and will be further investigated.

Allotropic Silver.

The phenomena connected with the reduction of silver salts have been examined by Mr. Carey Lea under such a variety of circumstances (*Pharm. Journ.*, xxi., 881, 981, 1173) that he is now able to arrive at the following important conclusions (*Phil. Mag.*, Oct., p. 337). The reduction of silver may be direct or indirect, direct when it passes from the condition of the normal salt or oxide to that of the metal, indirect when the change is first to a suboxide or to a corresponding subsalt. When the reduction is direct the metal always separates in its ordinary form, but when the reduction is indirect the silver presents itself in one of its allotropic modifications. The three principal modes of formation of allotropic silver are :—(1) Reduction of silver citrate or tartrate by ferrous citrate or tartrate ; (2) action of dextrine and fixed alkaline hydroxide on silver nitrate or oxide ; (3) action of tannin and fixed alkaline carbonate on silver nitrate or carbonate. There is a well marked tendency of acids to give rise to the formation of the yellow product and of alkalies to the blue. Hypophosphorous and phosphorous acids also appear to act like the organic reducing agents, but the colorations produced are but transitory, owing to the strong tendency of free mineral acids to convert allotropic into normal silver. If the action of indirect reducing agents be interrupted before it is completed, by addition of an excess of dilute hydrochloric acid, a dark purple-brown mixture of silver subchloride and protochloride is precipitated, suggesting that silver exists in its subsalts in the allotropic form, though the greater activity of allotropic silver and its less specific gravity indicate a simpler molecular constitution than obtains in normal silver.

A New Modification of Phosphorus.

While fusing ordinary yellow phosphorus, Mr. H. M. Vernon observed that in some cases the substance melted gradually without any definite melting point, though in others a definite melting point was exhibited. Further examination showed that there are two crystalline varieties of phosphorus, as of sulphur, and these also differ in other properties (*Phil. Mag.*, October, p. 365). The respective melting points were determined in tubes containing a trace of water vapour to prevent oxidation, placed in air-baths surrounded by water at 100° C. The melting point of one variety agreed with that recorded by v. Schrötter and other observers for octahedral phosphorus, 44·3° C., but that of the other modification was indefinite, and calculated from the latent heat curves is at least 1° C. higher. The two different varieties of phosphorus were both obtained from the same specimen, supposed to contain phosphorus all in the same state, and must therefore be easily convertible the one into the other. Experiment showed that the form assumed by the phosphorus depends upon the rate of the solidification of the molten substance. By rapid cooling solidification takes place at 43·8° C., and the variety with definite melting point is obtained. But by slow cooling the temperature falls to about 30° before solidification commences, and then rises to about 43° C.; the product in this case consists principally of the modification with indefinite melting point. As a single rapid or slow cooling of the melted phosphorus is not sufficient to wholly convert the one modification into the other, but the total conversion can be effected by a single repetition of the process in slow cooling and by two or three repetitions in rapid cooling, it follows that the phosphorus when

melted is also in a different state in the two cases. Up to the present it has been stated that phosphorus always occurs in octahedral or rhombic dodecahedral crystals, but careful examination shows that the variety with indefinite melting point crystallizes in rhombic prisms from benzene, though measurements of the crystals could not be taken because of their inflammable nature. As observed with octahedral and prismatic sulphur, the two varieties of phosphorus differ in specific gravity, the octahedral variety having the value of 1·8177 and the prismatic 1·8272 at 13° C. The octahedral modification has also considerably greater latent heat than the rhombic variety.

TERPENES AND CAMPHORS.*

BY O. WALLACH.

(*Continued from page* 239.)

All the terpenes are unsaturated compounds, but a difference is at once observed in the respective capability of different terpenes to combine with halogen hydrides, although this observation is of limited value for the recognition of individual hydrocarbons.

If anhydrous hydrochloric acid gas be led into well-cooled and absolutely dry pinene 1 mol. HCl is absorbed and a solid saturated compound separates, melting at 125°, boiling at 207–208°, and possessing a camphor-like odour, whence it has been called "artificial camphor." Aqueous hydrochloric acid produces radical changes in pinene.

Camphene also absorbs 1 mol. HCl, and the hydrochloride physically resembles that of pinene, but the compounds are distinguished by the relative degree of their stability. Camphene hydrochloride readily parts with hydrochloric acid again and camphene is regenerated. Hydrochloric acid is removed from pinene hydrochloride only with great difficulty, but then camphene and not pinene is obtained. This difference in behaviour suggests that in camphene hydrochloride the Cl and H atoms removable as hydrochloric acid are in the ortho position to one another, whilst the corresponding H and Cl atoms in pinene hydrochloride are more widely separated.

Fenchene hydrochloride is liquid and, like both the above compounds, possesses the formula $C_{10}H_{16}{\cdot}HCl$.

When absolutely dry limonene is brought into contact with anhydrous hydrochloric acid gas only 1 mol. HCl is absorbed by the terpene, and an optically active liquid of the composition $C_{10}H_{16}{\cdot}HCl$ results, that boils undecomposed under diminished pressure (97–98° at 11 mm.) and behaves towards other reagents as an unsaturated compound. It decolorizes bromine and absorbs moist hydrochloric acid readily, but by doing so becomes inactive and yields the inactive dipentene dihydrochloride $C_{10}H_{16}{\cdot}2HCl$. The latter compound is also obtained direct if the hydrocarbon is treated in solvents containing traces of water (ordinary ether, glacial acetic acid) with hydrochloric acid.

Dipentene behaves quite similarly to limonene, forming an unsaturated fluid monohydrochloride with dry hydrochloric acid and with aqueous acid the saturated dipentene dihydrochloride, $C_{10}H_{16}{\cdot}2HCl$, that melts at 50° and boils at about 115° C. at 11 mm.

Sylvestrene possesses properties analogous to limonene, yielding a saturated dihydrochloride, which is, however, active, crystallizes readily in the monosymmetric system and melts at 72° C.

The hydrocarbons can be regenerated from both the unsaturated and saturated hydrochlorides of limonene, dipentene, and sylvestrene by treatment with reagents removing hydrochloric acid, especially with aniline or sodium acetate. The hydrochlorides of the other terpenes have not yet been distinctly characterized. It is scarcely necessary to mention that hydrobromides, etc., can be prepared in a similar manner to the hydrochlorides.

The bromine addition products have played a more important *rôle* in the recognition of the terpenes. Pinene absorbs only 1 mol. bromine and yields a saturated dibromide $C_{10}H_{16}Br_2$, melting at 169–170°. No bromine addition product of camphene is known, but that of fenchene is fluid and has the composition $C_{10}H_{16}Br_2$. Limonene, dipentene, sylvestrene, and terpinolene take up 4 atoms of bromine, and the resulting tetrabromides, which are best prepared by brominating the hydrocarbon in nearly absolute glacial acetic acid and recrystallization out of acetic ether, have the following properties :—

Limonene bromide, $C_{10}H_{16}Br_4$, m.p. 104–105°, rhombic hemihedral.

Dipentene bromide, $C_{10}H_{16}Br_4$, m. p. 124–125°, rhombic.

Sylvestrene bromide, $C_{10}H_{16}Br_4$, m. p. 135°, symmetric.

Terpinolene bromide, $C_{10}H_{16}Br_4$, m. p. 116°, with decomposition, symmetric.

These facts characterize two large terpene groups: the members of one group containing one ethylene bond, and therefore only adding 1 mol. halogen or halogen hydride to form saturated compounds; the members of the second group containing two ethylene bonds, so that by addition of 1 mol. halogen or halogen hydride they still remain unsaturated and yield saturated bodies only on addition of 2 mol. halogen or halogen hydride.

The identification and characterization of individual terpenes has been considerably advanced by the study of those compounds which the terpenes are capable of forming with oxides of nitrogen and their derivatives.

The first experiment in this direction is attributed to Cahours, who observed the formation of a compound, subsequently identified as phellandrene nitrite, $C_{10}H_{16}{\cdot}N_2O_3$, when oil of fennel, nitric oxide and air are brought together. Phellandrene can also be readily detected if the hydrocarbon diluted with ligroin is shaken with an aqueous solution of sodium nitrite with gradual addition of acetic acid. If phellandrene be present the fluid is very speedily filled with very voluminous crystals of the nitrite. This compound is characteristic, but unstable, especially in an impure condition. Pure phellandrene nitrite melts at 102° C.

Terpinene combines with nitrous acid under the same conditions but much more slowly. Terpinene nitrosite, $C_{10}H_{16}{\cdot}N_2O_3$, is a very stable body and crystallizes readily out of acetic ether in transparent, monosymmetric prisms, an inch in length, melting at 155° C. The discovery of this beautiful compound is of especial importance, as it affords an easy means of separating the inactive terpinene from other inactive terpenes like dipentene, with which it is frequently confused.

The other terpenes do not give crystalline compounds with N_2O_3, but very important compounds with the chloride of nitrous acid, the so-called nitrosyl chloride, NOCl. This property of the terpenes was first observed by Tilden, who prepared small quantities of two representatives of this class of bodies, the pinene and limonene compounds. The reaction has become of importance since it has been found unnecessary to isolate nitrosyl chloride, and that the addition products are easily obtained by adding an alkyl nitrite, as amyl nitrite or even better ethyl nitrite, and then hydrochloric acid, to a well cooled solution of the terpene in glacial acetic acid or alcohol. The nitrosyl chloride, generated according to the equation

$$R{\cdot}ONO + HCl = R{\cdot}OH + NOCl,$$

combines with the hydrocarbon at the moment of formation, dissolving an ethylene bond of the hydro-

* Abstract from a lecture delivered before the Chemical Society at Berlin on February 23, 1891, and published in *Berichte*, xxiv., 1525.

carbon by the nitroso group NO attaching itself to one carbon atom and the chlorine atom to the other. In fact, the operation is precisely the same as in the addition of NOCl to amylene and analogous to that by which nitrosites or nitrosates result from the addition of N_2O_3 or N_2O_4 to unsaturated compounds. Further consideration shows that nitrosochlorides and nitrosites are of similar constitution, as shown by the formulæ

$$C_{10}H_{16}\begin{matrix}NO\\Cl\end{matrix} \qquad C_{10}H_{6}\begin{matrix}NO\\(ONO)\end{matrix}$$

the chlorine atom in the one case occupying the position of the nitrous acid radicle, so that the reaction can be considered a general one.

If under the above conditions a terpene be mixed with an alkyl nitrite and nitric acid, the oxide $NO{\cdot}ONO_2$, formed according to the equation

$$R{\cdot}O{\cdot}NO + NO_3H - R{\cdot}OH + NO{\cdot}ONO_2$$

combines with the terpene to a nitrosate $C_{10}H_{16}\begin{matrix}NO\\ONO_2\end{matrix}$ analogous to the nitrosochloride. The nitrosates are generally more soluble than the nitrosochlorides, or not crystalline, but in some instances are especially useful in the separation of definite compounds. Thus it has been found that the unsaturated hydrochlorides of terpenes with two ethylene bonds yield nitrosochlorides or especially nitrosates, as readily as the corresponding hydrocarbons, so that the liquid limonene and dipentene hydrochlorides can be readily precipitated by addition of an alkyl nitrite and hydrochloric or nitric acid in the form of crystalline insoluble nitrosochlorides or nitrosates of the formula—

$$C_{10}H_{16}\begin{matrix}ClNO\\HCl\end{matrix} \quad \text{and} \quad C_{10}H_{16}\begin{matrix}ClNO\\HONO_2\end{matrix}$$

Of the nitrosochlorides, hydrochlornitrosochlorides and hydrochlornitrosates prepared by this method some of the limonene series (the α-nitrosochloride) are especially characterized by their property of crystallization, and all can be made in any quantity. Not all the compounds are, however, stable, and as they decompose without exception at higher temperatures, the melting-point estimations of the different compounds are only of relative value, especially as those of the different isomerides are very near to each other.

A further discovery of great importance for the characterization of individual terpenes was the observation that the nitrosochlorides, as well as the nitrosates, nitrosites, and hydrochlornitrosates, readily combine with organic bases to form nitrolamines—

$$C_{10}H_{16}\begin{matrix}NO\\Cl\end{matrix} + NH_2R = C_{10}H_{16}\begin{matrix}NO\\NHR\end{matrix}{\cdot}HCl$$

Such nitrolamine bases can be prepared in infinite numbers in the pinene, limonene, dipentene, sylvestrene and terpinene series. They are distinguished by their good crystalline character, stability, and very definite melting-points, and are, therefore, important factors in the identification of terpenes, as a glance at the following table of melting points of a few bases derived from benzylamine and piperidine shows. The nitrolamines of the limonene and dipentene series occur in several different modifications.

	Pinene.	Limonene.	Dipentene.	Sylvestrene.	Terpinene.
Nitrol-benzylamine— $C_{10}H_{16}\begin{matrix}NO\\NHCH_2C_6H_5\end{matrix}$	122°	93°(α)	109°(α)	71°	137°
Nitrol-piperide— $C_{10}H_{16}\begin{matrix}NO\\NC_5H_{10}\end{matrix}$	118–119°	94°(α) 110°(β)	154°(α) 152°(β)	—	153°

A further characteristic and important reaction of the nitrosochlorides remains to be mentioned, namely, the splitting off of hydrochloric acid by suitable reagents and formation of nitroso compounds, $C_{10}H_{15}NO$. The preparation of these beautifully crystalline compounds can also be employed in the identification of individual terpenes, but their study more especially throws some light upon the constitution of the terpenes.

This sketch of the more important advances in the characterization of the terpenes, which is briefly represented in the accompanying table, demonstrates that the most important terpenes possess properties not less defined and distinctly characteristic than any other compounds. If, as may be expected in the course of time, new terpenes be discovered, they can be easily incorporated with the known types, but it is desirable that new hydrocarbons of the formula $C_{10}H_{16}$ shall only be recognized in scientific literature after they have been sharply defined and distinguished from the known terpenes.

Pinene.	Camphene.	Fenchene.	Limonene.	Dipentene.	Sylvestrene.	Phellandrene.	Terpinene.	Terpinolene.
155–156° 0·858	160°–161° 0·850 at 50° (m. p. 50°)	158–160° 0·864	175–176° 0·846		175° 0·848	ca. 170° —	ca. 180° —	ca. 185° —
$C_{10}H_{16}\begin{matrix}H\\Cl\end{matrix}$	$C_{10}H_{16}\begin{matrix}H\\Cl\end{matrix}$	$C_{10}H_{16}\begin{matrix}H\\Cl\end{matrix}$	$C_{10}H_{16}\begin{matrix}H\\Cl\end{matrix}$	$C_{10}H_{16}\begin{matrix}H\\Cl\end{matrix}$	$C_{10}H_{16}\begin{matrix}H\\Cl\end{matrix}$	—	—	—
(Saturated.)			(Unsaturated.)					
m. p. 125°	solid	fluid	fluid	fluid				
—	—	—	—	$C_{10}H_{16}\begin{matrix}HCl\\HCl\end{matrix}$ 50°	$C_{10}H_{16}\begin{matrix}HCl\\HCl\end{matrix}$ 72°	—	—	—
$C_{10}H_{16}Br_2$ 170°	—	$C_{10}H_{16}Br_2$ fluid	$C_{10}H_{16}Br_4$ 104°	$C_{10}H_{16}Br_4$ 124°	$C_{10}H_{16}Br_4$ 135°	—	—	$C_{10}H_{16}Br_4$ 116°
$C_{10}H_{16}NOCl$	—	—	$C_{10}H_{16}NOCl$	$C_{10}H_{16}NOCl$	$C_{10}H_{16}NOCl$	$C_{10}H_{16}N_2O_3$ 102°	$C_{10}H_{16}N_2O_3$ 155°	—
$C_{10}H_{16}\begin{matrix}NO\\NR\end{matrix}$ 122°	—	—	$C_{10}H_{16}\begin{matrix}NO\\NR\end{matrix}$ 93° (α)	$C_{10}H_{16}\begin{matrix}NO\\NR\end{matrix}$ 109° (α)	$C_{10}H_{16}\begin{matrix}NO\\NR\end{matrix}$ 71°	—	$C_{10}H_{16}\begin{matrix}NO\\NR\end{matrix}$ 137°	—
$C_{10}H_{15}NO$ 1328	—	—	$C_{10}H_{15}NO$ 72°	$C_{10}H_{15}NO$ 93°	—	—	—	—

R. in the above table = Benzyl.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, OCTOBER 31, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE POSSIBLE UTILITY OF LOCAL SECRETARIES IN THE PROTECTION OF TRADE INTERESTS.

CONSIDERING the importance attaching to the appointment of the Society's local secretaries throughout the country it might have been expected that a greater amount of active interest would have been taken in the nomination of persons to fill that office. But little information has come to hand of any meetings having been held for the purpose of obtaining expressions of opinion as to who may be considered in the several centres the most suitable. Nor has the correspondence received in reference to this matter been as copious as we think it should have been, to represent fully the feeling which there is reason to believe prevails as to the necessity for increased efficiency in the performance of the duties appertaining to the Society's local secretaries. So far as the letters which have already been published can be taken as an indication of the general state of opinion upon this subject, it must be inferred that there is considerable dissatisfaction. In the special instance mentioned by Mr. SWINN, the objection put forward by him appears to be a very reasonable one, for notwithstanding the fact that Salford may be considered in some respects as a part of Manchester, the extent of the borough is quite sufficient to justify a demand for special representation in regard to pharmaceutical affairs, in the same way that it has distinct parliamentary representation and a separate municipal body. The position taken up by Mr. SWINN is that no single individua could efficiently represent as local secretary so large and populous an area as that of Salford unless he devoted much more time to the duties than could be reasonably expected of him. Few we think will be disposed to differ from him in this opinion, and probably least of all the occupant of the post of local secretary for Manchester. For the effective supervision of such districts, where there is especial probability that the Pharmacy Acts may be infringed, it seems essential to the interests of those concerned in the maintenance of the law that they should select from among their number men who would undertake as divisional secretaries to look after their respective parliamentary districts, in order to report breaches of the Pharmacy Act and provide for their suppression. But it is strange that such a view of the matter is not generally taken and acted upon by those who are directly interested in having the provisions of the Pharmacy Act upheld, and that in place of vain complaints of illegal trading they do not endeavour to help themselves by claiming to have a local representative, and, through him, assisting the Council of the Society to take action for their protection.

In the other letter which appeared on this subject somewhat grave charges are made against the Society's local secretaries. Some of them are described as being lazy and indifferent, whilst others are said to be "absolutely heavy drags on the wheels of the pharmaceutical chariot." Without venturing either to adopt or refute these harsh statements, it may be fairly pointed out that whatever degree of foundation there may be for them, it is the chemists who suffer from the alleged negligence that are most of all to blame. While it is true that the local secretary is the only person who can be above suspicion in taking steps to prevent illegal trading, it is at least equally true that the individual members of the trade—to whom instances of illegal trading or other irregularities become known—should, for their own protection and in the general interest of their fellow traders, make the facts known to the local representatives of the Society in such a way that they may form a basis for the prosecution of offenders. It is only by such joint action that local secretaries can be made serviceable, and that the powers vested in the Society can be exercised for the benefit of the body it represents. It is stated that local secretaries sometimes abstain from taking action in reference to illegal proceedings of which they are personally cognizant, and that as a consequence the Society is blamed by those who do not belong to it for allowing such cases to remain unnoticed. But here again it becomes a question why those who are prejudiced by illegal proceedings and by the alleged disregard of them on the part of a local secretary do not take action on their own behalf, and combine to impress upon the Society's representative the need there may be for his active interference. This is a matter in which all the chemists of a district might be expected to join together, whether they are connected with the Society or not. Since it is only through the Society that persons engaged in illegal trading can be proceeded against, and since the influence of illegal trading is looked upon as the greatest grievance to which chemists are subjected, it is astonishing that the only obviously reasonable alternative is not adopted more generally. If a move were made in that direction it may safely be anticipated that the general common sense and business aptitude of chemists would lead them to re-

cognize the utility of having a body like the Society to represent them and to act on their behalf. Such a result, however, can scarcely be expected if local secretaries are relied upon to act single-handed in hunting up cases of infringement of the Act and as honorary officers to bear the entire onus of the work that is requisite for protecting the trade interests of chemists. In this connection there is a wholesome sentiment in the appeal made at the end of the letter signed "Progress, M.P.S.," which should be extended to every member of the trade.

The letters which appear in this week's Journal do not add much to what was said in those above referred to, but it may be remarked that Mr. PICKERING appears to overlook the fact that the Pharmaceutical Society is not supported by many of those who complain that their trade interests are not protected as he thinks would be desirable. No doubt local representatives of the Society and of the trade's interests should be prepared and willing to investigate all reports of infringement of the Pharmacy Acts as he suggests. But it is equally evident that those who look to such action as a means of promoting their individual trade interests should be themselves supporters of the Society through whose agency the results they desire are to be achieved, and that they should not depend upon the application of the Society's funds and the services of its officers for that purpose while they withhold their support. Mr. PICKERING'S proposition would be a sound one only if the greater part of the trade were connected with the Society from which protection is expected.

It will be seen from the official notices that appear in this week's Journal that at the next Evening Meeting of the Pharmaceutical Society on the 11th of November there will be a return to the former practice of having occasional lectures on subjects of general interest to pharmacists. On that occasion a lecture will be delivered on the subject of "Evolution in the Flower," by Mr. J. R. Green, the Professor of Botany in the Society's School of Pharmacy.

* * *

Just before going to press we learn that an inquest now being held at Leeds is likely to lead to an inquiry into the quality of the water supplied to Wakefield and the district adjoining that town. It is stated on medical authority that the alleged impregnation of the water with lead has been the cause of a large number of cases of poisoning.

* * *

We learn with much pleasure that the authorities of the Owens College, Manchester, have given further proof of their disposition to promote the cause of pharmaceutical education in the provinces by appointing Mr. William Kirkby Lecturer on Pharmacognosy, and Mr. J. H. Hoseason Assistant-Lecturer on Materia Medica.

* * *

At the meeting of the Royal College of Physicians, when the Harveian oration was delivered by Dr. W. H. Dickinson, the Baly Medal was presented to Professor Michael Foster for distinction in physiology, and the Morgan Medal was presented to Sir Alfred Garrod for distinction in clinical medicine.

* * *

The annual conversazione of the Chemists' Assistants' Association will take place on November 19, at the Portman Rooms, Baker Street, W., commencing at 8 p.m. with an exhibition of objects connected with photography. There will be a concert from 9 to 10.30, and dancing will commence at 10.30. Tickets may be obtained of any of the officers of the Association, or of the Honorary Secretary, Mr. Frank A. Rogers, 86, New Bond Street, W.

* * *

The annual conversazione of the Midland Counties Chemists' Association, on Tuesday evening, November 3, at 7.30 o'clock, will be held in the "Windsor Room" of the Grand Hotel, Colmore Row, Birmingham, and an address inaugurating the session will be delivered by Sir James Sawyer, M.D., F.R.C.P. During the evening there will be musical and other entertainments.

* * *

The Croonian Lectures will this year be delivered by Dr. Burdon Sanderson in the Examination Hall, the Savoy, on the 3rd, 10th, 17th, and 24th November. The subject of the lectures will be "The Progress of Discovery Relating to the Origin and Nature of Infectious Diseases."

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

October 20, 21, 22, *and* 23, 1891.

Present on each day.—Mr. Carteighe, President; Mr. Bottle, Vice-President; Messrs. Blunt, Bowen, Corder, Davies, Druce, Fletcher, Gerrard, Greenish, Holmes, Ransom, Saul, Symons, Tanner and Taylor.

Dr. Stevenson was present on the 21st on behalf of the Privy Council.

MAJOR EXAMINATION.

20*th.*—*Five* candidates were examined. *Two* failed. The undermentioned *three* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Broadbent, John Beaumont ...Honley.
Gee, Ernest .....Bath.
Wilson, Arthur .....Grimsby.

21*st.*—*Five* candidates were examined. *Two* failed. The undermentioned *three* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Blackman, Percy.....Southampton.
Churchyard, Arthur Ernest I...Norwich.
Squire, George..... Barnsley.

22*nd.*—*Five* candidates were examined. *One* failed. The undermentioned *four* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Ecclestone, George Thomas ..Soham.
Fillingham, John .....Grantham.
Fisher, Ernest Hunter .....Blackheath.
Green, William Henry .....Gargrave.

23*rd.*—*Six* candidates were examined. *One* failed. The undermentioned *five* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Anthony, Thomas .....St. Austell.
Long, Frederick Coleman.....Norwich.
Minett, Edward Pigott .....London.
Ralph, William .....Nairn.
Sturton, Samuel Ainsworth ...Framlingham.

MINOR EXAMINATION.

20*th.*—*Twenty-nine* candidates were examined. *Sixteen* failed. The undermentioned *thirteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Abram, Fredc. Wm. Joseph ...Wisbech.
Atkinson, Alfred .....Bishopton Mills.
Barnes, Frederick Walter.....London.
Blackbourn, William .....Newark.
Blakeley, Leonard .....Otley.
Blamey, John .....Penryn.
Butterfield, Thos. Alex. C. ...Keighley.
Corder, John Talwin .....Norwich.
Corfe, Alfred Frederick.....Maidstone.
Elliman, Edgar George .....London.
Evans, Ivor .....Aberdare.
Flemons, Edward Basset .....Withington.
Lambert, Jas. Ernest Harold...Farsley.

21*st.* — *Twenty-nine* candidates were examined. *Nineteen* failed. The undermentioned *ten* passed, and were declared qualified to be registered as Chemists and Druggists:—

Gallimore, James Samuel.....Tutbury.
Good, John Thomas .....Barton-on-Humber.
Haynes, Edward .....Oxford.
Hines, Henry Thomas .....Greenwich.
Hudson, John Edward .....Manchester.
Hughes, Richard.....Aberystwith.
Huntley, Joseph .....Cirencester.
James, Ernest .....London.
Latreille, Albert .....London.
Thomas, Owen Edward.....Bangor.

22*nd.* — *Twenty-nine* candidates were examined. *Seventeen* failed. The undermentioned *twelve* passed, and were declared qualified to be registered as Chemists and Druggists:—

Edwards, Henry Charles .....Rye.
Male, Trevan Bersey ....Plymouth.
Maundrell, Henry Tuckey.....London.
Moore, Arthur..... ...Birmingham.
Norrish, George Edgar .....Exeter.
Page, Richard Pearce.....London.
Parry, David .....London.
Ridley, Alexander .....Ipswich.
Seed, Thomas Henry .....London.
Smith, Thomas Ashworth.....Radcliffe.
Turney, Frederick Edmund ...Plymouth.
Wood, Ernest Thomas .....Stonehouse, Devon.

23*rd.* — *Twenty-six* candidates were examined. *Twelve* failed. The undermentioned *fourteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Davies, Thomas .....Aberystwith.
Dunning, James .....Manchester.
Shove, Bertha .....London.
Stockdale, William James.....Thirsk.
Sturt, Clifford Henry .....Oakengates.
Swainson, John Wm. Blanchard...Devonport.
Swinney, William Paulin .....Morpeth.
Thomas, William .....Llannon.
Thorley, Walter .....London.
Turney, Herbert Blandford ...Plymouth.
White, Alfred Edwin.....Ashford.
Wilkinson, Henry Albert .....Bulwell.
Williams, Rowland Henry ...Holyhead.
Winzer, Edmund .....Stoke Damerel.

PRELIMINARY EXAMINATION.

23*rd.*—Certificates by approved examining bodies were received from the undermentioned in lieu of the Society's examination:—

Allison, James.....Kennington.
Atkin, John Albert .....Lincoln.
Bentley, Thomas.....Normacot.
Beveridge, William .....Milnathort.
Blomfield, Edgar Athelstan ...Peckham.
Brown, George William.....Hanley.
Chaston, George Hunt .....Alresford.
Cornwall, Reginald de Vere ..London.
Dance, James George.....Brighton.
Dennis, Tom Hawksley.....Nottingham.
Durant, Henry Thomas .....Hampstead.
Hanna, George Henry.....London.
Harris, George Herbert .....Wellingborough.
Heanley, Alfred Vergette.....Peterborough.
Hodges, Francis John .....Malling.
Horner, Robert . .....Budleigh Salterton.
Johnson, George Arthur.....Rugby.
Jones, Samuel .....Maidstone.
Jones, Sidney Clifford .....Camberwell.
Morris, Kenneth Austin.....Presteign.
Mossom, Arthur Henry .....Darlington.
Nowell, John Percy Lewis D....Paignton.
Orchard, Fred .....Highbridge.
Owen, John George .....Kennington.
Perrett, Henry John .....London.
Rae, George Ernest Alfred ...Exeter.
Skinner, Ernest Pape .....Boston.
Stamp, Francis Underwood...Hampstead.
Swindells, Frederick .....Hyde.
Thorne, William Harold .. ...Exeter.
Tulley, Frederick Rudrum ...London.
Tweedy, Sidney .....Northwich.
Walker, Alfred .....Stafford.
Woods, Francis Edwin .....Birmingham.

The Report of the College of Preceptors on the Examination held on October 13 was received.

Three hundred and one candidates had presented themselves for examination, of whom *one hundred and forty-eight* had failed.

The following *one hundred and fifty-three* passed, and the Registrar was authorized to place their names upon the Register of Apprentices or Students:—

Adam, Charles.....Monymusk.
Allan, William F. .....Airdrie.
Allix, Francis George.....Jersey.
Andrew, James .....Southport.
Arblaster, Philip.....Birmingham.
Barclay, John .....Huntly.
Barlow, Francis Joseph..... ..Dudley.
Beal, Johnson .....Pendleton.
Begg, John Cuthbertson .....Motherwell.
Bennett, Charles Thomas .....Leicester.
Bertram, Alexander .....Peterhead.
Biddlecombe, William Robert..Bridgwater.
Binnie, James Smith .....Kelso.
Bisley, Stanley Ernest ... .London.
Blakeley, William .....Bramley.
Bonnar, William .....Glasgow.
Boyes, William Cotnam .....Bradford.
Brazier, George Henry Fredk..Winslow.
Bridgwood, Frank .....Stafford.
Brown, Morriss Thomas.. .....London.
Brown, William ....Thornhill.
Browton, William Wiltshire...London.
Buckley, James Arthur .....Blackpool.
Cameron, Alexander Findly...Kilmarnock.
Campbell, Adam H. .....Perth.
Cannell, John Wilfred .....Douglas (I.M.)
Cassels, Thomas Henry.....Southend.
Catchpole, Arthur William ...Ipswich.
Chambers, Arthur E. C.....Grantham.
Charlesworth, jun., Charles E.Manchester.
Coleman, John Albert S. .....London.
Collie, Alexander.....Bellshill.
Cowie, William .....Aberdeen.
Cran, John Thomas .....Peterhead

Crockart, James Hay .....Montrose.
Curry, Frank .....Dorking.
Curtis, George .....Lowestoft.
Dalrymple, Charles William...Liverpool.
Daniel, Robert .....Derby.
Daniells, William George .....London.
Davidson, Benjamin .....Edinburgh.
Eeley, Joseph .....Oxford.
Erskine, Edwin .....Berwick-on-Tweed.
Essam, James Francis .....Sheffield.
Ferriday, Alfred James .....Hertford.
Ferrier, David .....Dundee.
Ferry, Robert Bailey .....Hartlepool.
Fowler, William Holman .....Southborough.
Fuge, Walter T. ....Leamington.
Gair, Emmeline Annie .....London.
Gall, Alexander .....Aberdeen.
Gauldie, Norman Lewis.....Dundee.
Greenwood, Willie .....Halifax.
Greig, John .....St. Andrews.
Hallett, William John .....Bristol.
Harding, Kendrick .....Warrington.
Harvie, Henry Taylor.....Helensburgh.
Hemming, William Hubert ...Birmingham.
Hepburn, Robert James K. ...London.
Hitchon, Peter.....Padiham.
Hogg, John .....Edinburgh.
Hoyle, Arthur ....Bradford.
Hughes, Henry .....Carnarvon.
Hughes, Robert Vaughan.....Glandovey.
Hughes, William Griffiths.. ...Manchester.
Hunter, Edgar Pearson .....Bingley.
Jenkins, Morris William .....St. Clears.
Jutton, Sidney Arthur .....Margate.
Kay, James ..... Cumnock.
King, John ....Wishaw.
Knowles, William Richard ...Earlestown.
Lammas Henry Herbert .....Loughborough.
Leigh, John ....Llanelly.
Leslie, George.....Denny.
Lloyd, Thomas Mainwaring...Liverpool.
Lowe, James .....Wigan.
McConnell, Thos. Alexander...Wallacetown.
MacDonald, Angus.. .....Coatbridge.
McEwan, William .....Banff.
McGregor, Duncan.....Dalbeattie.
MacHardy, William .....Inverness.
Mackenzie, Alex. Ballantyre...Inverness.
McLaren, May.....Ratho.
McRostie, James.....Stranraer.
Marshall, John George .....Alfreton.
Metcalfe, William Edward ...Levenshulme.
Milestone, Evelyn Stone .....London.
Mitchell, Benjamin Arthur ...London.
Mitchell, Peter .....Lochee.
Mcnaghan, John E. .....Glasgow.
Montgomery, Donald ..... Campbeltown.
Neal, David Thomas ....Waddon.
Nicholson, William Henry.....Guildford.
Oliver, John..... .....Holywell.
Oliver, John.....Bilston.
Orme, Arthur John.....Nottingham.
Packer, Frederick Ernest .....Norwich.
Parkhouse, Arthur E.....Salcombe.
Phelps, Charles .....Birmingham.
Pickavant, Henry .....Lathom.
Picken, Charles Reynolds .....Newport, Salop.
Pragnell, Lawrence Barrett....London.
Pretty, Clement John Robert..Rye.
Price, Clifford .....Abertillery.
Prince, John .....Chester.
Ramsay, Alexander Robertson.Manchester.
Richardson, Ada Frances .....Walsall.
Rhodes, John William .....Leeds.
Roberts, Charles Jordan .....Deptford.
Robinson, Robert .....Windermere.
Rogers, James William .....Sheffield.
Rolfe, John Thurlow Twaites..Diss.
Roper, William Isaac.....Plymouth.
Ryder, Joseph .....Buckie.
St. Cyr, Etienne Laurent N....London.
Scott, Walter Stanley .....Middlesborough.
Simpson, Gilbert.....Galashiels.
Slater, Ernest Henry .....Whittlesey.
Smith, Charles Monie .....Dundee.
Smith, Ernest Edward .....Bristol.
Smith, John Gordon .....St. Andrews.
Smith, Sidney Frank .....Penzance.
Smith, Sydney... .....Bournemouth.
Snowdon, William Hall .....Hebburn-on-Tyne.
Spear, Frederick Augustus ...Plymouth.
Spence, Edward .....Linlithgow.
Spencer, William Frederic ...Stratford-on-Avon.
Spreckley, Alfred Ernest ..... Leicester.
Stansfeld, Jessie .....Oxford.
Sturrock, James Nicolson Law.Linlithgow.
Swift, Ernest Radcliffe .....Huddersfield.
Tasker, Walter Arthur .....Goole.
Terry, Ernest Wayte .....Manchester.
Thame, Joseph William.....Banbury.
Thomas, Morris William .....Narberth.
Thomas, Thomas.....Brecon.
Thompson, George Pinder.....Malton.
Townsend, Percy .....Riding Mill-on-Tyne.
Wallis, Robert Acrid ... .Birmingham.
Watson, Lewis Gladstone .....Lowestoft.
Watt, Marshall Keith.....Dunecht.
Westcott, Warren Guy .....Basingstoke.
Whamond, Philip Maclagan...Galashiels.
Wherly, Charles .....Stockton-on-Tees.
Whineray, George Edward ....Kendal.
Whitchurch, Ernest William...Nottingham.
Whitehead, Herbert Joseph ...Birmingham.
Whitehouse, James.....Bath.
Willmott, Harold Ernest .....Darlington.
Wilson, Henry Augustus .....Kenilworth.
Wilson, John Oliver .....Oxford.
Wood, William Arthur .....Boston.
Wright, John .....Leicester.

The questions set at this examination were published in the *Pharmaceutical Journal* for October 17, p. 306.

The following is a list of the centres at which the examination was held, showing the number of candidates at each centre and the result:—

	Candidates.		
	Examined.	Passed.	Failed.
Aberdeen	15	9	6
Birmingham	19	12	7
Brighton	2	1	1
Bristol	5	4	1
Cambridge	2	0	2
Canterbury	2	2	0
Cardiff	6	1	5
Carlisle	3	1	2
Carmarthen	5	4	1
Carnarvon	3	1	2
Cheltenham	1	0	1
Darlington	4	2	2
Douglas	1	1	0
Dundee	10	8	2
Edinburgh	18	10	8
Exeter	3	1	2
Glasgow	23	15	8
Guernsey	1	0	1
Hull	1	0	1
Inverness	2	2	0
Jersey	1	1	0
Lancaster	3	2	1
Leeds	15	8	7
Lincoln	5	0	5
Liverpool	17	9	8
London	38	19	19
Manchester	27	7	20
Newcastle-on-T.	10	4	6
Northampton	2	1	1
Norwich	6	4	2
Nottingham	12	8	4
Oxford	7	5	2
Penzance	3	1	2
Peterborough	6	2	4
Plymouth	5	2	3
Sheffield	6	2	4
Shrewsbury	3	2	1
Southampton	6	1	5
York	3	1	2

Proceedings of Societies in London.

BRITISH PHARMACEUTICAL CONFERENCE.

A meeting of the Executive Committee was held at 17, Bloomsbury Square, on Thursday, October 22.

Present—Mr. W. Martindale, Vice-President, in the chair, Professor Attfield, Messrs. M. Carteighe, Gerrard, Hodgkin and Holmes, Mr. R. H. Davies (Hon. Treas.), Messrs. Naylor and Ransom (Hon. Gen. Sec.), and Mr. M. R. Johnson (Asst. Sec.).

The minutes of the last Committee meeting held at Cardiff in August were read and confirmed.

A letter from Mr. John Moss relative to the publication of Conference papers was read and considered.

The Secretaries were requested to confer with the editor of the 'Year-Book,' in order to arrange, if possible, for its earlier publication in the future.

The date of the meeting of the Conference at Edinburgh next year formed the subject of conversation. The members generally expressed the opinion that the first week in August, the time at which the British Association had decided to hold its annual gathering, would be inconveniently early. It was agreed to postpone the fixing of a date in order that the Scottish members may be communicated with.

Several gentlemen were duly elected to membership.

THE WESTERN CHEMISTS' ASSOCIATION (OF LONDON).

The annual meeting of the Western Chemists' Association was held on the evening of the 21st inst. at the Westbourne Restaurant, Spring Street, Paddington, nearly forty members being present.

The chair was taken by Mr. Long, the President, who congratulated the Association upon its continuous progress, and in a very able and earnest address strongly advocated earlier hours of closing, and urged the importance of unity and friendly feeling.

The Hon. Treasurer (Mr. J. H. Mathews) read the financial statement (the accounts having been audited by Messrs. Plaister and Taplin), which was received and adopted; it showed a slight balance due to Treasurer, which he explained was more than covered by amounts subsequently received from new members.

The Hon. Secretary (Mr. Andrews) gave a short *résumé* of the work of the Association for the year, and stated that there were now 120 members, and that new names were still being proposed. He also suggested that the annual dinner should be on November 18, which seemed to meet with general approval, and mentioned that there would always be a meeting of the Association in that room on the third Wednesday of every month, unless notice to the contrary was given.

The Committee for the ensuing year was appointed, viz., Messrs. Andrews, Arkinstall, Cracknell, Garner, Gulliver, Hickey, Holding, Horsley, Hyslop, Knight, Long, Martindale, H. Mathews, T. H. Mathews, Parker, Pickard, Spink, Sugden, Taplin, Thomas, Tupholme, and Worsley.

A proposed addition to the 8th rule of the Association was read, due notice having been given.

Mr. Watson said that by an oversight no power had been given to the Committee to remove any name from the list of members, and though he hoped and trusted that such an occasion would never arise, yet in the event of any member being guilty of conduct contrary to or subversive of the interests of the Society or violating its principles and regulations the Committee ought to have the power to remove his name from the roll of members. He therefore proposed that—

"The Committee at a special meeting called for the purpose shall, by the decision of a majority of not less than two-thirds of those present, have power to remove any name from the list of members."

Mr. Cawdell having seconded the motion, Mr. Spyer suggested that while having full confidence that the Executive would not act either harshly or unjustly, yet considering that five members of Committee were sufficient to form a quorum, it seemed to be giving very great powers into the hands of a limited number of persons. The President and Mr. Watson urged that as the Committee consisted of twenty-two persons, and that a special meeting must be called, the difficulty was sufficiently met. Several gentlemen took part in the discussion, and there evidently being considerable sympathy with Mr. Spyer's views, Mr. Robinson said he thought the difficulty could be overcome by a slight addition to the original motion, and he therefore proposed to insert after the word "present" the sentence "being at least twelve in number," when the amended resolution would read thus:—

"The Committee at a special meeting called for the purpose shall, by the decision of a majority of not less than two-thirds of those present (being at least twelve in number), have power to remove any name from the list of members."

Mr. Martindale seconded the amendment, which was passed *nem. con.*

A vote of thanks to the officers and Committee for their able management of the affairs of the Association was passed, and the business being terminated the remainder of the evening was passed in friendly conversation.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting held on Thursday, October 22, Mr. W. Lloyd Williams, A.I.C., President, in the chair, Mr. J. W. Stainer read a paper on "Some Pathology for the Pharmaceutist," and Mr. E. B. Sherlock read the Prize Essay on "Recent Advance in Pharmacy."

Some Pathology for the Pharmaceutist.

BY J. W. STAINER.

Excellent papers on urinary analysis, invaluable to those engaged in that important work, have been read before this Association by esteemed members, but very little has been said on the microscopical examination of deposits. This, however, is of as great importance as the chemical examination, requires greater care, more judgment, and no stint of time, and moreover it is too often neglected.

I should like to call your attention to a few points of this wide subject. Dividing the consideration of urinary deposits into two heads, let us first take those that occur in non-albuminous urines and then the more serious ones in albuminous.

I need not occupy your time in describing the various crystals that are to be seen, as a glance at a series of plates is more valuable that several hours of description. Their identification is valuable in cases of threatened stone, but too much importance must not be attached to their presence, as it is not necessarily an indication that those salts are being excreted in excess, as their precipitation is often due to the acidity or alkalinity of the fluid or the scanty elimination of water. A chemical estimation is the best way to determine the quantity of any particular salt. I should like, however, to call special attention to oxalate of lime, because a few facts unmentioned, so far as I know, in any work on the subject have come before my notice. Dr. Bowles, of Folkestone, drew my attention to a scum floating on the surface of a specimen and having all the naked eye appearance of the phosphatic scum so frequently met with in alkaline urines, and it would doubtless have been so considered by a superficial observer. The presence, however, of much oxalate of lime in the deposit aroused his suspicions, and an examination showed that the scum consisted of amorphous crystalline aggregations, which, on chemical analysis, proved to be

oxalate of lime. Similar concretions are often to be seen in deposits. Their identity is established by chemical test and by the presence of the octahedral crystals which invariably accompany them.

The pathological significance of oxaluria is debatable, but all seem to agree that it is associated with dyspepsia, and of course must be present in the formation of mulberry stone. Whatever may be its import it is always the duty of a careful examiner to note its presence and its form.

The microscopical examination of albuminous urines is far more important, and yet I can certainly say that it is very carelessly done, if not entirely neglected by a great many medical practitioners.

Some writers on the subject say that a minute quantity of albumen present in the urine is not necessarily a grave symptom, and advocate the acceptance of such lives by life assurance societies, while others say that the presence of albumen is always grave, and even the faintest trace should be looked upon as a danger signal; but all seem to think that the danger is enhanced when casts of the tubules are found in the deposit. Now after careful examination of such cases, extending over several years, I have only met with two or three samples of urine containing minute traces of albumen unassociated with tube casts, unless, of course, the albumen has been due to blood or pus, in which cases the corpuscles have been present. I have also seen many cases reported "occasional albumen, no casts," in which I have invariably found both albumen and casts. Some of these cases have steadily become worse, in others a correct diagnosis has resulted from careful examination and improvement has followed.

The following question requires an answer. Is the importance of the presence of hyaline casts in the deposit of albuminous urine over estimated? As I said before, in only two or three cases have I failed to discover hyaline casts in specimens free from pus and blood, which contained a faint trace of albumen. The conclusion to which I have come is this; that hyaline casts are a product of albumen, invariably associated with it, a sort of coagulum moulded to the shape of the tubules in which they are formed, and consequently that the presence of hyaline casts is of the same importance as the presence of albumen. Dr. Bowles, whose opinion in such matters is as weighty as that of any physician, assures me that in consequence of this careful examination he is convinced that the importance of hyaline casts has been overestimated, and that although they may indicate the initial stage of serious kidney disorder, on the other hand, they are often due merely to a chill or some other cause that produces a slight and temporary elimination of albumen. Be this as it may, the microscopist must not relax his energies in the slightest degree, for the question is a serious one and requires solution. Bright's disease must have a beginning, and surely it is more likely to be successfully combated in an early and insidious stage than when it has a fair hold on the kidneys.

The identification of blood discs and pus corpuscles I need not enter upon, except to mention the resemblance a peculiar modification of oxalate of lime has to the former; the crystals, however, are inclined to oval, and are more highly coloured. A good acquaintance with the epithelium of the urinary tract will enable one to localize inflammation. Degenerating epithelium or curled up scales must not be mistaken for tube casts, nor must aggregations of ill-formed crystals of oxalate of lime, which are really common and often mistaken for degenerating epithelial casts. For descriptions of the various tube casts and their significance reference is best made to plates and text books. Oil in fatty casts is recognized by focussing, for it darkens on depressing and becomes lighter on lifting the objective. Spermatozoa should always be noted in a report. Casts of the seminal tubes sometimes occur and simulate renal casts; they are, however, generally more contorted and associated with free spermatozoa. Extraneous matter sometimes gives much trouble. Lycopodium bothered me when first I met with it. I have seen men searching a urinary sediment with an inch objective. This is far too low a power, for with it one would fail to see the smaller hyaline casts. A quarter is the most useful power. Little light is much better than strong light, and day light than artificial light. On bright days I use a small hole in the diaphragm.

I have gone somewhat lengthily into the subject of urinary sediments, because I think that urinary analysis is the work most likely to fall, and indeed is falling into our hands. Other spheres of usefulness that we may enter upon I will mention more briefly.

Since the grand discovery by Dr. Robert Koch that a bacillus is the cause of tuberculosis, its demonstration in the tissues has become most valuable in diagnosis. This indeed makes an opening for us, especially for those of us who live in the country, where no expert pathologist is at hand, for most medical men lack the manipulative skill or the necessary time, or sufficiently good optical aid to enable them to undertake this work for themselves. Sputum, of course, is the most frequent test object, and it is the easiest one to get on with. The bacillus has also to be sought for in purulent discharges, urinary sediments, and in the tissues themselves. To demonstrate the existence of this organism it is necessary to resort to one of the many methods of staining, descriptions of which may be seen in books on the subject. The method that I have adopted is that of Dr. Gibbes, as it is quick and yields very good results. A thin cover glass, previously washed in dilute HNO_3, is smeared over on one side with the suspected matter (sections require slightly different treatment) and allowed to dry. A few drops of double stain are then boiled in a test tube and poured out on to a watch glass. The prepared cover glass is then floated on to the hot fluid and allowed to remain for five minutes, after which it is removed and excess of colouring matter is washed away in spirit; the cover glass is then allowed to dry and is mounted in Canada balsam. The washing is the part of the process that requires most care, as upon it a good result depends. A quarter of an inch objective, if it be a good one, will show the bacilli, but a higher power is better. Proper illumination is the great thing. A substage condenser is essential, and I find artificial light superior to daylight. A twelfth of an inch immersion lens is good for reference, but is not so useful for surveying the field.

Another parasite of rather larger dimensions and a few steps higher in the scale of development is the ringworm.

Ringworm can be often only satisfactorily proved by an appeal to the microscope. The hair, which should be plucked out by the root, must be soaked with dilute KHO for several hours, then gently flattened and examined with $\frac{1}{4}$ in.

The mycelium of this fungus is not always easy to find, but the presence of the spores is sufficient for diagnosis.

To pass from vegetable parasites to animal.

It is a source of comfort to the patient and satisfaction to the physician to know when the head of the tape worm has been expelled. To become familiar with the naked eye appearance of this fellow is fairly easy, but to see the suckers, or suckers and hooklets with the microscope, makes assurance sure, and traces the origin of the unwelcome guest to beef, pork, mutton.

I once had submitted to me an ounce or so of excreted stuff that the sufferer's attendant thought was

tape worm and might contain the head. It was garden rhubarb, and the action of the alimentary canal had been to render the spiral vessels beautifully clear and distinct. I mounted some, but have lost the slides. They would make good conversazione objects.

To discover hooklets in fluid drained from the liver or elsewhere is to establish the morbid growth as hydatid. Pieces of the body wall of these creatures will sometimes escape through the drainage tube and may be identified by their laminated structure, sometimes by the naked eye and a pair of forceps, always by a rough section and a low power of the microscope.

Placenta tissue is easy to recognize. It wants teasing out a little with needles, staining with hæmatoxylin or some other stain, and mounting in a suitable medium, when an inch objective will show the chorionic villi and leave its identity beyond a doubt. Blood clots commonly escape from the same locality, but the microscopic appearance of them is of course very different.

Recognition of early fœtal life is sometimes a matter of some importance. It is easily made out by careful manipulation and the use of a hand lens.

A careful examination of vomit will sometimes throw important light upon a case.

Morbid growths in their great variety of characters demand the knowledge gained by practical experience. Some of them are soft enough to admit of microscopical examination with very little preparation. Soft tumours are of this sort. A piece the size of a pin's head is teased out, stained with a staining reagent, covered with a cover glass, and gently flattened by the thumb nail. Examination with a quarter will then determine the nature of the cellular elements of the body, and an opinion of its malignancy may be formed which will determine the action of the surgeon and the hope of recovery for the patient.

Most morbid growths will not lend themselves to this treatment, and the more difficult and lengthy process of hardening and of cutting sections has to be resorted to. The names of the commonly used hardening fluids we are all familiar with, and also with the methods of cutting sections. A little painstaking ensures a fairly good result, and in a short time one may be able to recognize the various tumours, fatty degeneration, tubercular disease, syphilitic gummata and many other of the more marked morbid changes.

My paper has been of a very fragmentary nature. The various subjects upon which I have touched deserve much fuller treatment by an abler exponent. My object has not been to attempt to deal fully or systematically with any of them, but merely by mentioning them to point out a line of advance along which we may march with pleasure and profit to ourselves, giving precision to the science of medicine and helping to alleviate the sufferings of mankind.

The President then called upon the meeting to discuss the very interesting paper Mr. Stainer had read.

Mr. Sherlock stated that he had lately had to deal with specimens of urine from one person, in which there was always a deposit of uric acid, sometimes abundant, sometimes starchy, and that the crystals were very various in their size and shape, and asked for a method by which the quantity could be estimated and a reason for the difference in shape that the crystals assumed.

Mr. Stead remarked on the amorphous aggregations and ill-formed crystalline forms of oxalate of lime, and inquired whether any means could be adopted, other than recrystallization, to bring about their proper form. He mentioned the debatable import of traces of albumen and the difficulty of recognizing faint hyaline casts, and asked for a method of demonstrating the existence of blood in stale specimens.

Mr. Seecombe asked whether the presence of white blood corpuscles had any particular significance.

Mr. Taylor spoke of a case that had come before his notice, in which ropy shreds were found, and inquired what it was, and asked what reliance could be placed in yeast as a test for sugar.

The President, in closing the discussion, said it was sometimes remarked that the pharmacist had stolen the clothes of the medical profession, and when the title of Mr. Stainer's paper was announced it looked as though he would encourage the abstraction of a further portion of the physician's property. Mr. Stainer's treatment of his subject, however, had entirely removed any suspicious feeling that might have arisen, and as a typical pharmacist he recognized the vital importance of assisting the medical man. The paper indeed was a most valuable contribution to their knowledge on the subject of urinary analysis, and it formed a fitting appendix to communications which had been made to the Association in former years on other branches of the same subject. It was yet another forcible illustration of the value of the microscope—a value, he was glad to say, which became more widely recognized every day—and such knowledge as Mr. Stainer possessed must inevitably tend to lift their calling to the level of a profession, because it demonstrated to the educated mind that they were actually furnished with the love and skill with which the professional man was most properly credited. Commenting upon some of the details of the paper, the President remarked that the question of traces of albumen had been much discussed, and so far as he had been able to gather, it was still unsettled, one school regarding the presence of albumen in urine as damning the patient, the other looking upon the matter more leniently. Very much the same state of things existed in regard to traces of sugar in urine, but of course the province of the pharmacist ended with his report, and the responsibility of diagnosis rested solely with the medical man. After alluding to the detection of bacilli in sputum, and remarking upon the suggestive character of the paper generally, Mr. Williams concluded by congratulating Mr. Stainer upon the loyalty to the Association which he exhibited by coming up from Folkestone, where he lived, for the express purpose of reading his paper.

Mr. Stainer, in reply, said that the deposition of uric acid was so much dependent on the acidity of the urine that a good opinion of the quantity could not be formed from the amount of red grains. A rough method of estimation could be resorted to by adding hydrochloric acid and methylated spirit, by which means nearly all the uric acid was precipitated. A more exact method was that of Haycraft. The cause of variety of forms of uric acid crystals, he believed, could not be explained. Pure, well-formed crystals of oxalate of lime could not be obtained from amorphous aggregations, unless by recrystallization. In stale urines blood discs were sometimes altered, the characteristic form being changed, the edges becoming crenate and the appearance uniformly yellowish. Crystals of hæmatin were often found under such circumstances. White blood corpuscles only occurred in deposits when red ones did, and were of the same significance. The ropy shreds were doubtless mucous. Yeast was a very reliable test for sugar and made a good appeal test when there was any reason to mistrust Fehling, which was reduced by other substances besides sugar.

The President called for a very hearty vote of thanks to Mr. Stainer, which was carried with acclamation.

The Prize Essay on Advances in Pharmacy.

Mr. Sherlock then read the essay on "Advances in Pharmacy," for which he had been awarded the prize offered for the best essay on the subject.

The essay consisted of a *résumé* of the principal incidents in connection with pharmacy in this country during the year 1890 and the present year up to the time of the celebration of the jubilee of the Pharmaceutical Society. On the ground that what constitutes an "advance" would be a point upon which pharmacists would not be in agreement, the author said he had made an effort to record all matters of moment connected with pharmacy, especially as found in this country, without debating whether they might be signs of progress or retrogression. Political topics were first dealt with, the order being the Pharmacy Bill, the compulsory curriculum, the Preliminary examination, the subscription to the Pharmaceutical Society, the Pharmacopœia committee, the new schedules, the research laboratory, the "seller" judgment, the election of local secretaries, the proposed bye-laws, the jubilee, and provincial meetings. A brief summary was then given of the new synthetical remedies and of researches in materia medica, followed by some notes on new apparatus. The essayist then diverged again into political topics, such as the Weights and Measures Act, and pharmaceutical affairs in Ireland, Canada, Australia and the United States. After a reference to tuberculin and other remedies for tuberculosis, the essayist concluded with an account of recent efforts to obtain fresh legislation relating to pharmacy in France.

The President, with a few appropriate words, congratulated Mr. Sherlock, and addressing the meeting said that he hoped they would have a good competition this session for the Association's prizes, pointing out their value and the advantages accruing to the successful candidates.

The proceedings then terminated.

Provincial Transactions.

BRIGHTON JUNIOR ASSOCIATION OF PHARMACY.

The usual weekly meeting was held on Wednesday, October 21, at the Sillwood Terrace room, when there was a good attendance, the President, Mr. Kilby Pears, jun., in the chair.

Mr. Marshall Leigh read the following paper on—

The Sale of Poisons.

By the passing of the Pharmacy Act, 1868 (otherwise entitled "an Act to regulate the sale of poisons and alter and amend the Pharmacy Act, 1852"), the Legislature provided that special care should be taken in the sale by retail of certain poisons, and selected chemists, probably on account of their education and training, to take charge of such sales.

By the passing of that Act, a trust was placed in the hands of chemists to supply the legitimate wants of the community, and prevent the sale of poisons for illegal and improper purposes or to irresponsible people.

Whilst the Act involved large responsibility, it secured chemists a legal position, the monopoly of the sale of poisons, and the dispensing of prescriptions containing poison.

The sale of poisons was made a public trust, not to be flinched from, but faithfully discharged by the carrying out of all legal requirements.

The duties of chemists in relation to the sale of poisons are briefly—

(1) To protect the public from designing persons.

(2) To place no unnecessary difficulty in the way of those who require poisons for legitimate purposes.

Under the Act, certain precautions in the sale are ordered to be taken, and it is the first duty of the chemist, when a sale is made, to see that these precautions are complied with.

The legal poisons are enumerated in schedule A, and are divided into two classes, I. and II., and are as follows:—

Part I.

Arsenic, and its preparations.
Aconite, and its preparations.
Alkaloids:—All poisonous vegetable alkaloids and their salts.
Atropine, and its preparations.
Cantharides.
Corrosive sublimate.
Cyanide of potassium, and all metallic cyanides and their preparations.
Emetic tartar.
Ergot of rye, and its preparations.
Prussic acid, and its preparations.
Savin, and its oil.
Strychnine, and its preparations.
Vermin killers, if they are preparations of poisons the preparations of which are on this list.

Part II.

Almonds, essential oil of, unless deprived of prussic acid.
Belladonna, and its preparations.
Cantharides, tincture, and all vesicating liquid preparations thereof.
Chloroform.
Chloral hydrate, and its preparations.
Corrosive sublimate, preparations of.
Morphia, preparations of.
Nux vomica, and its preparations.
Opium, and its preparations; and preparations of poppies.
Oxalic acid.
Precipitate, red (red oxide of mercury).
Precipitate, white (ammoniated mercury).
Vermin killers. Compounds containing poisons, prepared for the destruction of vermin, if not in Part I.

None of the articles enumerated in Schedule A, Part II., may be sold retail unless labelled with the word "poison," and the name and address of the seller. Whilst the more powerful poisons mentioned in Part I., besides being subject to the regulations already mentioned, may not be sold retail to any person unknown to the seller, unless introduced by some person known to him. For every sale of any such poison, the seller must before delivery make or cause to be made an entry in the book to be kept for the purpose, of the date of sale, the name and address of the purchaser, the name and quantity of the article sold and the purpose for which it is stated to be required. To this entry the signature of the purchaser and of the person, if any, who introduced him must be affixed.

For the sale of arsenic or any of its preparations, in addition to all the regulations applying to poisons in Schedule A., the following provisions of the Arsenic Act must be observed. The poison, if colourless, must be mixed with soot or indigo to colour it. The person to whom it is sold must be of mature age. The occupation, as well as the name and address of the purchaser must be entered in the poison book. When the purchaser is not known to the seller, and is introduced by some person known to both, this person shall be present as a witness of the transaction and shall write his name and address in the poison book.

There are certain exemptions to these regulations. The Act intends no interference with the business of legally qualified medical practitioners, apothecaries or veterinary surgeons; with making or dealing in patent medicines, or with wholesale transactions.

None of the regulations apply to any article forming part of the ingredients of any medicine dispensed by a registered chemist and druggist, but if a medicine contain a scheduled poison, the ingredients of the

medicine, together with the name of the person to whom it is sold, must be entered in a book kept for that purpose (prescription book), and the name and address of the seller must be attached to the medicine.

In addition to the careful fulfilment of the directions laid down by the Legislature, we are expected to use our knowledge and skill to provide against the misuse of poison for criminal purpose, as suicide, or secret poisoning, and against accident.

In regard to the first, in this country, year after year, more than 1500 men and women seek a refuge in death, of these between 200 and 300 take poison.

Most suicides belong to the class of irresponsible beings whose deficient mental organization incapacitates them from being safe custodians of their own lives. The causes of suicide are in most cases the same as drive people to madness, so we must beware of selling poisons to people of unstable mind—the hypochondriac and the semi-insane and the drunkard.

In regard to secret poisoning, fortunately, the cases are very rare, and the chemist would hardly be expected to divine the intention of such poisoners as Dr. Lamson or Mrs. Maybrick.

The fear of detection is the only deterrent, and one of the greatest services modern science has rendered to mankind is that it has made secret poisoning without detection almost impossible. Dr. Meymott Tidy says, "Science follows the traces of secret treachery with a bloodhound scent, and will ultimately repress entirely the crime of poisoning." What steps can be taken to prevent accidental poisoning?

With regard to the scheduled poisons we cannot do much more than faithfully carry out the directions of the law; but for poisons not included in the schedule, such as carbolic acid, spirit of salts, sulphuric acid, etc., and which are frequently the cause of accidental death, we think that much greater care should be taken than is sometimes done.

These substances should never be sold in cups, ginger beer or beer bottles, or even ordinary medicine bottles. The public should be induced to purchase proper poison bottles, and they should be sent out clearly labelled "poison," with the name and address of the seller. By the precautions which most chemists take in the sale of these unofficial poisons, they set a good example to other traders, which I fear is not often followed. Other traders do not feel any responsibility; it is with them simply a commercial transaction, and they naturally choose the cheapest and easiest way of supplying customers. Meanwhile from 50 to 100 deaths of the most agonizing character are officially declared annually due to carbolic acid. Until these dangerous things are placed in the schedule of poisons, and their sale confined to chemists, the number of accidental poisoning cases will not decrease.

It is also known that many (unregistered) traders supply scheduled poisons with a carelessness most appalling. I refer especially to the sale of weed killers by gardeners and seedsmen. The preparation called "weed killer" has been proved to be a strong solution of arsenic, and this has been freely sold in pennyworths and twopennyworths in cups and glasses, without label.

With a reckless disregard of consequences this preparation has often been prepared of the colour of beer and sent out in beer casks, thus making it very liable to be drunk in mistake.

Only last week, at Crowborough, in our own county, a gamekeeper died, and his wife and four relatives were made seriously ill, by drinking gooseberry wine that had been stored in a barrel formerly used for the weed killer.

Three weeks ago, at an inquest at Teignmouth, the evidence showed that a gardener sold a strong solution of arsenic for use as a weed killer, and not having in stock a suitable vessel to deliver it in, he forwarded it in a watering can by a boy. The watering can was left unattended on the road, and a little boy, aged nine years, thinking it was water, drank some and died the same day.

It is quite time that the sale of powerful scheduled poisons by unqualified men was put down with a very strong hand.

It is quite true that the Council of the Pharmaceutical Society is taking the matter up with a view to stopping the careless sale of powerful poisons by gardeners and nurserymen, but they only hear of cases where there is an inquest.

It must be remembered that the trade in weed killers is a very large one, and if chemists (especially in the country) would lay themselves out to supply it, there is no doubt that its distribution would soon come into their hands exclusively.

Let us now direct our attention to two or three knotty questions relating to the sale of poisons and arising in the interpretation of the Act of Parliament.

For some twenty years after the passing of the Act it was generally believed that assistants and apprentices in the shop of a chemist were entitled to sell poisons, until in September, 1889, a case arose in which a youth called Wheeldon sold a servant girl a packet of vermin killer containing strychnine, he being at the time an unregistered assistant and in sole charge of the shop. The case was brought to the notice of the Pharmaceutical Council, with the result that proceedings against the youth were taken in the Wandsworth County Court, and he was fined, the judge remarking "The Act says that any unqualified person who sells poison is liable to a penalty of £5. The person who sells is liable, whether he is master, or servant, or apprentice."

The decision was appealed against in the Queen's Bench Division of the High Court, before Baron Pollock and Justice Hawkins. The court held that the county court was right and dismissed the appeal. This decision was based on the 15th section of the Act, and it practically decides the question. Now, not only the owner of a shop must be registered, but the assistant who sells or hands over the poison to a customer must be registered too, unless he acts under the supervision of a qualified person.

It seems that the decision does not affect the dispenser of medicines; that is, an assistant need not be qualified if his duties are merely dispensing and not selling. It appears rather anomalous that the selling, which requires little skill, should require qualification, whilst the dispensing, which requires considerable skill, can be performed by unqualified men. I think that there is no doubt that in future years the 15th section will probably be read so as to cover the dispensing and compounding of poisons. The words of the 15th section run "any person who shall sell or keep an open shop for the retailing, dispensing, or compounding poisons." By the Wheeldon decision the word "sell" is separated from the others, and represents a separate offence. By and bye, perhaps the words "compounding poisons" will be separated from the context, and then every dispenser will have to be qualified.

Lord Selborne in his judgment in the "London and Provincial Supply Association" case seems to me to indicate this solution of the question. He says, "The act of selling, the act of compounding, and every other act mentioned in these sections (1 and 15) is struck at, whether done by a principal to whom the business belongs or done by the person whom he employs to carry on the business."

In section 16 there are a number of exemptions. One of them is as follows:—"Nothing hereinbefore contained shall extend to or interfere with . . . . the making or dealing with patent medicines." This exemption of patent medicines from the restrictions

placed by the 15th section on the sale of poisons was introduced to buy off the opposition of the patent medicine makers and vendors to the Bill. At the time of the passing of the Act there is no doubt that the words "patent medicine" were understood to mean all medicines bearing a medicine stamp and sold under a stamped medicine licence. Recently a high authority has put a fresh interpretation on the phrase. Mr. E. N. Alpe (of the solicitors' department of the Board of Inland Revenue) states in his "Handy Book of Medicine Stamp Duty," "The meaning of the technical phrase 'patent medicine' has not yet been the subject of judicial interpretation; but there can be scarcely any doubt that it covers only those preparations which are strictly patent medicines, that is, medicines sold under the authority of letters patent."

If this view is the legal one, and if it is sanctioned by a high court of law, the effect will be to restrict the sale of stamped medicines containing scheduled poisons to registered chemists and druggists.

It is quite certain that there are medicines sold under the medicine stamp which contain powerful poisons, and which are now sold by anybody who has a licence and in any quantity.

This is an anomaly that ought not to exist any longer; the sale of stamped medicines containing poisons should be restricted to chemists. In the meantime, before a judicial interpretation of the term has been obtained, I think we should label notoriously dangerous stamped medicines with the word poison and the name and address of the seller.

But the question arises, "What quantity of poison in a mixture will make it desirable for it to be labelled 'poison'?"

It is impossible to give a definite reply to this question.

The legal decisions afford us some direction.

In 1882, a chemist was prosecuted for selling "Hunter's Solution of Chloral" without a poison label or the name and address of the seller, and was fined.

In 1889, for selling cough linctus containing $\frac{1}{2}$-grain of acetate of morphia in the ounce not labelled poison, a chemist was fined at the Mansion House police court.

It was stated in court that all persons selling proprietary medicines were bound to take this precaution, if the medicine contained any poison scheduled under the Act.

It seems to me that it does not certainly follow, that because a medicine contains a small proportion of a scheduled poison, the compound is a poison. Many proprietary medicines contain minute quantities of poison and are as harmless as paregoric lozenges.

In the addition of a poison label every chemist must exercise his own discretion, labelling those which he has reason to believe are of a dangerous character.

A question related to this came up almost as soon as the Pharmacy Bill became law. The question was whether chemists must apply the word poison to preparations which are comparatively harmless, such as paregoric elixir, etc., and the Pharmaceutical Society, taking up the matter, communicated with the Privy Council and received the following reply from the medical department:—

"My Lords having given their best consideration to the subject, are of opinion that the 'preparation' of a poison in the Pharmacy Act, 1868, means a compound which, like the poison of which it is a preparation, is in itself deadly or dangerous, and that it does not seem a compound which is in itself perfectly harmless, although into its composition may enter a poison or the preparation of a poison, which taken alone would be dangerous or deadly.

"It seems to their Lordships that for general purposes, and as matter for legal interpretation, extreme and barely supposable cases may be disregarded, and that the Pharmaceutical Society may safely act upon the test given.

"My Lords, however, are advised that it is not feasible to define the precise proportion of poison in any preparation which may bring it within the meaning of the Act.

"I am, your obedient servant, JOHN SIMON."

In regard to chemists own specialities, like cough mixture, which often contain a scheduled poison, the same rule holds good.

If it contains sufficient to make it a deadly and dangerous preparation, it ought to be labelled "poison," and any chemist issuing or selling it without one, and an accident occurring, will be liable to penalties.

Dispensing.—The dispensing of medicines containing poisons (whether prescribed by medical practitioners or chemists) is excluded by special provision from section 17. It runs thus (with certain words left out which do not apply):—"The provisions of this section . . shall not . . apply to any article when forming part of the ingredients of any medicine dispensed by a person registered under this Act, provided such medicine be labelled with the name and address of the seller and the ingredients thereof be entered with the name of the person to whom it is sold or delivered in the book kept by the seller for that purpose."

With most prescriptions there is no difficulty, but occasionally undated and unsigned prescriptions are handed in that are simply and solely poisons or powerful preparations of poisons. This we should not dispense without some evidence of their genuineness. If that is not forthcoming they should be treated in all respect as scheduled poisons. Then, again, it has often occurred to me that many patients have dangerous medicines supplied them years after the physician prescribed them. I refer specially to "hypodermic solution of morphia" and "solutions of chloral hydrate."

It is difficult, nay, almost impossible, to refuse, especially in cases where the patient asserts that he has taken the prescription for years. In some cases it would be kind to the patient as well as on the safe side for the chemist if the medical prescriber was privately communicated with.

In conclusion, the Pharmacy Act has been called a "wretched Poison Act." I do not agree with the term, because it affords the public a great degree of protection, whilst it also gives to chemists certain privileges. Those privileges would be greater if the Act was more enforced. Everything in the poison schedule, and many things not in that schedule, should be sold only by chemists.

The large trade in weed killers, arsenical fly-papers, sheep dips, etc., should all go through the chemists' hands. In order to do this the chemists themselves must be prepared to supply them to people requiring them for lawful purposes.

By care in handling and labelling chemists should make the sale of these things as different as possible from that of the present dealers; they will then confer a benefit on the public as well as themselves.

I need hardly point out to you the importance of your duties as sellers of poison.

The Legislature has selected us as a body of educated and reliable men to conduct the sale of poisons. We hold it as a trust to the public not to rashly sell them, but as faithful stewards to exercise every care that persons who require them for legitimate purposes shall be able to obtain them without trouble, and that those who wish to use them for mischievous or malicious purposes shall not be able to get them. In a word, we must make it "Easy to do right and difficult to do wrong."

At the conclusion of the address a vote of thanks was awarded to the author.

MEETING OF CHEMISTS AND DRUGGISTS AT WINDSOR.

A meeting of the pharmaceutical chemists and chemists and druggists of Windsor was held on Wednesday evening, Oct. 21, at the house of the Local Secretary of the Pharmaceutical Society (Mr. C. J. L. Russell), who, having filled the post for about thirty years, desired to tender his resignation, but was unanimously solicited to accept office for another year.

A resolution was also passed to request the President and Council to take into consideration the operation of the "Pharmacy and Poisons Acts" for a more complete controlling of the sale of all proprietary or patent medicines, whether stamped or unstamped, which contain any poisons scheduled in those Acts.

LIVERPOOL PHARMACEUTICAL STUDENTS' SOCIETY.

The usual fortnightly meeting of this Society was held on Thursday, the 22nd inst., Mr. Harold Wyatt, jun., President, in the chair. There was a good attendance.

The President, on calling upon Dr. Symes to deliver his address, remarked that it was customary for the President of such a society to deliver an inaugural address, but he did not object, and he was sure the audience would not object to Dr. Symes doing so in his place.

Dr. Symes remarked that it was growing extremely difficult to find fresh matter for addresses on pharmaceutical topics, but he would offer some remarks, the result of observation and experience, which he trusted would be of interest to those present. No two persons were exactly alike, and the same might be said of personal experiences. Often, too, the deductions drawn from similar experiences varied according to the observer. Mr. Proctor had recently given an excellent address to the students of Newcastle, and had shown how early in life he had adopted the experimental method for the acquirement of knowledge. Reading this called to his memory an experiment which he made with a toy drum on sound when about 8 or 9 years of age, since which time he had made others of a more complex kind. Mr. Proctor's experience led him to advise his hearers not to trust anybody's theory or anything without thoroughly testing it oneself. He, however, had come to the conclusion that to test everything properly involved an amount of knowledge which few, if any, possessed, and occupied time which one could ill-afford to spare out of an ordinary lifetime; that it was better to accept as correct all well authenticated statements until they were proved to be inaccurate, and devote one's time to assisting in building up the great temple of knowledge, and thus serve our day and generation. That night, he said, they were a meeting of pharmacists. In a general way they were interested in the welfare of their fraternity. They desired to keep pace with the progress made by the pharmacists of other nations, and with the demands made on them by the medical profession and public of their own country. When any measure in Parliament threatened to interfere with their existing interests or to curtail their liberties in the future, they joined hearts and hands in protesting, and much as might be said about the indifference of Parliament to pharmaceutical interests they rarely protested in vain. When, however, all was peaceful without they had rarely any difficulty in finding a grumble within. Dr. Symes then referred to the complaints against the Pharmaceutical Society, and showed that many of them were groundless. He thought, however, that everyone ought to have an interest in the society, and he presumed that they knew he held an opinion that everyone who passed the qualifying examination should be elected a member of the Society without an annual subscription. Even as matters stood he thought the Society was not altogether free from responsibility toward those it examined and received fees from. He then considered some points of difference with regard to prices, dispensing, closing, etc., which are bones of contention between the various classes of chemists and druggists, and the recent discussions and correspondence as to difficulties between principals and assistants. He thought all these differences if they existed to any extent (which he scarcely thought to be so) could be settled by friendly means, and he thought the proposal "to go on strike" an unwise one, and inconsistent with their position as gentlemen. Their position was one of transition, and soon most of them would become principals; they should now ask themselves what would be their opinions then? He then considered the question,—is pharmacy worth following? And spoke in hopeful terms of its future. He urged young pharmacists to cultivate a habit of observation and preparedness for such opportunities as might present themselves in life, and in conclusion reviewed the work and position of the Society, which he considered satisfactory.

A vote of thanks and discussion followed, in which the President and Messrs. Johnson, Wokes and Mitchell took part.

The Secretary intimated that the President and a well-known Liverpool dentist offered prizes of £1 1*s*. each for essays, the subjects for competition to be decided by the Council.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The first ordinary meeting of the session was held in the rooms, 74, Commercial Street, Dundee, on Thursday evening last, 22nd inst. There was a large attendance, and an address was delivered by the President, Mr. James A. Kinnear. Having thanked the members for having placed him in that honourable position, Mr. Kinnear said that with all young societies the second and third years were the most critical of their lives. As the novelty of the first year wore over members were apt to say that it was the same thing over again, and it was by their presence and self-sacrifice, so to speak, that continued success could be assured. He considered it no sacrifice, however, to give up other engagements, or rather not to make them for one night a week. It was their presence and interest in the work that acted as a stimulus to others, it was this which made the Society—it was not a nicely got up syllabus with the name of this big man and the next to give a paper. Being in its chrysalis state the Association required the best talent available, and it was essential that those who had been elected to the executive should exert what abilities they possessed to the utmost. Similarly the members were in duty bound to support those whom they had chosen. The President then proceeded to a review of the Association since its inception. He epitomized the work which has been accomplished during the past two sessions and sketched in detail that proposed to be done during the session just opened. The ten minutes proposed to be devoted at the beginning of each meeting to miscellaneous subjects he thought a valuable suggestion, and he hoped it would be taken advantage of by those who felt shy at taking the floor for the first time. Those who were old hands on the floor he would ask to remember that they were once beginners themselves and to be lenient but just in their criticism, lest by being too severe they might deter beginners from future efforts. "Be merciful, though ye be strong." The address was listened to with marked attention and Mr. Kinnear was heartily thanked for the trouble he had taken in preparing it.

Most of the members present expressed their appreciation of the very practical address to which they had listened.

On the motion of the Secretary (Mr. Mair), Mr. Thomas Maben was unanimously elected an honorary member of the Association.

Mr. Maben has offered an extra prize to be competed for by the Association classes, in addition to those already announced.

NEWCASTLE-ON-TYNE CHEMISTS' ASSISTANTS' AND APPRENTICES' ASSOCIATION.

The second meeting of the session was held in St. Nicholas Café, on Wednesday, the 21st inst., at 8.15 p.m. Mr. G. F. Merson, President, in the chair.

The minutes of the previous meeting having been read and approved of, the President called upon Mr. F. Park, ex-President of the Association, to read a paper on "The Chemistry of Photography."

At the conclusion of the paper, which will be published in a future number, the President proposed a cordial vote of thanks to Mr. Park for his paper, and that the discussion be held over until next meeting.

Mr. A. R. Bennet seconded the motion, which was supported by Messrs. Kellet, Ord, Pattinson, Pescod and Strother.

Obituary.

Notice has been received of the death of the following:—

On the 13th of October, Mr. Arthur Dale, Chemist and Druggist, Bridge Street, Leeds. Aged 61 years.

On the 23rd of October, Mr. Robert Colling, Pharmaceutical Chemist, Stockton-on-Tees. Aged 39 years

---

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Election of Local Secretaries.

Sir,—The election of local secretaries is one of the most important of the Society's duties. To them the trade must look to report any illegal trading. Instances are not wanting in almost every town of ironmongers, grocers, photographic dealers, and others daily dealing in poisons of many kinds, to the serious detriment of the public safety, the deterioration of the chemist's business, and the want of popularity with the trade of the Society, whose duty it is to take action against illegal transactions in poisons when authentic information is furnished.

It is obvious that delicacy and other considerations ofttimes deter private individuals from giving that necessary information, therefore it should be distinctly understood that those who are appointed to represent the Society's and the trade's interest locally should be prepared, willing and anxious to do all in their individual official power to investigate all rumours of infringement of the Pharmacy Act in their respective districts, as far as is necessary, to enable them to furnish the officials at headquarters with such information as shall lead to the conviction of offenders more often than is now the case.

This is a matter of trade interest, and would be the means of inducing very many who now remain outside the Society to join, and aid by their subscriptions the Society's efforts to protect the trade and raise its status.

How often do we hear it said, "Why should I join the Society? What benefit do I gain by passing its examinations to qualify me to deal in poisons, when my neighbours sell indiscriminately and without any restraint such things as I am obliged to register, and whose profits are not regulated in any way by a consideration of time and money spent in the acquiring of any technical knowledge which chemists possess?" A great deal of the Society's success depends on the energy of its local secretaries. Can we wonder at the small number who enroll if its local representatives are apathetic?

Newquay, Cornwall. C. E. Pickering.

Sir,—In a recent Journal "Progress" details a few shortcomings of our local secretaries. I have yet another to add to the list.

In the town where I live, several grocers sell oxalic acid quite freely and openly—one even has it in his price-list. The local secretary must surely be aware of this state of matters; but how can he, presuming he is a conscientious man, take steps against these law-breakers when he has a habit of going out of town for two or three weeks at a time, leaving only a young apprentice in charge of his business? Apprentice.

The Benevolent Fund.

Sir,—Permit me to direct the attention of your readers to the above fund. It is the grandest object connected with the British Pharmaceutical Society. Its management reflects the greatest credit on the Pharmaceutical Council, and I should like to know why every registered chemist does not give something to it? No one knows but that himself or his family may some day be anxious applicants for its aid, and it is while blessed with health and prosperity that we should remember to give, as we may not have the opportunity of doing so in the future. Should we never require the assistance of the Fund so much the better for us; but still it would be, even from a selfish point of view, a wise provision to make; better than any life insurance policy for £1000, on which we might not always be able to pay the premium, for if that sum were safely invested it would scarcely yield more than each annuitant receives at present from this Benevolent Fund. Moreover, every one should remember that those who contribute, should they ever become applicants, stand a much better chance of being elected than those who do not, and this is very proper. No chemist should miss an annual subscription of 2*s.* 6*d.* or 5*s.* Very many could give donations of five guineas, ten guineas and upwards, which would constitute them life members and entitle them to an equivalent number of votes annually. By doing this they would never feel themselves one penny poorer, for it is a true proverb that "it is more blessed to give than to receive."

Belfast. A. McNaught.

The Sale of Poisons.

Sir,—It is to me a matter of no little surprise that the paper on the "Sale of Poisons," read by Dr. Danford Thomas at one of the sectional meetings of the Hygiene Congress, should have been passed over without further notice, or without any attempt being made to emphasize the conclusions at which he arrived. It may be that, as chemists, we are disinclined to move in a matter in which to a certain extent we are pecuniarily interested, but we can at least give our testimony in favour of regulations or restrictions which aim at the saving of life without laying ourselves under any reproach, except from a carping criticism which may well be disregarded.

Dr. Thomas throughout his paper spoke as a coroner, and solely from a coroner's point of view; he therefore did not refer to the many cases of poisoning, accidental or otherwise, which just stop short of fatal results, and therefore do not pass in review before a court, or find publicity in the daily newspapers.

Chemists know very well that for every case in which death follows the administration of poison, twenty probably happen in which the patient is either just snatched from death by prompt and skilful treatment; or the dose, although too small to endanger life, is yet large enough to produce serious after effects. Many a fine constitution has been shattered, many a life shortened and indirectly sacrificed by such mishaps, and surely cases of this kind should be taken in consideration as of some weight. Accidental

doses of carbolic, oxalic and the mineral acids result in shocks to the system from which recovery is but slow; while salivation by white or red precipitate, or corrosion by liquid ammonia (not a legal poison at all) often leave behind lifelong pain and misery.

Another matter for consideration is the exemption of the wholesale trade from the provisions of the Poisons Acts. As occasionally accidents are traceable to an error or oversight on the part of some employé in a wholesale house, why in the name of common sense should the retail chemist be supposed to play the part of watch-dog and take both risk and blame? One would suppose, whether compelled by law or otherwise, wholesale druggists would at least take common precautions, but we find a poison label so rarely attached to a bottle that a strong prejudice against them must surely exist. And lest I should be accused of speaking without sufficient warrant, let me give a list of bottles taken from my poison cupboard which merely bear the name of the article on the ordinary stock wholesale label, as if the contents were as harmless as so much butter scotch. The list is as follows:—Atrop. sulph., morph. hydroch., acid. arsen. pur., atropia, strychnin. pur., hydrarg. bicyanid., ferri arsenias, veratria, morph. acet., acid. hydrocy. dil., sodæ arsenias, cantharidin.

All these deadly drugs are sent out in ordinary commercial bottles, when one would suppose wholesale druggists would pride themselves in supplying bottles of such peculiar shape that accidents would be impossible.

Again, does it not seem extraordinary that a dealer in fireworks is liable to a penalty for supplying anyone under a given age with a cracker or star-light, while we are free to hand over white precipitate, laudanum or carbolic acid to every child just able to toddle and carry a penny wrapped in paper.

Far be it from me to advocate much restriction in the sale of so necessary a toilet article as white precipitate, but surely in these days of education a written order with name and address is no hardship to anyone.

Finally, there is our *bete noir*, the "patent medicine." Does it not seem a wonderful anomaly that penalties may be recovered for the illegal sale of morphia, belladonna, chloroform and prussic acid for the "safety of the public," as the Act humorously puts it, and yet all these four, and a dozen more if you like, may be put into a bottle covered with a government stamp and sold to anyone free of risk for the benefit of a revenue which winks at anything as long as its "returns increase"? But as Dr. Thomas points out, "they do these things differently in—Japan!" In this matter, however, justice and common sense are on our side, and unless the "safety of the public" is merely an empty legal phrase, it should not be long before the sale of poisons is restricted to those whose education and training have fitted them for the responsibility.

Denmark Hill, S.E. T. H. Powell.

Note on Tincture of Colchicum.

Sir,—It having been stated on more than one occasion that the active principle of colchicum seeds resides entirely or almost entirely in the testa, and that therefore a tincture made from the uncrushed seeds is as active as one made from the ground drug, I determined to satisfy myself upon this point.

One pint of tincture was made from the whole seeds and 1 pint from seeds in No. 20 powder, both by maceration, the method of percolation being manifestly unsuited for the whole seeds. The tinctures were filtered, but not pressed or made up to the full bulk, and measured respectively 18½ fluid ounces and 16 fluid ounces. The total solids and colchicine and colchiceine were estimated with following results:—

Total solids, whole seeds	0·52	per cent.
,, No. 20 powder	1·50	,,
Colchicine and colchiceine, whole seeds	0·028	,,
,, No. 20 powder	0·084	,,

Comment is unnecessary. R. A. Cripps.

Collodium Belladonnæ, B.P.C.

Sir,—As corroborative, and to a certain extent supplementary to the statement of Mr. Conroy in a note on collodium belladonnæ, read before the Liverpool Chemists' Association and reported in your last issue, I should like to bring under the notice of your readers the results of experiments which also had as a starting point the unsatisfactory nature of the British Pharmaceutical Conference formula for that preparation.

My investigation was, however, carried somewhat further than Mr. Conroy appears to have had an opportunity of doing. I found that not only did the alkaloidal value of the extracts of belladonna of trade vary considerably, as has been pointed out on a former occasion by Professor Dunstan and Mr. Ransom, but also not two could be said to be alike in physical characters. This fact is rendered more evident by the varying ratio between the amounts of extract and alkaloid dissolved by a similar solvent liquid.

The results are shown in the following table:—

Extract.	No.	Loss at 100° C.	Alkaloid calculated on dried extract.	Extract soluble in collod. bellad., B.P.C. process.	Alkaloid from extract soluble in collod. bellad., B.P.C. process.	Alkaloid undissolved (by difference).
			P. c.	P. c.	P. c.	P. c.
Rad. alcoholic, B.P. . .	1	14·7	3·98	21·27	1·36	2·62
Rad. alcoholic, B.P. . .	2	12·1	3·57	16 85	1·37	2·2
Rad. alcoholic, B.P. . . .	3	21·4	0·76	5·13	Too small for estimation.	—
Bellad., B.P.	1	23·79	1·2	4·46	,,	—
,,	2	25·1	1·26	2·92	,,	—
,,	3	21·5	0 94	3·6	,,	—
					P. c.	
Fol. alcoholic	1	10·5	0·81	85·0	0·80	—
,,	2	17·5	2·07	21·9	0·75	1·32
,,	3	15·3	2 90	38·15	1·32	1·58

It will be seen from above figures that the difference in strength of these potent extracts is very great, and of far greater importance than even the unsatisfactory nature of a preparation, the demand for which is at present limited.

John C. Umney.

NOTICES OF MEETINGS.

Society of Chemical Industry.—London Section.—Monday, Nov. 2.—Papers: (1) "On Volatile Organic Matter in Potable Water and a Simple Method of Estimating Volatile and Non-Volatile Matter in Water," by Mr. W. C. Young. (2) "Some Experiments in Solidifying Petroleum," by Dr. S. Rideal.

Midland Counties Chemists' Association.—Tuesday, Nov. 3, at 7.30 p.m.—Inaugural Address by Sir James Sawyer, M.D., F.R.C.P.

Brighton Junior Association of Pharmacy.—Wednesday, Nov. 4, at 9 p.m.—Paper on "Photo-Micrography," by Mr. D. E. Caush.

Newcastle Assistants and Apprentices' Association.—Wednesday, Nov. 4.—Paper on "Water Analysis," with practical demonstrations, by Mr. A. Russel Bennet.

Chemical Society.—Thursday, Nov. 5, at 8 p.m.

Chemists' Assistants' Association.—Thursday, Nov. 5, at 9 p.m. Short Papers.

Liverpool Pharmaceutical Students' Society.—Thursday, Nov. 5.—Paper: "Fats and Saponification," by Mr. E. Davies.

C. W.—(1) The sale would be legal if made "in the ordinary course of wholesale dealing." (2) The legality of the sale would depend upon whether the article sold were held by the court to be a poison within the meaning of the Pharmacy Act.

D. H. Oxen.—Your letter to the Secretary has been handed to us. You are in error in assuming that the letters you refer to were not published "because the information was not correct." See the Journal for the 15th of August, p. 144.

Communications, Letters, etc., have been received from Messrs. Allanson, Stevenson, Linford, Beale and Allen.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, NOVEMBER 7, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE COUNCIL MEETING.

AT the Council meeting ast Wednesday the additions to the Society consisted of one pharmaceutical chemist member and thirty associates. The Report of the Finance Committee presented no unusual features and it was unanimously adopted. Outside the ordinary receipts on account of the Benevolent Fund there have not been during the past month any other contributions to this account, but a further investment to the extent of one hundred pounds consols has been made, leaving twenty-one pounds in hand as a nucleus for another like investment. On the recommendation of the Benevolent Fund Committee the Council authorized one grant of fifteen pounds, three grants of ten pounds each and one of five pounds. The death of Mr. GEORGE LEE SANDERS, an annuitant, was reported by the Secretary. The VICE-PRESIDENT, in moving the adoption of the report mentioned that in the case where a rather larger sum than usual had been granted the applicant was about to start a small business, and there was reason to hope that she might be permanently benefited by the assistance rendered from the Fund. He also pointed out that the financial position and prospects of the Fund are satisfactory, although about forty pounds more than usual has been expended in annuities, and probably some forty or fifty pounds more in grants. Already the amount of the receipts is within a few pounds of the total receipts last year.

The report of the Library, Museum, etc., Committee dealt with a number of subjects. In the first place it showed that the number of visitors to the Museum and the attendance of readers at the Library during the months of July, August and September, as well as the circulation of books, have been maintained, and on the recommendation of this Committee the purchase of various books for the Libraries in London and Edinburgh was authorized. The consideration of M. BOCQUILLON-LIMOUSIN'S letter, in reference to the proposed International Congress in 1893, which was entrusted to the Committee, has been deferred for the present. An important recommendation was made in reference to the REDWOOD Scholarship. It is proposed to transfer this scholarship from the School Laboratory to the Research Laboratory, in the hope that the opportunity which would thus be offered for devoting an additional year or two to further study would encourage students to take advantage of it. This plan has met with approval from Professor REDWOOD, who has written to the SECRETARY to that effect, and expressed his opinion that the alteration will tend to the promotion of advanced pharmaceutical education. According to the new regulation, the REDWOOD Scholarship will be offered annually in July to pharmaceutical chemists desirous of obtaining advanced instruction in chemistry and chemical pharmacology and of undertaking investigations connected with those subjects. The nomination of a candidate for approval and election by the Council is to be made by the Research Committee after ascertaining his fitness by examination or otherwise. Another subject reported upon by the Library, etc., Committee was the application from the Leeds Chemists' Association for a grant, and it was recommended as desirable that such a grant should be made in the general interest of education. In speaking on this subject the PRESIDENT referred to the failure which has too often attended attempts to furnish good pharmaceutical education in provincial towns. The unfortunate tendency of apprentices to put off all preparatory thought of the technical examination until they have the chance of going through a short course of reading in London, or some other large town, to enable them to pass, is by many thought to be due to the absence of a compulsory curriculum. But in any case the interests of the pharmaceutical body are considered by the Committee to require encouragement of education in large centres. It is on that ground that the grant applied for from Leeds has been recommended, and that the desire is expressed to see other associations in a position to ask for such assistance. In connection with this part of the report the VICE-PRESIDENT drew attention to the fact that considerable sums of money are now about to be distributed by the County Councils for the promotion of technical education. He suggested that it might be possible to obtain for pharmaceutical students some assistance from these funds and probably it might be within the power of the Society's local secretaries to influence their distribution. Certainly, where the money is to be applied to the establishment of a museum as is the case at some places, it should be possible, as suggested by Mr, MARTINDALE and Mr. HARRISON, to secure the addition of a good collection of materia medica specimens that would be useful to pharmaceutical apprentices.

In the course of the proceedings the PRESIDENT drew attention to a special report from the Boards

of Examiners in reference to proposed alterations of the method of conducting the examinations. These alterations were fully described by the PRESIDENT, and the grounds upon which they are considered desirable were explained. They also gave rise to considerable discussion, which is fully reported. Further reference to the subject will therefore be deferred to a future occasion, and it may be hoped that in the meantime its importance will secure for it careful and unprejudiced consideration.

The report of the General Purposes Committee furnished the usual information from the solicitor as to the progress made with law cases in his hands and recommended that proceedings should be taken in two cases of alleged infringement of the Pharmacy Acts. The nominations received for the Society's local secretaries having been considered a list was recommended for adoption, and the PRESIDENT mentioned that more than usual interest has been taken in this matter, nominations having been sent from many places which had not formerly sent any. The report was accompanied with a list of places at which written examinations are to be held, Kirkwall, in Orkney, being now added. With the exception of London and Edinburgh the appointment of superintendent is to be offered to the local secretary in each centre.

The lecture to be delivered by Professor Green at the next Evening Meeting in London, on the 11th inst., will treat of the influence of the insect world in developing peculiarities in the colour, odour, and form of flowers and describe the various mechanisms which occur in them. It will be illustrated by the aid of the oxy-hydrogen lantern, and as the subject is one of general interest the President wishes it to be understood that the meeting will be open to ladies.

* * *

An Evening Meeting of the Pharmaceutical Society will be held in the Society's House, 36, York Place, Edinburgh, on Wednesday evening, November 11, at 8.30 p.m. The chair will be taken by Mr. J. Laidlaw Ewing. An address to inaugurate the Session, the subject being "Botanical Enterprise in Relation to Pharmacology," will be delivered on this occasion by Professor I. Bayley Balfour, M.D., F.R.S., and various additions and donations to the Museum will be exhibited.

* * *

The opening meeting of the School of Pharmacy Students' Association will take place on Thursday, November 12, at 7 o'clock, Professor Attfield, F.R.S., President, in the chair. The officers for the ensuing session will be elected. The School has now entered on its fiftieth session and it has been proposed that the officers and members of the Association should this year aid in the compilation of a record of the School that shall worthily commemorate its Jubilee. At this meeting the President of the Pharmaceutical Society, Mr. Michael Carteighe, will introduce this subject to the members of the Association.

* * *

The Southampton Chemists' Assistants and Apprentices' Association having failed to receive from those in whose interest it was formed the amount of support that might have been expected, it was resolved at a recent meeting to wind up the affairs of the Association, and to present any balance that might remain in hand to the Benevolent Fund. In accordance with this resolution the sum of £5 has been forwarded to Mr. Bremridge by Mr. Norton D. Desborough.

* * *

As the time for the election of annuitants on the Society's Benevolent Fund is drawing near, we take the opportunity of reminding our readers that the meeting for the purpose of electing six annuitants will be held on Thursday, the 3rd of December, at noon, and that all persons subscribing on or before the day of election will be entitled to vote for candidates. A list of the nine approved candidates will be found at page v. of the Journal of the 24th October. There are at present forty-four annuitants, receiving from the Fund fifteen hundred pounds per annum, and last year the total amount distributed in annuities and casual relief was £1918. Reference to the statement of the claims of the present candidates will sufficiently enable members of the trade to appreciate the good that is to be done by this charity. The facts there stated furnish strong support to the arguments lately put forward in this Journal by Mr. McNaught, and justify his opinion that no chemist should miss giving an annual subscription to the Fund.

* * *

The subject of the presence of copper in preserved vegetables came up for discussion at the recent meeting of the Association of Naturalists and Physicians in Halle. According to Dr. Tschirch the practice with some manufacturers is to treat the green vegetables with a dilute solution of sulphate of copper, and afterwards wash them thoroughly with water before boiling. The result is the formation in the plant tissue of phyllocyaninate of copper, a compound containing 9·2 per cent. of CuO, which is insoluble in water, dilute hydrochloric acid, or acetic acid, but soluble in alcohol. The tinctorial power of this compound is said to be comparable to that of eosine, so that a few milligrams are sufficient to colour 100 grams of preserves, and the colour is unaltered by light. Considering that copper itself is not an active poison, and that this compound contains it in so small proportion and in so insoluble a form, Dr. Tschirch expressed the opinion that this treatment of preserved vegetables might be allowed. Dr. Kobert, on the other hand, said it was true that a large dose of a copper salt might be taken at one time without producing toxic effects, but it had not been proved that a continuous administration would not produce chronic poisoning. Moreover, although it might not be convenient to produce green preserved peas without the use of copper, it was by no means necessary that peas should be green in order to be eaten.

* * *

We are indebted to a correspondent for the information that Mr. A. Ivatt, B.A., of Christ's College, Cambridge, a member of the Pharmaceutical Society, has been appointed to hold during the present term a class in Pharmaceutical Chemistry for the candidates presenting themselves for the M.B. degree in Sidney College Laboratory in the University of Cambridge.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, November 4, 1891.

Present—

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Messrs. Abraham, Allen, Atkins, Cross, Evans, Greenish, Hampson, Harrison, Hills, Leigh, Martindale, Newsholme, Richardson, Schacht, Southall, and Warren.

The minutes of the previous meeting were read and confirmed.

Diplomas.

The undermentioned, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Anthony, Thomas.
Blackman, Percy.
Broadbent, John Beaumont.
Churchyard, Arthur Ernest I.
Cowie, William Beaverly.
Ecclestone, George Thomas.
Fillingham, John.
Fisher, Ernest Hunter.
Gee, Ernest.
Green, William Henry.
Long, Frederick Coleman.
Minett, Edward Pigott.
Ralph, William.
Squire, George.
Sturton, Samuel Ainsworth.
Wilson, Arthur.

Elections.

MEMBER.

Pharmaceutical Chemist.

John Beaumont Broadbent, of Honley, having passed the Major examination and paid the subscription for the current year was elected a "Member" of the Society.

ASSOCIATES.

The following, having passed the Minor examination and previously paid as "Apprentices or Students" their subscriptions for the current year, were elected "Associates" of the Society:—

Abram, Fredc. Wm. Joseph ...Wisbech.
Anning, James John .....Leeds.
Atkinson, Alfred .....Bishopton Mills.
Blackbourn, William .....Newark.
Blamey, John .....Penryn.
Corder, John Talwin .....Norwich.
Corfe, Alfred Frederick.....Maidstone.
Dunning, James .....Manchester.
Elliman, Edgar George .....London.
Evans, Ivor .....Aberdare.
Gallimore, James Samuel .....Tutbury.
Gare, George Henry .....Blandford.
Grieve, William .....Crieff.
James, Ernest .....London.
Lambert, James Ernest Harold.Farsley.
Latreille, Albert .....London.
Moore, Arthur .....Birmingham.
Parry, David .....London.
Ridley, Alexander .....Ipswich.
Shove, Bertha .....London.
Smith, Thomas Ashworth.....Radcliffe.
Stockdale, William James ...Thirsk.
Swainson, Jno. Wm. Blanchard.Devonport.
Swinney, Wm. Paulin .....Morpeth.
Turney, Frederick Edmund ...Plymouth.
Turney, Herbert Blandford ...Plymouth.
White, Alfred Edwin.....Ashford.
Wilkinson, Henry Albert .....Bulwell.
Winzer, Edmund .....Stoke Damerel.
Wood, Ernest Thomas .....Stonehouse (Devon)

Restoration to the Register.

The name of the following person, who had made the required declaration and paid a fine of one guinea, was restored to the Register of Chemists and Druggists:—

Rufus Madgwick, Bridge Street, Andover.

Report of the Finance Committee.

The report of this Committee was of the ordinary character and recommended sundry accounts for payment.

The PRESIDENT (as Chairman of the Committee), in moving the adoption of the report, said the receipts and payments on the general account were all of the usual character and required no special comment. With regard to the Benevolent Fund, there had been receipts from ground rents, dividends, and subscriptions to the amount of £214, which was about the usual amount at this time of year. Nothing had been received on the donation account, but £100 worth of consols had been purchased, leaving only £21 in hand towards another £100 for investment, which he hoped some of their friends would soon make up.

The report and recommendations were unanimously adopted.

Report of the Benevolent Fund Committee.

The report of this Committee included a recommendation of the following grants:—

£10 to the widow (aged 55) of a member who had a grant of £15 in 1887. Her present position is due to her lodging-house having proved a failure. (London).

£5 to the widow (aged 62) of a registered chemist and druggist, who has had six previous grants of like amount and is unable to do anything for her own support. (London).

£10 to the widow (aged 58) of a registered chemist and druggist, who has had six previous grants, amounting to £40, the last a year ago; she is a chronic invalid. (Crewe).

£10 to a registered chemist and druggist (aged 56), who suffers from locomotor ataxy, and is mainly dependent on his wife's earnings as a lodging-house keeper. Has had two previous grants of £10 each. (Gravesend).

£15 to the widow (aged 47) of a member who died in September last, leaving no provision for his family. There are five children dependent, or partially dependent, on applicant. (Birmingham).

One case had been deferred for further inquiry and one was not entertained.

The Secretary had reported the death on October 13, at the age of 80, of Mr. Geo. Lee Sanders, who was elected an annuitant in 1884.

The VICE-PRESIDENT, as Chairman of the Committee, in moving the adoption of the report, said the only case he need remark upon was one in which the Committee had recommended rather a larger grant than usual, the reason being that the applicant was going to start a small business, and it was hoped that a little extra assistance at this juncture would be permanently advantageous to her. The general position of the Fund was very satisfactory. About £40 more had been expended in annuities than previously, and probably the ordinary grants would also mount up to £40 or £50 more by the end of the year, but notwithstanding this the state of the finances appeared very satisfactory, and the amount received had already reached within a few pounds the total of last year's receipts.

The report was unanimously adopted.

Report of the Library, Museum, Laboratory and House Committee.

Library.

The report of the Librarian had been received, including the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
July	Day	473	29	10	18
	Evening	156	20	1	7
August	Day	43	6	0	2
September	Day	117	14	3	8

Circulation of books.	Total.	Town.	Country.	Carriage paid £	s.	d.
July	162	82	80	0	15	4
August	65	26	39	0	10	11½
September	112	41	71	0	19	0½

Donations to the Library had been announced (see p. 306), and the Committee had ordered the usual letter of thanks to be sent to the respective donors.

The Librarian had reported that two of the books missing last year had been returned to the Library, and that at the revision this year the following were missing:—

Cooley, Pharmaceutical Latin Grammar, 1868.
Ince, Latin Grammar of Pharmacy, 1882.
Darwin, Climbing Plants, 1882.
Gerrard, Materia Medica and Pharmacy, 1886.
Meldola, Chemistry of Photography, 1889.
Prescriber's Pharmacopœia, 1886.

The Committee recommended the purchase of the undermentioned works:—

For the Library in London—

Société chimique de Paris, Bulletin.
Williams (G. H.), Elements of Crystallography, 2nd ed., 1890.
Parker, (T. J.), Lessons in Elementary Biology, 1891.
Solms-Laubach, Fossil Botany, 1891.
Halliburton (W. D.), Text-book of Chemical Physiology and Pathology, 1891.
Ostwald (W.), Solutions, 1891.
Guillemin (A.), Electricity and Magnetism, 1891.
Harvey, Flora Capensis.
Cooke (M. C.), British Edible Fungi, 1891.
Hager (H.), Manuale Pharmaceuticum, ed. 6., vol. 1.
Woodhead (G. S.), Bacteria and their Products.
Squire, Pharmacopœias of the London Hospitals, 6th ed., 1891. Two copies.
Carpenter, The Microscope, 7th ed. Two copies.

For the Library in Edinburgh—

Woodhead (G. S.), Bacteria, 1891.
Squire, Pharmacopœias of London Hospitals, 1891.
Carpenter, The Microscope, 7th ed.
Gordon, Our Country's Flowers.
De Bary, Comparative Morphology and Biology of Fungi and Bacteria.
Veterinary Counter Practice.

Museum.

The Curator's report had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
July	Morning	557	33	6	20
	Evening	105	16	1	3

Donations to the Museum had been reported (see page 306) and the Committee had ordered the usual letter of thanks to be sent to the respective donors.

The Librarian had presented a report on the Fourteenth Annual Meeting of the Library Association held at Nottingham.

A communication from M. Bocquillon-Limousin, respecting the proposed meeting of the International Congress in 1893, had been discussed and the further consideration of the subject deferred.

The Committee recommended the adoption of modified regulations for the Redwood Scholarship.

The President, in moving the adoption of the report, said the Committee, besides the ordinary formal business, had had to consider first of all the grant applied for by the Leeds Chemists' Association, and it felt quite satisfied that it was desirable in the interest of education generally that this grant should be made. It had often been a subject of regret that the organised attempts to furnish good pharmaceutical education in the great towns had not been very successful hitherto. Many thought it was due to the absence of a compulsory curriculum, that there was still a tendency for apprentices to put all thought of preparation for the technical examination on one side until they came to London, or some great centre, and then go through a short course of reading in the hope of being able to pass. It was because the Committee thought it was in the interests of the pharmaceutical body at large to encourage education in large centres that this recommendation was made, and he should be glad if there were many other associations in a position to ask for such assistance, and to show that they were doing good work. With regard to the International Congress, the Committee thought that inasmuch as the arrangements were left in the hands of the executive Committee which was continued from the last meeting of the Congress until the next, it was desirable to write to the Secretary in Brussels for further information before replying to the gentleman who had written from France. It had been stated that the Americans proposed to hold a Congress in Chicago in 1893, and it certainly seemed inadvisable to have two meetings in the same year, one in America and one in Europe. With regard to the Redwood Scholarship, he thought the change now proposed would be an improvement in the educational machinery and a boon to a number of men who were quite willing to devote their time for a year or so to further study if a little encouragement were offered them. Last month, in referring to this subject, he said he had reason to believe that Professor Redwood sympathized with the scheme, and he had great pleasure in reading the following letter which the Secretary had received from him:—

"27 October, 1891.

"Dear Mr. Bremridge,—

"I have perused with great satisfaction the copy you sent me of proposed regulations for transferring the Redwood scholar of the Pharmaceutical Society from the Laboratory, in which general and elementary instruction in chemistry and allied subjects is provided, to the Research Laboratory. All the specified conditions connected with the proposed arrangement appear to me judicious, and well calculated to further the contemplated object, which I take to be that of promoting advanced pharmaceutical education. I feel proud to find my name associated with means which will, I believe, tend to advance that very important and desirable object.

"I am, yours very truly,

"T. Redwood."

After that letter the Council could hardly have any hesitation in approving the scheme.

Mr. Schacht suggested that it might be as well to modify the clause which said that candidates must have passed the Major examination before applying. Would it not be sufficient to say before receiving the appointment? It was desirable that all who passed the examination in July should be eligible, and this might be an obstacle.

The President thought that would be met by fixing the date for the end of July, so as to include the whole of the Major men of that year. A man

could not be elected in August, in the hope that he would pass in October. This would not prevent a man considering whether he should apply in the event of his passing, but the formal application could only be made by a duly qualified man.

Mr. SOUTHALL said he hoped the successful man would be able to commence work in the Laboratory at once. If there were an interregnum of two or three months it would be very detrimental.

The VICE-PRESIDENT, referring to the grant of £20 to Leeds, said such assistance to pharmaceutical education had his entire sympathy. He should like to call the attention of all local secretaries to the fact that the County Councils were about to distribute considerable sums of money to borough councils for the promotion of technical education, and if they were alive to the situation they might obtain some assistance from these funds for pharmaceutical students. In Dover between £700 and £800 had been voted for the purpose of technical education. The application of the funds was in the hands of the local authorities, but probably in many places local secretaries might influence its distribution.

Mr. ABRAHAM feared that in many places the funds had already been disposed of.

Mr. CROSS said there were very good lectures now given in his town on botany and chemistry, and he was glad to find that they were attended by many chemists' assistants and apprentices.

Mr. NEWSHOLME thought the suggestion of the Vice-President a very good one. From the fact that the Leeds Chemists' Association was, so to speak, affiliated to the Yorkshire College he believed it would benefit very materially from the fund. In Sheffield he feared they could not obtain money in that way. He heartily agreed in the recommendation with regard to the grant. In Leeds they went in for cheap education, charging nothing; but in Sheffield it had been found necessary to provide such an education as would enable a young man to pass the Minor, and year by year they had increased the fees until they reached a considerable amount. An apprentice or student who started the first year and went through the whole course, paying 15*s.* or £1 1*s.* a year, at the end of four or five years would have paid practically as much as was charged by many schools in London, but he had this great advantage, that he had been educated and not crammed. He hoped this grant would be the means of helping their Leeds friends, and was quite sure it would be an additional bond of union between the chemists of Sheffield and Leeds.

Mr. MARTINDALE said he knew one town in the north of England where the grant from the County Council was to be applied in establishing a museum; in connection with such an institution a good collection of materia medica specimens would be of great use to pharmaceutical students.

Mr. RICHARDSON said the application of these funds depended a great deal on the character of the neighbourhood. In Leicester they were building technical schools for the boot and shoe and hosiery trades. He was also sorry that the Local Government Board had taken away the privilege formerly enjoyed by chemists' assistants of utilising the very excellent laboratories at the Wiggeston schools, for what reason he knew not.

Mr. HARRISON hoped the suggestion thrown out by the Vice-President might be strongly emphasized. As yet he believed few towns had allocated the whole of this money coming to them under the Customs Bill, and the Society as a whole probably could not take any action. The local secretaries in their respective neighbourhoods might exercise some influence. In his own town the money was unappropriated, the only suggestion being that it should go towards an extension of the museum, and there was little doubt that if it took that form they could act on the suggestion, and obtain the addition of a materia medica section.

Mr. EVANS pointed out that the fund referred to was only available for one year, and it was not at all certain that it would be continued. At the same time he might say, having formed one of a deputation which waited on Mr. Goschen to ask him to continue this local taxation grant, that his reply was that as long as the money was used for educational purposes it would be very difficult for any Government to refuse to continue it. There was another means of obtaining money for technical instruction, viz., the Technical Instruction Act itself, which enabled a rate not exceeding 1*d.* to be made for the purpose. In his neighbourhood they applied the local taxation money for intermediate education, and levied a ½*d.* rate for technical instruction, which was applied according to the needs of the different districts, in some places to agriculture, in others to mining. Pharmacists might derive some benefit from this Act.

Mr. ATKINS said no doubt the suggestion of the Vice-President might bear some fruit, but in his town the money had already been allotted. The greater part had been given to Swindon with its large schools. Salisbury only came in for £280, the larger part of which had gone to the School of Science and Art, where science was conspicuous by its absence; it was really only an art school. The secretary had called on him and discussed the possibility of doing something to restore the scientific section, and perhaps some steps in that direction might be taken. He had seen the splendid museum at Sunderland, to which the addition of materia medica specimens would be very valuable. The great difficulty in small towns was to establish permanent scientific teaching. Leeds and Sheffield were very favourably situated in that respect, being able to affiliate with large permanent bodies, but in smaller towns they often had to experience success in one year, and failure in another.

Mr. CROSS said he thought the Technical Instruction Act had been very little adopted.

Mr. EVANS said it was in operation in every county in Wales.

The motion for adopting the report was then carried unanimously, with the modified regulations for the Redwood Scholarship in the following form:—

Redwood Scholarship.

"The Redwood Scholarship is offered annually in July to Pharmaceutical Chemists who are desirous of obtaining advanced instruction in Chemistry and Chemical Pharmacology, with a view to conducting original investigations in these subjects.

"The scholar will receive the sum of £20, and will be provided, free of cost, with a working bench, apparatus and materials in the Society's Research Laboratory, and will be required to work under the supervision of the Director and to observe the rules and regulations of the Research Laboratory. The nomination of the scholar will be made by the Research Committee after ascertaining the candidate's fitness by means of an examination in Chemistry and Materia Medica, or in such other manner as the Committee may think fit. The nomination of the Research Committee will be submitted for the approval of the Council, who will elect the scholar.

"A Redwood scholar may be re-elected on the recommendation of the Research Committee.

"The holder of a Jacob Bell Memorial Scholarship, if he be a Pharmaceutical Chemist, will be eligible for election as a Redwood scholar after the expiration of his Bell Scholarship.

"Applications for the Redwood Scholarship must be in the hands of the Secretary of the Pharmaceutical Society not later than the 25th day of July in each year."

The Research Laboratory.

The PRESIDENT said he was instructed by the Research Committee to ask the Council to consider the propriety of giving certificates to those who did good work in the Research Laboratory at the end of their term. These men saw their younger brethren receiving medals and certificates, whilst they received no mark of recognition. It was customary to give certificates of attendance in many institutions of the kind, but it was proposed that these certificates should not be given, unless good work had been done; and it was thought that they might not only bear the seal of the Society, but also the signatures of all the members of the Research Committee. He would suggest that the question be referred to the Library, Museum and Laboratory Committee.

Mr. SOUTHALL hoped certificates would not be given merely for attendance.

The PRESIDENT said that was not intended.

The suggestion to refer the subject was agreed to.

REPORT OF EXAMINATIONS.—*October*, 1891.

ENGLAND AND WALES.

	Candidates.		
	Examined.	Passed.	Failed.
Major (20th)	5	3	2
,, (21st)	5	3	2
,, (22nd)	5	4	1
,, (23rd)	6	5	1
	— 21	—15	— 6
Minor (20th)	29	13	16
,, (21st)	29	10	19
,, (22nd)	29	12	17
,, (23rd)	26	14	12
	—113	—49	—64
	134	64	70

SCOTLAND.

	Candidates		
	Examined.	Passed.	Failed.
Major (21st)	1	1	0
Minor (21st)	12	6	6
,, (22nd)	13	8	5
,, (23rd)	12	5	7
,, (27th)	13	9	4
,, (28th)	12	7	5
,, (29th)	13	9	4
	—75	—44	—31
	76	45	31

Preliminary Examination.

13*th*.—Candidates, 301. Passed, 153. Failed, 148.

23*rd*.—Thirty-four certificates accepted in lieu of the Society's examination.

The PRESIDENT said there was a special report of both Boards of Examiners, to which he had to call special attention and ask the approval of the Council. He referred to certain changes in the method of conducting the examinations which the Boards had decided to recommend. The new schedule came into operation in October, and the examinations in London and Edinburgh had been conducted in accordance therewith, but both Boards had been considering very carefully how the examinations could best be conducted under the altered conditions. In making these recommendations the Boards had not been wanting in consideration for the candidates, nor had they lost sight of the fact that as men of common sense, they had to deal with things practically. It had often been said that it was a very great hardship for anyone, however gifted, to have to be examined orally and practically in six subjects in one day. Since the time for practical dispensing had been extended, and the practical chemistry examination had been added, candidates for the Minor had in fact to do a certain amount of practical work extending over some hours, besides which they had to be examined, and even cross-examined, in every subject. He was supposed to be rather a terror to candidates in some respects, but he had never lost sight of the fact that it was a hardship, and perhaps a little unjust, to submit candidates to such tests. He believed the reason why some attempt had not been made before to divide the examination and make it a more reasonable process for the candidates had been a feeling that it was very undesirable to keep candidates in London or Edinburgh for more than one day. When he was a candidate, and when he first came on the Council, it was considered almost inadmissible not to allow the candidates to get back to their homes on the same night; but considering the expenditure in time and money that candidates had to undergo to obtain their qualification nowadays, he thought the same consideration hardly applied at the present time. He felt certain that the propositions of the Boards in this matter of detail would commend themselves to the candidates as well as to the Council. An efficient examination should be reasonable and fair to the candidate. At present men were in the examination room for many hours without any interruption, and as many of these men were in the habit of having a mid-day meal it was a very severe strain upon them, even if they had been well trained. Again, the Board had come to the conclusion that it was impossible to test men fairly unless more time were given to the subjects of practical chemistry and practical dispensing and pharmacy. It was, therefore, recommended with regard to the Minor examination that practical dispensing and practical pharmacy should be taken as one combined subject for three hours on a day preceding the examination, and that practical chemistry should occupy a like number of hours on the afternoon of the same day after an interval. The candidate would be examined for three hours in practical dispensing and pharmacy, and then after an interval of one hour, for another three hours in practical chemistry. When the examiners who had charge of this portion of the examination reported to the Boards that a candidate had passed satisfactorily, or had attained a certain position, he would then be allowed to go before the whole Board and be examined in the remaining subjects of botany, materia medica, chemistry and that portion of pharmacy which was not included in practical pharmacy. It was conceived that that part of the oral examination would be got through in a good half day, so that the candidate would not be kept the greater part of the day waiting to be examined by the whole Board. It was not proposed in these practical examinations to overburden the candidate with work, but that the test should rather be the excellence of the work done. That would be a distinct advantage to the candidates, inasmuch as they would have ample time to do what was required of them. These examinations were, to many, a very trying ordeal, and some men, even if they had competent knowledge, had not the same strength of nerve as others. The older he got the more difficulty he felt in arriving at a sound conclusion as to the knowledge possessed by the man who was being examined, having regard to the difficulty of distinguishing between nervousness and ignorance, and of determining whether the nervousness of a candidate or his want of ability to express himself orally, was to be attributable to ignorance or to nervousness proper. Anything which would allow the candidates to obtain a good hold of the work without interruption would, he thought, be welcomed by them as an advantage, and would tend to give them courage when they came before the whole Board later on. It was proposed that this alteration should take place after January 1,

and it followed that after that date a candidate for the Minor would have to present himself on two different days, but not necessarily on two consecutive days. In fact, he would have to attend at the Board rooms in the same way as the Major candidates, who now came up for practical work on some day antecedent to the meeting of the full Board for his oral examination. With regard to the Major, it was proposed that a candidate should be examined in chemistry and physics for three hours in writing, and in botany and materia medica in writing for another three hours; that he should then go through the practical work on the basis of the schedule, the character of his work of course being of the utmost importance. He would have to present himself first for the written examination, and secondly for the practical, and then on the reports of the appointed examiners in these respective subjects, if they were satisfactory, he would be allowed to pass without further examination. If, on the other hand, in the opinion of the examiners, he was weak in one or two of the subjects, the Board might in its discretion allow him to be examined orally in two of these subjects, but this oral examination was to be contingent upon the character of the paper work and the practical work. In carrying out this arrangement the Board felt very strongly that it was desirable with regard to the Major that excellence in two out of the four subjects should qualify a man to pass, even if he were a little weak in the other two; in other words, that they ought not to exact from the Major candidate under the new schedule such a high standard of knowledge of all four subjects as had hitherto been required. At present they expected a man to be good in botany, materia medica, practical chemistry and theoretical chemistry and physics, but it was well known that there were men whose bent lay in the direction of biology on the botanical side, and if they came out extremely well in botany and materia medica, they would be allowed to pass, even though they were not so strong in theoretical chemistry and physics as some others who might be correspondingly weak in biology. That modification it was thought would be a great advantage, and coupled with the reduced fee, which it was hoped would shortly be introduced for the Major, it would encourage men who had passed the Minor to come up for the Major, as the examination would be less trying than it had hitherto been. With regard to another part of the report, the Board of Examiners in Scotland desired the sanction of the Council to the Executive making such alterations in the fitments of the examination room as might be required by the Board. Facilities were required for examining a few more men at a time in practical chemistry. The alterations would not be serious; it was principally a question of chemical benches and of re-arranging the examination room. He had last week been in Edinburgh to confer with the Board on this subject, and it was desired that the Council should give the Executive of the North British Branch authority to deal with the matter, so that the alterations might be made before the examination in January. The whole subject of the examinations had been very thoroughly considered by both Boards, and both the Vice-President and himself had been present at deliberations of the Board in Edinburgh. It was not proposed that the same examiners should necessarily conduct the examination in practical work on each occasion, or even on each day; that was a matter of detail which the examiners would settle amongst themselves. But probably the examiners in the respective subjects would be changed from time to time and the work divided in various ways. There were certain advantages which the Board of Examiners thought might arise from this change, amongst which would be the fact that the Board would retain control over the practical work, and would be able, if it thought well, before rejecting any man definitely, to allow him an opportunity of being further examined orally. He would note:—

"That the reports and recommendations of the Boards of Examiners be received and adopted, and that the Executive of the North British Branch be authorized to take the necessary steps for carrying out the alterations suggested by the Board of Examiners in Scotland."

Mr. EVANS remarked that one of the most ordinary causes of failure was the difficulty which many young men had in expressing their thoughts when being examined, and this was especially the case with some lads from Wales, who were always accustomed to think in Welsh, and though they might have a fair knowledge of English had to go through a process of translation in considering and answering questions put to them. Anything which would reduce the difficulties which such men had to encounter would be very welcome.

The PRESIDENT said he quite understood the difficulty alluded to, and he had often given candidates written questions to answer rather than embarrass them by too much talking. He remembered on one occasion examining a man who made apparently the grossest blunders; but it occurred to him that it must be from want of acquaintance with the language, and on giving the candidate a series of written questions he was found to possess very good knowledge.

Mr. MARTINDALE, as an old examiner, supported the proposition. The present examination, with so many subjects all crowded into one day's work, was a very trying ordeal for a nervous candidate, and every consideration should be shown to a man in an examination which might make or mar him for life.

Mr. HAMPSON supported the motion, feeling sure it was a step in the right direction, and one which would be of great convenience all round. It was simply moving with the times, and was necessitated by the larger number of subjects. He was very sanguine that the change would be acceptable to candidates.

Mr. SOUTHALL was very glad to see that the Major examination would be more of a written examination than formerly, and he hoped the same process would go on until it became entirely written.

The PRESIDENT observed that the examination must be a practical one in the case of analysis. It was proposed to continue the practical examination, but to omit the oral, except in cases where the written work was not quite satisfactory, and then the candidate might, at the discretion of the Board, have an opportunity of supplementing it by an oral examination.

Mr. SOUTHALL regretted the same system was not extended to the Minor. He also thought it undesirable that all the practical work should be done in one day. If one practical subject were taken in the morning, and the oral examination in the afternoon, it would be more of a change than having the practical work on one day and the oral the next, and he should have thought it would not be more difficult.

Mr. ALLEN said no doubt this was a very great change in the conduct of the examination, and one which would be looked at very critically, but he hoped those who were most concerned, the actual students, would before forming any judgment on the matter carefully read the remarks which the President had made. If they did so they would find that the whole change had been made almost entirely in their interests, and that it was one of the best things for candidates that could possibly happen. The intention was not to crowd an enormous amount of work into so many hours, but to give every man a fair chance of showing his knowledge. It was the best scheme that could be devised for any man who knew his work, and perhaps the worst for the one who wanted to get through with no knowledge whatever.

Mr. SCHACHT said he should like to say a word or two in approval of the suggestion, which seemed to

commend itself all round, especially in the interest of the average student, who would have a better opportunity of showing what he knew. He also wished to say one word in special commendation of the proposed change with regard to the Major examination, which made it possible for a man rather specially distinguished in one of the sciences to develop himself in that direction and to attain the higher qualification, without being obliged to divert his energies into several directions, with some of which he might perhaps have no great sympathy. This was a very prudent thing to do, and was only following the course adopted at the Universities, where a man having shown a certain amount of culture in the required subjects, was allowed to go up for honours in the one of his own choice. This would give somewhat similar facilities to pharmaceutical students, who having passed a fair Minor examination, might take honours as a pharmaceutical chemist either in chemistry and physics, or in botany and materia medica.

Mr. ATKINS said that this was so important a matter that it was desirable as far as possible to have the assent of the entire Council to it, and, therefore, he could only echo what had been already said. He desired to express his concurrence. He quite agreed with what Mr. Schacht had said with regard to the man who might be specially qualified in one subject and not so well qualified in all, and he also agreed with Mr. Allen that if young men carefully considered this alteration, they would see the advantage of it, and many who had been unfortunate in the past would regret that the change had not come a little earlier. He could quite believe that many of these men, to use a vulgar expression, were really pumped out at the end of the examination. He liked the change, especially because it transferred a large amount of the examination for the higher qualification from oral work to written. It was within the knowledge of everyone that very competent men were not very ready in expressing their thoughts, but give them an opportunity of writing and they at once redeemed the position they had apparently forfeited. Another reason why he agreed with it was that it would facilitate the progress from the Minor to the Major, and whatever did that would be very helpful. The only misgiving he had was the additional expense which it might cast upon the Minor students; but he did not think that was very important, because the reduction in cost through the absence of failure would more than compensate for it.

Mr. HILLS felt sure that these regulations would be for the advantage of the candidates, and he hoped the Board of Examiners would take into serious consideration before long that very important part of the examination, the Preliminary. If they could see their way to bring that up a little more in consonance with modern views by adding one or two subjects it would be a great advantage, and would probably lead to a reduction in the number of failures in the qualifying examinations.

Mr. EVANS said it was cruelty to allow a young man to come into the trade by passing a very easy Preliminary examination.

The PRESIDENT said, in reply to Mr. Southall, that the suggestion he had made would be impracticable. It would necessitate the whole Board sitting to receive the candidates as they came forward, which would be very costly. This proposition threw a large part of the work on individual examiners, singly or in pairs, in anticipation of the general board meeting, and he did not think it could be worked as Mr. Southall suggested. But even if it were possible, from what he knew of the candidates they would not like it so well; they would prefer to get through the whole of the practical work on one day. He had seen men so shaky from handling the pestle and other things that they could not write down the most simple thing with exactitude, partly from the mere nervousness of the hand, and partly from general nervousness of the body. The proposition as to the Major was to replace the present oral examination in botany, materia medica, chemistry and physics by a written examination and a practical one, and an oral one where necessary. If the candidate's paper were doubtful, or the practical work doubtful without being wholly bad, then in the discretion of the Board, after receiving the report of the examiners and seeing the papers themselves, the candidate could be examined a little further and perhaps be passed instead of being rejected. He remembered the case of a Minor candidate from Wales who did his practical work very satisfactorily, but made the grossest blunder in stating the result, and still persisted in it, although he endeavoured by every possible means to show the candidate where he was in error. He then gave him a solution of the same article which he had before had in a powder and set him to work again, taking his original notes away from him. The candidate went through the thing perfectly again and put the right name to it, and when he was shown his previous paper he was much upset at seeing the blunder he had made. A careful examiner could tell by the character of a paper or of the practical work done whether he had sufficient materials to form a judgment, and if he had not, rather than reject a candidate he could send him on to be orally examined. Mr. Hills' observation with regard to the Preliminary was rather outside the discussion, and he could say nothing about it at the present moment. He thought the Board agreed generally with the suggestion of Mr. Hills and others, but that was a matter which had to be dealt with under the bye-laws and not by resolution of the Board. No doubt it would receive the attention of the Board, because, though the College of Preceptors conducted this examination for the Society, certain members of the Board of Examiners held interviews from time to time with the College with regard to the mode in which it was carried on.

The motion was then put and carried unanimously.

MR. THOMAS HANBURY'S DONATION OF BOOKS.

The PRESIDENT said that when distributing the prizes to the successful competitors on the last occasion he found himself in the uncomfortable position of not being able to give to certain prizemen the books which had hitherto been given to them in memory of the late Daniel Hanbury; the supply previously furnished by Mr. Thomas Hanbury having been exhausted, and naturally some of the young men were rather disappointed. He ventured to write to Mr. Hanbury, telling him exactly how they were placed, and in the most generous manner that gentleman had given an order on his publishers for 50 copies of the 'Pharmacographia' and 100 copies of the 'Science Papers.' Mr. Hanbury had also desired to be informed when the present supply was exhausted. He, therefore, begged to move:—

> "That the best thanks of the Council be accorded to Mr. Thomas Hanbury for his handsome gift of 50 copies of the 'Pharmacographia' and 100 of 'Science Papers.'"

The motion was seconded by the Vice-President and carried unanimously.

CORRESPONDENCE.

The PRESIDENT said a letter had been received from Mr. Russell, local secretary at Windsor, stating that at a meeting of chemists and druggists held at his house he had desired to tender his resignation, but had been unanimously solicited to resume office for another year. He might take the opportunity to say that Mr. Russell had held the position of local secretary at Windsor for nearly thirty years, and the Society was much indebted

to him for the zealous and loyal manner in which he had fulfilled the duties of the office. A resolution was also passed at the same meeting, requesting the Council to take into consideration the operation of the Pharmacy Act and to provide for the more complete control and sale of all proprietary and patent medicines, stamped and unstamped, containing any schedule poison.

An official letter had also been received from Mr. Hunt, of Plymouth, sending a copy of a resolution passed there, expressing gratification that Plymouth had been re-appointed a centre for examinations.

The Next Evening Meeting.

The President announced that on Wednesday evening next Professor Green would give a lecture on "The Evolution of the Flower," to be illustrated very completely by an oxyhydrogen lantern. He should like it to be understood that the meeting would be open to ladies.

Report of the General Purposes Committee.

The report of this committee included the usual letter from the solicitor stating the progress made with cases placed in his hands. In one case a verdict had been obtained for four penalties and costs on the higher scale. One defendant had disappeared and could not be traced.

Two cases of alleged infringement had been reported to the Committee and proceedings recommended under the direction of the President.

Local Secretaries.

The Committee had considered the nominations received for local secretaries and approved of the appointment of the persons named in the following list:—

List of Local Secretaries, 1891–1892.*

Towns eligible.	Names of persons appointed.
Aberdeen	Strachan, Alexander.
Aberystwith	Wynne, Edward P.
Abingdon	Smith, William.
Altrincham	Clarke, James Thomas.
Andover	Bienvenu, John.
Appleby	Longrigg, John.
Arbroath	Robertson, John.
Ashbourne	Bradley, Edwin S.
Ashford	Ingall, Joseph.
Ashton-under-Lyne	Bostock, John W.
Aylesbury	Turner, John.
Banbury	Ball, George Vincent.
Banff	Alexander, William.
Bangor	Jones, Owen.
Barking	Ridley, Charles H.
Barnet	Young, R. Fisher.
Barnsley	Eastwood, Lewis.
Barnstaple	Goss, Samuel.
Barrow-in-Furness	Chapman, Leonard P.
Bath	Appleby, Edward J.
Batley	Smith Sam.
Bedford	Taylor, James B.
Belper	Calvert, James.
Berwick	Lyle, William.
Beverley	Fields, Tom William.
Biggleswade	Evans, John.
Birkenhead	Brookes, Alfred Fincher.
Birmingham	Thompson, Charles.
Bishop Auckland	Dobinson, Thomas.
Blackburn	Garland, Alfred P.
Blackpool	Laurie, John.
Blandford	Groves, Richard H.
Bodmin	Cardell, Richard T.
Bolton	Mason, William B.
Boston	Grimble, Albert.
Bournemouth	Worth, Edwin.
Bradford (Yorkshire)	Rimmington, George.
Brechin	Hodgeton, David.
Brecon	Meredith, John.
Brentford	Wood, Alexander.
Bridgnorth	Deighton, Thomas Milner.
Bridgwater	Basker, John Anthony.
Bridlington	Purvis, John B.
Brighton	Gwatkin, James Ross.
Bristol	Stroud, John.
Broughty Ferry	Park, William.
Burnley	Cowgill, Bryan H.
Burslem	Blackshaw, Thomas.
Burton-on-Trent	Wright, George.
Bury	Heywood, William.
Bury St. Edmunds	Summers, Frank.
Buxton	Wright, Robert.
Camborne	Allan, Charles J.
Cambridge	Deck, Arthur.
Canterbury	Bing, Edwin.
Cardiff	Munday, John.
Carlisle	Hallaway, John.
Carmarthen	Lloyd, Walter.
Carnarvon	Jones, John.
Chatham	Morgan, Alfred William.
Chelmsford	Metcalfe, Wilson.
Cheltenham	Barron, William.
Chester	Baxter, George.
Chesterfield	Windle, John T.
Chichester	Long, William Elliott.
Chippenham	Coles, John Coles.
Chorley	Hill, William.
Cockermouth	Cooper, F. Ashley.
Colchester	Cordley, William Bains.
Coventry	Hinds, James.
Cromer	Hoare, William Parker.
Croydon	Clarke, Josiah.
Darlington	Robinson, James.
Dartford	Botwood, Charles W.
Darwen	Shorrock, Ralph.
Deal	Green, John.
Derby	Cope, John A.
Devizes	Edwards, Thos. Roberts.
Devonport	Rendle, Richard H.
Dolgelly	Williams, Richard Wynne.
Doncaster	Howorth, James.
Dorking	Clift, Joseph.
Douglas (Isle of Man)	Radcliffe, John C.
Dover	Bottle, Alexander.
Droitwich	Harris, Stephen.
Dudley	Gare, Charles Hazard.
Dumfries	Allan, William.
Dundee	Hardie, James.
Dunfermline	Seath, Alexander.
Durham	Sarsfield, William.
Ealing	Curtis, Frederic G.
Eastbourne	Crook, Herbert.
East Grinstead	Tully, John.
Eccles	Howie, William Lamond.
Egremont (Cumberland)	Ireland, Edward J.
Elgin	Robertson, William.
Epping	Rowland, Thomas W.
Evesham	Dingley, Richard Loxley.
Exeter	Lake, John Hinton.
Eye	Bishop, Robert.
Falkirk	Murdoch, David.
Falmouth	Newman, Walter Francis.
Fareham	Batchelor, Charles.
Faversham	Laxon, Matthew.
Finchley	Freeman, Frederick Wm.
Flint	Jones, Owen Williams.
Folkestone	Goodliffe, George.
Forfar	Fowler, George R.

* Local Secretaries are appointed in all towns in Great Britain (except London and Edinburgh) which return a Member or Members to Parliament, and in such other towns as contain not less than three Members of the Society or Associates in Business.

Towns eligible.	Names of persons appointed.
Frome	Green, Edmund C. F.
Gainsborough	Surfleet, Arthur George.
Galashiels	Walker, James.
Glasgow	Kinninmont, Alexander.
Gloucester	Foulkes, William Henry.
Grantham	Whysall, William.
Gravesend	Clarke, R. Feaver.
Greenock	McNaught, Archibald.
Grimsby, Great	Cook, Robert.
Guernsey	Nickolls, John B.
Guildford	Long, Alexander J. T.
Haddington	Watt, James.
Halifax	Seely, Herbert N.
Hanley	Cornwell, Thomas C.
Harrogate	Davis, R. Hayton.
Harrow	Gunn, Samuel John.
Harwich	Worts, Augustine.
Hastings and St. Leonards	Tharle, Charles A.
Hawick	Maben, Thomas.
Helensburgh	Harvie, George.
Hendon	Goldfinch, George.
Henley-on-Thames	Batchelor, Charles J. H.
Hereford	Williams, Walter.
Hertford	Lines, George.
Hexham	Gibson, John Pattison.
Hitchin	Ransom, William.
Honiton	Dyer, Edward H.
Horncastle	Kemp, Herbert W.
Houghton-le-Spring	Rowell, Robert H.
Huddersfield	King, William.
Hull	Bell, Charles Bains.
Huntingdon	Baxter, Robert.
Huntly	Chalmers, George.
Hyde	Billinge, Mark.
Hythe	Lemmon, Robert Alce.
Ilfracombe	Crang, Walter.
Ilkley	Worfolk, George W.
Inverness	Bethune, William J.
Ipswich	Anness, Samuel Richard.
Jersey	Cole, George.
Keith	Pirie, James.
Kendal	Severs, Joseph.
Kilmarnock	Borland, John.
Kingston-on-Thames	Walmsley, Samuel.
Kirkcaldy	Storrar, David.
Kirkwall (Orkney)	Stewart, Duncan.
Knutsford	Silvester, Henry T.
Lancaster	Vince, James.
Leamington	Barrett, Josephus T.
Leeds	Reynolds, Richard.
Leicester	Clark, Walter Beales.
Leigh (Lancs.)	Bennett, John William.
Leighton Buzzard	Herington, Joseph.
Leith	Finlayson, Thomas.
Leominster	Sandiland, R. B.
Lewes	Saxby, Henry.
Leytonstone	Bennett, Cornelius.
Lichfield	Perkins, John Jaquest.
Lincoln	Maltby, Joseph.
Liverpool	Parkinson, Richard.
Llandudno	Winter, Joseph.
Llanrwst	Jones, Owen.
Loughborough	Scrase, Richard.
Louth	Dennis, Fred Woodrow.
Lowestoft	Clarke, Geo. Ernest.
Ludlow	Woodhouse, George.
Luton	Duberley, George S.
Macclesfield	Wright, John.
Maidenhead	Walton, Ralph.
Maidstone	Stonham, W. B.
Malton	Buckle, James.
Malvern	Coldwell, David B.
Manchester, etc.	Benger, F. Baden.
Mansfield	Patterson, Douglas J.
March	Davies, Peter Hughes.
Margate	Harvey, William Sutton.
Market Harborough	Maynard, Henry R.
Melton Mowbray	Wing, Geo. N.
Merthyr Tydvil	Smyth, Walter.
Middlesborough	Robson, J. Crosby.
Middleton	Parker, James H.
Montrose	Davidson, Alfred.
Morecambe	Fell, John James.
Morpeth	Schofield, Fredk. E.
Newark	Cherrington, Geo. W.
Newcastle-on-Tyne	Martin, Nicholas H.
Newcastle-under-Lyme	Poole, Weston.
Newmarket	Barrow, Frank Arthur.
Newport (Mon.)	Garrett, Thomas P.
Newport (Salop)	Barlow, John.
Newton Abbot	Bibbings, John Henry.
Newtown	Owen, Edward.
Northampton	Bingley, John.
Northwich	Humphreys, Griffith.
Norwich	Sutton, Francis.
Norwood	Birch, Henry C.
Nottingham	Parker, William Henry.
Nuneaton	Iliffe, George.
Oban	Robertson, Alexander.
Oldham	Bates, Henry.
Oswestry	Evans, John.
Oxford	Prior, George Thomas.
Paisley	MacCowan, Robert Thos.
Pembroke Dock	Williams, Cornelius.
Penrith	Cowper, Joseph.
Penzance	Shakerley, Benjamin.
Perth	Donald, David.
Peterborough	Heanley, Marshall.
Peterhead	Tocher, James F.
Petersfield	Edgeler, William B.
Plymouth	Hunt, Freeman W.
Pontefract	Bratley, William.
Pontypridd	Cule, Taliesin.
Poole	Pomeroy, Francis T.
Portsmouth, etc.	Childs, James L.
Preston	Arkle, Charles A.
Prestwich	Mercer, Allan.
Radcliffe	Pollitt, Joseph Moore.
Ramsey (Hunts)	Palmer, Frederick Wm.
Ramsgate	Baily, Edward.
Reading	Bradley, Charles.
Rhyl	Lawrence, Geo. Richard.
Richmond (Surrey)	Thacker, William.
Richmond (Yorks)	Walton, E. Bridges.
Ripon	Parkin, Joseph Brooks.
Rochdale	Taylor, Edward.
Romford	Lasham, John William.
Ross	Matthews, Thomas A.
Rotherham	France, Joseph.
Rothesay	Duncan, William.
Rugby	Brown, Frederic P.
Ruthin	Rouw, Theodore J.
Ryde (Isle of Wight)	Pollard, Henry Hindes.
Rye	Waters, William Allen.
St. Albans	Ekins, Arthur E.
St. Andrews	Govan, Alexander.
St. Austell	Binks, Burcham.
St. Helens	Wallbridge, John George.
St. Ives (Cornwall)	Young, Tonkin.
Saffron Walden	Gilling, John.
Salisbury	Atkins, William Ralph.
Scarborough	Whitfield, John.
Sevenoaks	Pain, Edwin.
Sheffield	Ward, William.
Shields, South	Noble, John.
Shipley	Dunn, Henry.
Shrewsbury	Cross, William Gowen.
Southampton	Dawson, Oliver R.
Southend-on-Sea	Powers, Edward.
South Molton	Swingburn, Richd. Hy.

Towns eligible.	Names of persons appointed.
Southport	Righton, James.
Spalding	Bell, E. Wightman.
Stafford	Averill, John.
Stalybridge	Simpson, Allwood.
Stirling	Shairp, William.
Stockport	Orton, Wm. Billing.
Stockton-on-Tees	Brayshay, Thomas.
Stoke-on-Trent	Adams, Frank.
Stone, Staffs.	Jacks, Frederick.
Stonehouse (Devon)	Maitland, Frank.
Stourbridge	Selleck, William R.
Stowmarket	Gostling, George James.
Stratford	Holford, Thomas C.
Stratford-on-Avon	Hawkes, Richard.
Streatham	Bascombe, William.
Stroud	Coley, Samuel James.
Sunderland	Harrison, John.
Swaffham	Bell, Frederick R.
Swansea	Grose, Nicholas M.
Sydenham, Upper	Babb, James.
Tamworth	Allkins, Thomas Boulton.
Taunton	Short, George William.
Tavistock	Gill, William.
Teignmouth	Maunder, William.
Tiverton	Havill, Paul W.
Torquay	Shapley, Charles.
Totnes	Morse, Charles H. S.
Tottenham	Tanner, Alfred E.
Treherbert	Richards, Thomas.
Truro	Percy, Thomas Bickle.
Tunbridge Wells	Howard, Richard.
Twickenham	Peake, Henry F.
Uxbridge	Waterhouse, Tom.
Ventnor	Weston, Charles.
Wakefield	Chaplin, John Henry.
Walsall	Elliott, George.
Walthamstow	Saunders, Arthur.
Warrington	Greenough, Hugh F.
Warwick	Pratt, Henry.
Watford	Chater, Edward Mitchell.
Wednesbury	Gittoes, Samuel James.
Wellington (Salop)	Bates, James.
Wellington (Somerset)	Windeatt, George John.
Wells (Somerset)	Manning, Richard J.
West Bromwich	Gill, S. Dudley.
Westbury	Paine, Charles.
Weston-super-Mare	Hall, Edwin.
Weymouth	Groves, Thomas Bennett.
Whitby	Stevenson, John.
Whitehaven	Kitchin, Archibald.
Wick	Miller, Kenneth.
Wigan	Phillips, Jonathan.
Winchester	Hunt, Richard.
Windsor	Russell, Charles J. L.
Wokingham	Spencer, Thomas.
Wolverhampton	Gibson, Frederic John.
Woodbridge	Betts, John.
Worcester	Virgo, Charles.
Worthing	Cortis, Arthur Brownhill.
Wrexham	Edisbury, J. F.
Wycombe	Wilford, Josiah.
Yarmouth, Great	Poll, William S.
Yeovil	Wright, Alfred.
York	Sowray, Joseph.

Superintendents of Written Examinations.

The Committee recommended that the written examinations be held at the following centres, and that the appointment of superintendent be offered to the local secretary in each place, with the exception of London and Edinburgh:—

England and Wales—Aberystwith, Birmingham, Brighton, Bristol, Cambridge, Canterbury, Cardiff, Carlisle, Carmarthen, Carnarvon, Cheltenham, Darlington, Exeter, Hull, Lancaster, Leeds, Lincoln, Liverpool, London, Manchester, Newcastle, Northampton, Norwich, Nottingham, Oxford, Penzance, Peterborough, Plymouth, Sheffield, Shrewsbury, Southampton, Worcester, York.

Scotland—Aberdeen, Dundee, Edinburgh, Glasgow, Inverness.

Kirkwall, Orkney; Douglas, I. of Man; Guernsey; Jersey.

The Committee recommended that after April next the written examinations in Jersey, Guernsey, Isle of Man and Orkney be held in July every year, and at all the other centres in January, April, July and October.

PRELIMINARY EXAMINATIONS.

The following return was submitted to the Council:—

List of Centres and Table of Attendances of Candidates at each Centre.

	1889. Jan. Apr., July, Oct.	1890. Jan., Apr., July, Oct.	1891. Jan., Apr., July, Oct.	Total number of attendances at each centre at 12 examinations.
ENGLAND AND WALES.				
*Aberystwith	—	—	4	4
Birmingham	61	60	78	199
Brighton	12	9	13	34
Bristol	36	38	37	111
Cambridge	26	26	17	69
Canterbury	15	17	10	42
Cardiff	27	31	37	95
Carlisle	33	28	26	87
Carmarthen	46	33	32	111
Carnarvon	22	25	22	69
Cheltenham	23	11	9	43
Darlington	19	22	27	68
Exeter	33	36	22	91
Hull	32	29	25	86
Lancaster	20	22	16	58
Leeds	70	73	74	217
Lincoln	15	24	28	67
Liverpool	54	59	65	178
London	163	171	173	507
Manchester	113	118	112	343
Newcastle	47	60	41	148
Northampton	13	12	8	33
Norwich	21	17	28	66
Nottingham	44	59	57	160
Oxford	9	9	18	36
*Penzance	—	—	13	13
Peterborough	13	12	25	50
*Plymouth	—	—	12	12
Sheffield	34	36	36	106
Shrewsbury	16	15	15	46
Southampton	30	31	37	98
Worcester	8	7	6	21
York	19	18	25	62
SCOTLAND.				
Aberdeen	82	45	68	195
Dundee	34	43	47	124
Edinburgh	77	97	79	253
Glasgow	43	54	85	182
Inverness	11	11	13	35
Douglas, I. of Man	3	2	9	14
Guernsey	1	3	1	5
Jersey	4	4	5	13

* Total number of attendances at this centre at four examinations.

Examinations in 1892 *and* 1893.

The Committee also recommended that the Board of Examiners for England and Wales should meet in 1892, in February, April, July and October, and in 1893 in January, April, July and October. The Board of Examiners in Scotland to meet in January, April, July and October in 1892 and 1893.

The consideration of the legal portion of the above report being deferred, the President remarked, with regard to the local secretaries. that some eight or ten gentlemen had been appointed in outer London as local secretaries. With those exceptions this list was the result of the nominations and the number of votes recorded. The nominations this year had evoked greater interest than usual, many places having sent up nominations from which formerly none at all were received. To avoid any misapprehension he might say that the gentleman who had the largest number of nominations was appointed by the Council, but in some cases two gentlemen had the same number, and when that was the case the Council, as a rule, if one had been previously in office retained him, and if neither had been in office before, the choice generally fell upon the elder of the two. He did not know that the Council could adopt any better plan. With regard to the centres of examination, and the time of holding tha examinations, he might remark with reference to Orkney, the Isle of Man, and the Channel Islands that it had been thought desirable there should be an examination once a year which was fixed in July, when there was the least chance of communication by sea being interrupted.

The Council then went into committee to hear and consider the legal portion of the report.

On resuming, the whole of the report and recommendations were unanimously agreed to.

EXAMINATIONS IN EDINBURGH.

October 21, 22, 23, 27, 28 and 29, 1891.

Present on each day—Messrs. Clark, Dott, Gibson, Gilmour, Kinninmont, Maben, Nesbit and Stephenson.

The President was present on the 27th, 28th and 29th.

Professor Sir Douglas Maclagan was present on the 23rd and 28th on behalf of the Privy Council.

MAJOR EXAMINATION.

21*st.*—The undermentioned was examined, and was declared qualified to be registered as a Pharmaceutical Chemist:—

Cowie, William Beaverly .....Mains of Newrain.

MINOR EXAMINATION.

21*st.*—*Twelve* candidates were examined. *Six* failed. The undermentioned *six* passed, and were declared qualified to be registered as Chemists and Druggists:—

Anning, James John .....Leeds.
Beatton, Peter Samuel .....Port Glasgow.
Bradley, Thomas Henry.....Chesterfield.
Callander, Robert Andrew.....Falkirk.
Dimbleby, James Orlando.....Attercliffe.
Marshall, Henry ....Dunfermline.

22*nd.*—*Thirteen* candidates were examined. *Five* failed. The undermentioned *eight* passed, and were declared qualified to be registered as Chemists and Druggists:—

Dyson, Henry Crowther.....Crossland Moor.
Ellinor, John Thomas.....Sheffield.
Fraser, John.....Dundee.
Gare, George Henry .....Blandford.
Goddard, John Geo. Joshua...Barrow-in-Furness.
Gordon, Robert .....Aberdeen.
Hancox, Frank Heeley .....Liverpool.
Hogg, George .....Edinburgh.

23*rd.*—*Twelve* candidates were examined. *Seven* failed. The undermentioned *five* passed, and were declared qualified to be registered as Chemists and Druggists:—

Horne, Joseph.....Pendleton.
Hughes, William.....Birkenhead.
Jones, Henry David .....London.
King, Ernest Edward.....Lancaster.
Kirk, William .....Newcastle-on-Tyne.

27*th.*—*Thirteen* candidates were examined. *Four* failed. The undermentioned *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Muir, Thomas Holmes .....Glasgow.
Parker, John Robert .....York.
Pick, William .....Boroughbridge.
Robertson, Geo. Smith Birrell..Dundee.
Robinson, Joseph .....Sunderland.
Robson, Richard Greenwell....Sunderland.
Sandford, Harry Moile .....Manchester.
Sinclair, John Gordon .....Aberdeen.
Stobie, James .....Alloa.

28*th.*—*Twelve* candidates were examined. *Five* failed. The undermentioned *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Barlow, Arthur .....Hyde.
Benson, Arthur Herbert.....Wigton.
Bushby, George Frederick ...Manchester.
Enoch, Abraham.....Pontypridd.
Gill, William Sharp .....Boston Spa.
Swift, Charles William .....St. Helens.
Symon, James .....Kinross.

29*th.*—*Thirteen* candidates were examined. *Four* failed. The undermentioned *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Jones, Lewis Morris .....Holyhead.
Wallace, Mungo .....Glasgow.
Wakefield, John Henry .....Dudley.
Walker, George .....Keith Hall.
Walker, James.....Dundee.
Walker, Richard Thomas .....Wigan.
Ward, Walter James .....Headingley.
Whitton, Andrew Crichton ...Dundee.
Winstanley, Thomas Harrison.Wigan.

Retirement of Dr. Inglis Clark.

At the meeting of the Board on the 29th, it was resolved that—

"The Board has learned with regret that owing to business engagements Dr. Inglis Clark finds it necessary to retire from the Board after this year. They desire to record their appreciation of his services for the past ten years, and their great regret at losing him as a colleague."

Provincial Transactions.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

The annual conversazione of the Midland Counties Chemists' Association was held on Tuesday evening at the Grand Hotel, Birmingham. Mr. Southall (President of the Association) occupied the chair, and amongst the large company present were Sir James Sawyer (who delivered the inaugural address), Councillor Barclay, Professor Hillhouse (of Mason College), and a considerable muster of ladies.

The President, in opening the proceedings, thanked the members for having re-elected him President of the Association, and said he did not know that anything very important had taken place during the past

year. They had, however, made one or two changes which had been of advantage. In the first place they had considerably improved the library. And thanks to Mr. Perry, they had not only a good library, but a good catalogue, which was almost as important. There was to be a fresh syllabus for the Minor examinations, which he fancied some of their younger friends were rather frightened at. He did not know that there was much occasion for that. The syllabus was certainly very much fuller than the old one was, but it had the advantage that it showed the students exactly what they had to learn and what questions they would be asked. They had sometimes been told that the examiners exceeded their duty in asking questions which were not expected by the candidates, but that complaint could not be made now. In times past there had been a great many failures at the examinations, but he trusted, now they had the new syllabus, candidates would do better in that respect. So far their educational work in Birmingham had not been very successful. As was known, they had no classes this year; there were not sufficient students to make it worth while to commence classes. They were working for the bright future, and that future was to be when they could get their Pharmacy Bill through Parliament. Up to the present the Bill had been obstructed by over-pressure of business; the poor chemist had received no attention; but they hoped in the future that this would be remedied. So far as the chemists went, there was no doubt the Bill was very much more popular than it was a year or so ago. Everyone was crying out about the curriculum being too stiff, but now, owing, perhaps, to the many gatherings Mr. Carteighe addressed on the subject the feeling was different. He then introduced Sir James Sawyer to the gathering.

Inaugural Sessional Address.

Sir James Sawyer, who was received with much enthusiasm, said he was grateful indeed for the hospitable reception which had been given him and for the kind words in which their President had introduced him to the meeting. He ventured, however, to say that he scarcely needed an introduction because many of those present he ranked amongst his oldest friends. He noticed with great interest what Mr. Southall said in his speech with regard to the educational work in which their Society was engaged. He had watched with close interest and with much admiration the progress which pharmacy had made in educational directions during the last few years, and he was quite sure that all improvements in that way were likely to bring the best possible results to pharmacists, to the medical profession, and to the public generally. He was proud to meet them, because he knew that the Midland Counties Chemists' Association represented the calling of pharmacy in the midland counties. He quite agreed it was perhaps a good thing that the physician should sometimes speak to the pharmacist, and he also thought it would be a good thing if one of the pharmacist body would occasionally speak to the physician. He might point out that evening to those before him that this was an age of remarkable progress. He was proud to deny that that progress was an exclusive privilege of any party. It was a law of the human race. It was a law which in its incidence had affected pharmacy, medicine, and therapeutics, and all the arts which had been generally practised in the most excellent way during the last twenty-five years, over which period his own intimate and personal acquaintance with those matters extended. He might point out some of the great triumphs which medicine had accomplished during that time, taking medicine in its broadest and best signification as representing, not the art merely of preparing drugs, the duty of prescribing them, and the pleasure of swallowing them, but medicine in its broadest and best signification as indicating all they knew with regard to the causation of disease, all they knew as to the process of disease, all they knew as to the prevention of disease, and all they knew as to its alleviation and cure. He might also point out to them, as he had pointed out to medical audiences in the city of Birmingham, how great indeed had been the progress which medicine in its widest sense had made during that time, and he was proud above all things to point out that great as had been the advances which surgery (which they as physicians hoped sooner or later to do away with) had made, that those advances, excellent as they might have been in their material, striking as they might be in their efforts, cutting as they might be in their effects—that those advances were more than outstripped by that great and nobler branch of the healing art which was represented by medicine and therapeutics. He might further point out the triumphs which had been accomplished during that time in therapeutics—that was in that particular part of the art of medicine as distinguished from its practice, which concerned the employment of drugs and the employment of other remedial agencies, for they knew there were many which were not in the British Pharmacopœia. He should like to point out the great triumphs which the curative parts of medicine had accomplished during the last twenty-five years. Pharmacists knew that they not only had better drugs and drugs which they knew how to use with more precision than their forefathers did, but they had learnt to revive many old drugs with advantage, and they had, on the whole, he believed, in rational medicine and in rational therapeutics, as distinguished from the gim-crack humbug which had such an attraction in these days for many semi-educated and exalted minds, straightforward, honest medicine founded on the knowledge of disease, founded on the knowledge of action of medicines, founded on the knowledge cultivated by experience of how to employ them—he said straightforward, honest therapeutics as distinguished from hanky-panky and humbug—that indeed had made a progress in our time of which we might be generally proud. To come more particularly to pharmacy. Pharmacy had made great progress, and if he were asked to recount the progress and the improvements which had been made in that particular branch of the healing art he could point out that they had made great progress in the selection of drugs, and, supposing they had a plant with certain remedial virtues, in the selection of that part of the plant which contained those remedial virtues in the greatest efficacy. He could also illustrate to them the advances made in pharmacy, in the cultivation of drugs, in the development of vegetable drugs, in inducing a growth in parts which developed their remedial virtues to the greatest possible extent. Then, again, they had made great progress in the art of extracting from drugs their efficient and native principles. Great progress had been made in the taking crude vegetable drugs, which had been administered in a more or less crude way, submitting them to the processes of pharmacy and chemistry in such a way as to separate the parts which were efficient from the parts which were inactive, and bringing them into use for remedial purposes. Another group of triumphs in pharmacy might be found in the application of scientific chemistry to the development of the active principles of drugs. They knew how the science of chemistry had advanced in recent years; they knew how great had been the progress, for example, of chemistry since the days of Dr. Priestley. Every one of these advantages he was proud to think had found its reflection in the process and work of the pharmaceutical chemist. Chemical science had been applied by analysis and by other means so as to bring out, perfect, and accentuate and strengthen all the active principles in

which they had to deal with the treatment of disease. He thought he could further point out that pharmacy had made great progress in the perfection of its preparations; that was that the art of pharmacy had advanced in the preparation of drugs in such a form that they could be better swallowed by or applied in other ways to the living human body when the subject of disease. He did not think he was wrong in saying that some of this progress had been due to the influence and to the guidance of that most excellent association, the Pharmaceutical Society of Great Britain. He supposed it was nearly fifty years since the Pharmaceutical Society was founded. He could not remember when it was founded because he was not born then, but he had early opportunities of talking to those who took part in its foundation. He knew that that Society had done a great deal in advancing pharmacy. It was to the efforts of that Society that they owed the progress they had made in the elevation of a trade into a profession. The Pharmaceutical Society was the first body to show that a pharmacist should be a man not only of education—for pharmacists were men of education long before this Society was founded—that a pharmacist should be a man of general education and a man of education in the details of his particular calling, but it was the first to insist, and to insist with success, and with distinct advantage that his education must be proved and tested and certified by the state. And it was in insisting that pharmacists should be men of education, and that the public must have some guarantee of such, that great progress had been accomplished. Because the more they had advanced in this direction the more they had raised the general character of their calling, and the more they had entered as brothers into the great fellowship of medicine. Now these two callings—the calling of the pharmacist and the calling of the physician—had been drawn so closely together that neither in the future, it would be found, could go very far without the other. He should like to say to them, and to say it with all his heart, how warm was his attachment to pharmacy, how proud he was to remember that his honoured father was a pharmacist, and how proud he was to recall how much he owed to his sound training and guidance in any of the success he had attained. He based the warmth of his attachment to pharmacy, not upon the fact that his father took part in the formation of the Pharmaceutical Society, and that he was one of the original founders in 1841, but he based it upon the fact that the more he looked back upon his own progress and his own work during the thirty years he had been in Birmingham, part of it as a student, and all the rest as a practitioner, the more he found without any conscious direction of his own mind in a particular channel that he had turned more by more, year by year, to the duty that he should advance the practical art of medicine in the alleviation and cure of disease. He owed much of his attachment to pharmacy to the fact that during the time to which he had referred he had experienced over and over again the greatest kindness and consideration from members of their profession in this town and neighbourhood. He was now going to ask them a very plain question, and he was going to ask them to allow him to answer it for that evening at all events. He asked what was the highest duty of the pharmacist? He answered to share in making perfect the art of medicine. He must point out to them that the art of medicine aimed at the prevention and the cure of all disease, not some diseases, not this disease, not that disease, but aimed at the prevention and cure of all disease, and he would ask them to accept, following upon this statement, that the potentiality of the art of medicine was bounded only by the physiological possibilities of human life. They would see what he meant by that ideal, that in that condition of human life that life in each individual should be as exalted and as perfect and as long as possible free from every disease and every pain and every pang, and every condition of suffering whatever which curtailed that ideal. It was to the prevention of everything which stood in the way of perfection, it was to that that medicine, supported and protected by pharmacy, must direct its aims. They might say that was a high aim, and not likely to be reached; but he was sanguine enough to think that some day it would be reached, and that we were getting nearer to it every day. Towards this consummation, so devoutly to be wished, the art of medicine, the art of therapeutics, was sure to grow. The lines of its development were plain, and they know them well. Only by slow experience and only by the labour of many hands—the more the better—could that progress be attained. Little by little would the knowledge surely grow, but only by the experience of reliable observations, infinitely multiplied and laboriously compared. Let him ask them for a moment to look at another aspect of the scope of therapeutics. He need not remind them that the popular view of therapeutics was not the complete view; that it was much more than swallowing of medicine at stated intervals during the twenty-four hours; that the art of therapeutics was not merely the administration of drugs. Just think for a moment what it was besides that. It included the agencies which could favourably influence disease. It included dietetics, what a patient ought to eat and drink and when he ought not to eat and drink. It included balneology, a very ancient system of therapeutics, and which was better understood, he was inclined to think, in ancient civilization than it was understood now. The art of therapeutics included also climatology, in which we are still very much at sea. It also comprised a knowledge and correct knowledge of climatic conditions of different places, the effect of those climatic conditions upon disease, both as to its prevention and cure, and the remedial art included the physiological resources of mechanics, a mine of boundless worth. By this application of mechanics to therapeutics most brilliant results had been accomplished and better results would be secured in the future. This art included the application of electricity in the treatment of disease, gymnastics and regular movements of the body in the treatment and curing of disease, a branch of therapeutics very much neglected by many people, who would rather be cured by swallowing medicine than by straightening their backs. If people only understood how much could be done in the prevention of disease, amongst children especially, by well ordered and regular movements, which, whilst they secured a graceful movement of body, would also allow the organs of the body to work under the least possible conditions, it would be a good thing. But if they would give him the opportunity of addressing them again, he would speak of that. The art of therapeutics also included the regulation of occupations, the regulation of pursuits and amusements in their remedial aspects, and also many details of practical education in their physical bearings upon growth and stability. Many men and women were ill, or thought they were ill, because they had not been properly educated and had not been taught how to control feelings and irritabilities and unpleasant sensations, which did not constitute disease, but which were so apt to run into disease in certain morbid, improperly educated, feeble-minded persons. Well, he asked them as pharmacists to accept some such a great view as that which he had endeavoured to put before them as to the art of therapeutics, and if they did that, if they so accepted what he had said, it was their duty now to take part and share with those who worked for the same end. It was their duty to take part and

share in making perfect the art of medicine. Let him be a little more precise as to the lines upon which the art of medicine was making advance. He ventured to say that the art of medicine was making advance upon three great roads, three great lines, not quite parallel lines, but still three great lines of advance. Like a great army divided into three divisions, but divided so that they may at a certain time reach a certain place. By improvements in our knowledge of nature, cause, process and prevention of disease, that was our great line, and there were many men working in that line. Another line was the improvements in the art of diagnosis. They knew that many improvements had been made in the art of diagnosis in our time. How by instruments, mechanical instruments of precision, how by training our own hands, eyes and ears and our faculties for observing accurately, intelligently and precisely, how by using the instruments which man had made and the instruments which God only could make, the art of medicine was making progress in improvements in the diagnosis, in the detection of disease, in its early recognition, and the discrimination of different forms of disease one from the other. There was another great road, and that was by improvements in remedies, by improvements in our knowledge of the remedies, by the discovery of new remedies and the improvements in the selection and preparation and mode of application of those remedial agencies. In this third road more especially pharmacists had shared, greatly to their credit, to the public advantage in the past, and they were likely to share still more in the future. He wished to press this subject a little more closely, and he asked them to unite heartily with the medical profession, and especially in improving that part of the art of medicine which concerned the administration of drugs. But there was a part which the public could play in this. He had ventured to point out the lines of their duty. He had ventured to point out the lines in which the duty of the medical profession lay, and he did not think the medical profession had ever failed in doing its best by many honest labourers to prevent disease and to increase its cure. But there was a part of this great work of carrying forward the alleviation and cure of disease, in which the public had a part to play, and in which the general public were interested, much more than anybody; a part which the public alone could play. He wanted the public to be good enough to accept one explicit and particular duty in this particular direction, and that was that they should avoid low priced dispensing. He said that the public could help the progress of the art of medicine, and certainly the alleviation of their sufferings by avoiding and shunning low-priced dispensing. Now, they all knew that the cultivation of the low-priced was one of the features of this last quarter of the nineteenth century. They knew that in everything, in the clothes we wear, in the food we eat, and in the drinks we drink; we know that in the houses we live in, in the carriages we ride in, in all that we put on and all that we put in we know that there had been a great cultivation in the public mind of that which was low in price. They knew that a great development had taken place in the means of communication with other countries, and that these developments had brought to our doors the products of other countries, whether to our advantage or not he must not now stop to discuss. The public had got into the way of expecting everything to be low priced, and he asked them to please to note that he did not use the word "cheap," but they expected everything to be low priced, and they would walk about from one place to another thinking they could get articles at a little lower price at one place than another. He wanted to make it clear that that sort of fashion, if they liked to call it such, was making great headway in our times. The old attachment of purchaser to the vendor, in which the purchaser trusted the vendor and the vendor very often trusted the purchaser, was disappearing. He did not say it was all bad, but he was expressing his own opinion unhesitatingly, and he desired to say this with the utmost emphasis which he was capable of that the public were doing harm to the advancement of remedial art by the excessive pursuit of low-priced remedies. He did not say that the fault lay with pharmacists. Pharmacists had to a great extent to follow the public fashion in these matters. There had been a public demand which pharmacists in their way had met and to a certain extent encouraged and to a certain extent discouraged. They had been divided among themselves as to the way in which the law dealt with this peculiar feature of our times. Some of them had bowed to it, some had scorned it, and some had wobbled; some had taken a straight course one way, and some had gone the other way, whilst others had tried to go both ways at once. The public in the matter of the remedies they use ought to make that all important distinction between that which is low priced and that which is "cheap." They would all agree with him that more or less a low priced article was an uncertain quantity, which was very often to the disadvantage of the purchaser. They knew there were employed in medicine a large number of drugs which were derivatives of the vegetable kingdom. He supposed that on the whole there were more drugs derived from the vegetable kingdom than drugs derived from all other sources put together. Take a root or a bark or any vegetable product. They knew the Pharmacopœia, through which they could drive a coach and four in its most stringent clauses, while extremely precise as to the number of grains or the amount of bark they might have to put into a certain tincture, while it was extremely precise as to the alcoholic strength, took no notice, no cognizance whatever as to the quality or efficiency of the vegetable drugs which the pharmacist dealt with. Every vegetable drug tended by nature to range itself into three qualities. The root was produced of course by nature, and the best pieces picked out of it formed the best quality, and the pieces which were worm eaten and decayed, which were left after the best pieces were picked out, formed the third quality. They knew the Pharmacopœia took no notice as to which of these were used, and this matter was left, he was going to say, to the consciences of pharmacists, and when he said that he knew that that trust was very seldom indeed abused, and he knew the public on the whole could trust as safely to the conscience of the pharmacist in that particular as they could trust to the conscience of the prescriber with regard to the diagnosis of the disease and the indication of its remedy. Do not let it be thought that he cast the slightest shade of a shadow of imputation upon any member of the profession of pharmacy in what he had been saying, but what he wanted to do was to press upon the public their duty in this particular. If the public would rush for low priced dispensing in medicine, they must not expect to get the best drugs for their money. It was impossible that it could be otherwise, because not only was the expense of maintaining businesses much greater than it used to be, but they had a long education now to pay for, more expensive assistants now to employ than ever, and he contended that no pharmacist was remunerated if his remuneration depended on the cost of the agencies he employed. The pharmacist had to pay for much more than that. He had to pay for his experience, the time, cost, labour and toil which had been expended in bringing that man up to the knowledge which he had placed at the disposal of the public. If the public would have low-priced dispensing, let them understand what they are getting for their money. They might say what he was going

to suggest was an impossibility in daily work. A man was ill, he was alarmed; he went to the physician. The physician diagnosed his disease, indicated the treatment, and in that treatment there was the swallowing of certain medicine for the preparation of which the patient went to the pharmacist with the physician's prescription. Many a patient thought he could pay a large fee to the physician and grudged to pay a small remuneration to the pharmacist, and trusted to get the prescription dispensed at as low a price as possible. He said the public were wrong in doing that, and if the public were more generous in this matter, then there would be no doubt whatever—as, indeed, there was little doubt now—that pharmacists would always employ the best of drugs, as it was their duty to employ the best drugs. As it was the duty of the physician to take the best means to find out what was the matter with a man, so it was the pharmacist's duty that the remedies should be supplied in their most active form and most excellent and efficient condition. If the public would have low priced dispensing he would let them know what they were having. He would say, "Here is a prescription; I can make it up for so much, and so much." He was not going to mention sums of money, but he should let those prices vary as did the cost of cotton and of stuffs, or of satins for a man's wife. She would be equally warm possibly in any one of those garments, supposing they were of adequate and proper thickness; but he would let the purchaser know that there were qualities in drugs as there were qualities in everything else, and he would let him choose which he should pay for. If one or two pharmacists did this for a little time they would soon cure the British public of this pernicious pursuit of the low price. The duty to supply pure drugs was a duty which concerned human pain, and which trenched very directly on the sanctity of human life. He was going to say that he wished pharmacists would not prescribe; and he wished—he would not say physicians, they never did anything wrong—he wished pharmacists would not prescribe, and that medical practitioners would not so frequently dispense. It was very easy in turning a sentence to set one up against the other as a kind of an antithesis, but let them not take it that the two things were exactly parallel or the one precisely the reverse of the other. He knew this was a matter of the greatest difficulty and delicacy, and he did not propose to trouble them by considering it now with its details; but he contended that there was room for the pharmacist to prescribe a little less, and he thought there was room for the medical practitioner to dispense a little less. He knew the case for the medical practitioner could be put rather strongly, and he had a right to dispense if he so chose, and that the pharmacist had no right to prescribe if he so chose. He knew it was also held that in remote districts and out-of-the-way places it was a great convenience to the patient that the medical practitioner should be able to supply drugs and dispense his own prescriptions under certain conditions. He knew there was no one in the room who would not concede that such conditions existed in different parts of the country, but he considered where these exceptions did not exist it would be better if the medical practitioner depended more on the pharmacist and if the pharmacist exercised an improved discretion in the direction of prescribing. The ideas which directed them all were crowding on their minds, and he had only to say again that he thanked them for the generosity and cordiality of their reception. In thanking them he warmly and sincerely wished all progress and advancement to pharmacy. He hoped that they in their corporate capacity in that influential society might have all prosperity, and to bring the matter a little nearer home he wished them in their homes and in their individual lives the highest prosperity which might bring them sufficiency, content, retirement, rural quiet, friendship, books, ease and alternate labour, useful life, progressive virtue and approving Heaven.

Councillor Barclay moved a vote of thanks to Sir James Sawyer for his interesting and valuable address. He said he hoped this new departure of the physician coming amongst pharmacists would before long develope into a custom, and that they would frequently have on such occasions an opportunity of meeting the members of a profession which was so closely allied to their own. They were glad to hear from Sir James that the education of the pharmacist was watched so closely by the medical profession, because they felt that the education of the pharmacist was of the greatest importance to the medical profession. It was impossible for the physician to be successful unless he had the co-operation of an intelligent pharmacist. They would be stimulated by the address they had heard that night to look forward in that direction, for it was quite evident if they were to keep pace with the medical profession, which was making such strides in the various directions Sir James had pointed out, that they must work more studiously. Sir James had given them many practical suggestions which would be read with interest, not only by the chemists of Birmingham, but by the chemists throughout the kingdom. Sir James had alluded to the wrong which was done by prescribing, he thought he called it hanky-panky humbug. It was a strong term, but not too strong to use for the kind of thing which obtained in some quarters. He had just come back from America, where he found it obtained to an alarming extent. The nostrums supplied there made a chemist more of a vendor of medicines than a practical pharmacist, and he hoped they would not Americanize their establishments in that direction. It was impossible for one man to be a prescriber and dispenser and to do the whole work himself. And it was desirable for the public that the prescribing and dispensing should be separated as much as possible. It was to the interest of the public that prescribing, as far as possible, should be done by the chemist, and dispensing could be discontinued by the medical practitioner. One of the great drawbacks of the present age was the terrible cutting business which was found all round.

Mr. C. Thompson seconded the resolution, and it was supported by Mr. Perry, who thanked Sir James for his earnest and noble address. If they could often hear such expressions of opinion from the medical profession as had been given utterance to that night the appreciation by the public of the work of pharmacists would speedily follow.

Professor Hillhouse also spoke in support, and the resolution was carried with acclamation.

Sir James Sawyer, in acknowledgment, said he hoped they might have further opportunities in the future of comparing each others' experiences.

A vote of thanks was then passed to the President, and the remainder of the evening was devoted to an enjoyable entertainment.

BRIGHTON JUNIOR ASSOCIATION OF PHARMACY.

Annual Dinner.

The annual dinner of the Brighton Junior Association of Pharmacy was held on Wednesday, at the Café Royal, East Street, Brighton. Mr. H. W. Kilby Pears, President of the Association, occupied the chair, the vice-chair being taken by Mr. A. E. Colman (Vice-President).

The toast of "The Queen" having been submitted by the President in patriotic style and duly honoured, Mr. A. P. Nosworthy submitted the toast of "The

Pharmaceutical Society of Great Britain," coupling the name of Mr. Marshall Leigh. Those present, he said, were fully aware of the good the Society had done in the past, of the splendid work it was doing now, and they also entertained bright hopes for its success in the future. They knew that it was much hampered in its work, which was partly due to lack of funds and to the absence of support from the whole of the chemists of Great Britain. If it could only enrol the chemists and druggists of the kingdom in its ranks it would be enabled to do a great deal more good, not only from a legislative point of view, but in furtherance of the interest generally of the profession. Those present recognized completely that the Society had raised the status of chemists. Having extended the science of chemistry and pharmacy, it was devoting its powers to improving the educational standard, and was making the Minor examination stiffer year by year. He was of opinion the severer the examination was the better would be the class of men who entered for it. The recent suggested Pharmacy Act Amendment Bill had caused a certain amount of anxiety. It would perhaps be remembered that a Bill was brought forward in 1852 by the Society, but Parliament refused to impose further restrictions than then existed, and the promoters had to go on working for sixteen years before they gained their object by the Pharmacy Bill becoming law in 1868. He had no doubt that if the whole of the chemists were in touch with the Society a great lever for obtaining legislation would be secured. The speaker proceeded to refer to the Benevolent Fund for assisting distressed members and associates, and widows and orphans, in eulogistic terms. He also remarked that meetings were being called for choosing local secretaries of the Society, it being felt that it was desirable to select men who took an interest in the work, and who were in touch with the objects in view. Many of these secretaries, he said, had held the position for many years and did not do the work efficiently. He had great pleasure in coupling with the toast the name of Mr. Marshall Leigh. That gentleman was an able representative in the Council, and was also to the front in matters of local pharmaceutical interest.

Mr. Marshall Leigh, on rising to reply, was very cordially received. He said that as a member of the Council of the Pharmaceutical Society, and therefore representing that body, he tendered his thanks to Mr. Nosworthy for his speech of appreciation of that Society, and he thanked them also for the hearty way in which they had drunk the toast, which showed that the subject of the toast was popular with young men. And the Pharmaceutical Society ought to be popular with young men, because as the result of the last fifty years' work of the Council, the young men who were in the trade and those who would come into it during the next few years would reap most of the benefit. With regard to the work of the Society, he might say that all through it had been consistent. They owed very much indeed to those who had been labouring during the last 50 years, many of whom had been men of prominence and who had done the bulk of the work. There was a man who died in 1859 who was the mainspring of the Pharmaceutical Society, and whose ideals had been followed ever since; that man was Jacob Bell. He assisted in founding the Society, and the first of his ideals was to obtain unity in the trade. Next he strove for a thorough education for everyone coming into the trade. Now they owed their education very much to the fact that Jacob Bell advocated the principle of making it compulsory, and he (Mr. Marshall Leigh) very much questioned if the matter had been left optional whether education would have advanced as it had. Jacob Bell's third ideal was to obtain Parliamentary recognition for the trade, but he was disappointed in his life, for it was nine years after his death that the Bill of 1868 was passed. He also worked with the object of increasing the professional status of chemists. The trade at the present time was very much higher than it was twenty years ago in the simple matter of assistants, and it was also higher so far as concerned the interests of the community. Jacob Bell further put before the trade an ideal of great importance, viz., the pecuniary interests of pharmacy. A good many complained about the bad state of trade and the difficulty of making a living. As a trade they were just adapting themselves to fresh conditions, and the public was also adapting itself to them. They could not adapt themselves to all the conditions of trade in a generation, but in time the public would undoubtedly appreciate the higher education of the chemist more than it did twenty or thirty years ago, when there was no compulsory education at all. Those were the ideals which Jacob Bell worked up to, and they were the principles and objects of the Pharmaceutical Council to-day. He (the speaker) did not suppose there were any present who complained of the work of the Council; they were too enthusiastic and too eulogistic, but there were some who said the members of the Council were working for their own ends and did not care two pins for the trade. Although he had only been a member of the Council for three years he could say that there was not a member who was not actuated by a pure desire to help the whole trade. They were ready to sacrifice their time and labour and thought for the good of the trade. There were men on the Council who gave a certain standing to the trade, and he need hardly say that at the present time there was a man amongst them who was head and shoulders above them. He was a man who had devoted time and talents and money for the good of the Society; he entered with the greatest earnestness into the management of the Society and into the ideals he (the speaker) had put before them. That man was Michael Carteighe. He might bespeak for him and the Council their very cordial support.

Mr. Yates next submitted "The Brighton Association of Pharmacy," and during the course of his remarks thanked the local Senior Association for its gift of prizes for competition by the unqualified members of the Junior Association. He had no doubt, he added, that it would greatly tend to the increase of members.

Mr. Savage, replying on behalf of the Association, facetiously observed that it was a pity that such nice occasions as that should be marred by speeches; having to make a speech spoilt one's appetite and spoilt the dinner, too. Proceeding, Mr. Savage said that in 1809 there were three firms of chemists in Brighton, viz., Messrs. Brew, Glaisyer aud Kemp, and Noakes. Since then they had increased year by year, and now they numbered about sixty; but until their Association came into existence there were no feelings of cordiality existing between them. Thanks to their old friend, Mr. Alderman Cox, that gentleman brought them together and showed that it was possible for chemists to enjoy themselves socially. Many had been the happy occasions they had spent with him, and he trusted he would be long spared to entertain them. He also hoped that this pleasant relationship would long continue, and whenever he could be of service to the Association he should always be happy to extend it.

Mr. Ince, who was greeted with loud and prolonged applause, rose to propose the toast of "The Brighton Junior Association of Pharmacy." He said that he was quite sure that all present, and particularly those interested in the Association, were glad to call Mr. H. W. Kilby Pears "Mr. President." The first observation that occurred to him in connection with the toast was that he was very glad to be present, and secondly he was equally pleased to see their friend in the chair

He recollected him perfectly well as the earnest and energetic student, and again, when the intellectual air of London acted upon him to the loss of his health. He was, however, pleased to find that he was once more quite himself and restored. It would be a great want of taste to endeavour even to venture to praise a man before his face, and he must really pass over what he had to say in his praise. But he recollected in proposing the toast of the Junior Association he might say something in connection with himself. During the past month they had been as usual, he would not say "overwhelmed," but certainly "visited" by a great number of addresses. Some of them contained a certain tone of disappointment and discontent, as if the world had gone wrong with assistants in particular and young associations and associates also. He had read every address that had been delivered that was in print, and when he came to that presented by the Brighton Junior Association it seemed to him something like a ray of sunshine. It was conceived in a hopeful spirit, and he thought that that was exactly the spirit they ought to come to. He had no hesitation in saying that during the whole course of his life that spirit had marked his conduct, and moreover he had found it was the right course. He did not believe in a man hanging his harp on the willows and giving way to weeping, which would not do much good to himself. In every circumstance of life there was not one of them who would not have to contend against something which he would rather not. To put it in the mildest way; circumstances happened in every man's life—pharmacists or others—which he would rather not occur. Well, then, surely the best way was, as these difficulties were bound to happen and they would have to contend with them, not to mourn over them, but to meet them fairly. That advice, he was sure, was good for young associates. It was a true old adage that said, "He that observeth the winds shall not sow, and he that regardeth the clouds shall not reap." Taking things altogether, they had no right to complain, they had no need to indulge in a spirit of discontent or a spirit of melancholy. He had decided that if anyone had a cause for that sort of spirit it was their predecessors and his predecessors, not them. On occasions when he had been sitting by the side of his elders on public occasions, they had told him what happened to them in their youth—not at all in a spirit of compliment, not the slightest, only a statement of fact. They told him about the hours being so very long, and the work so very hard. His own father, with whom were associated many in these circumstances, had said, "We have had very long hours, but those of my son shall be shorter; we have had hard work, but that of my son shall be easier, and I have endeavoured to the best of my means to give him the soundest possible education." The noble generosity they had shown to their descendants, had its reward. He thought he might further trespass upon them for two or three minutes—stating what he conceived to be the actual position of pharmacy at the present time. The chairman would recollect that every Thursday, and to-morrow the time would come again, he was in the habit of standing before quite as many persons as there were in that room just as he heard the great clock of St. George's strike four, and he never for one moment kept them beyond the earliest moment for dismissing them. He never detained them for one moment beyond the time, and he would not fall into that error that night. Those young men would in a year or two leave their technical studies and enter into active life, and in order to learn their business they must devote their heart and soul to it. They must learn it straight; if they did not know it, endeavour to do so. Let them put forth their entire energies; know how to buy and sell and how to please the customer. They must all consider the actual dignity of trade. Mr. Marshall Leigh had alluded to those they had in the Council who did not despise trade interest. Although he was engaged in literary and scholastic training, he was not amongst those who looked down upon and neglected the interest of trade. He would say if he failed in certain dignity of trade it was his fault, and was not certainly due to the want of appreciation. The whole matter could be summed up in one sentence. The man, although a chemist, who despised chemistry, and the man, a pharmacist, who looked coldly upon pharmacy, and the man of drugs who bought drugs to sell retail, and knowing nothing about them, their therapeutic action, their history, where they came from, everything science taught with respect to materia medica, that man did not understand the training of the nineteenth century. He now proposed "Prosperity to the Junior Chemists' Association," may it continue, that was the great thing, and increase in popularity, and having done that he would say further let them cultivate the social amenities of life, and secondly endeavour to let their work bear upon the best interests of the Society. It was his greatest possible pleasure to associate with the toast the Chairman and old student, Mr. Kilby Pears.

The President, in reply, said it was his pleasure to express to Mr. Ince their sense of gratitude for the way in which he had spoken to them. He was quite sure the words of wisdom they had heard from that gentleman would make a deep impression upon them, coming as they did from the uncrowned prince of pharmacy. They must not think they had reached the summit of the profession. Science had progressed by leaps and bounds. Music had never gone beyond the works of Mozart and Beethoven, poetry was in its zenith in the days of Homer, but science was still in its infancy. Having referred to the discoveries made in relation to chemistry during the last few years, the speaker said they must not be behindhand in these matters; they must be familiar with all the crystalline principles which were being brought to light, and take to heart deeply the advice coming from such a source as Mr. Ince. It was the favour with which such men looked upon their Association that would enable them to strive to make the Association more and more a success.

Mr. Hulme next proposed "The Visitors," and during the course of his remarks he said they were delighted to see Mr. Ince amongst them. He remembered being plucked by him at the South London School of Pharmacy, and was very sorry for it. He thought the Pharmaceutical Society could not have a better President than Mr. Michael Carteighe; at one time he was with him as assistant and never had a better master.

Mr. Goyne Stevens briefly acknowledged the toast, remarking that he recognized Mr. Ince as the writer of some clever articles on "Percolation" in the *Pharmaceutical Journal.*

Mr. Histed also replied and expressed the pleasure he felt in seeing the son of his friend Mr. Kilby Pears in the chair, both of whom he had known, the former during the whole of his life and the latter for a great many years.

Mr. Marshall Leigh then submitted "The Health of our Friend and Visitor, Mr. Ince." He (the speaker) thought that not many of them knew the history of Mr. Ince. He had been engaged in pharmacy long before most of them were born. He was one of the staff of the *Pharmaceutical Journal* long before he (the speaker) saw the light of day, and he had been working in pharmacy ever since, and had also for some years taught pharmacy to students at the Square with remarkable success. He had not only been the guiding light to students, but an inspiring agent, stimulating his pupils to work and make the best of their ability. He taught young men to be manly, to

do things thoroughly, and that was the kind of man they wanted to educate the students at the Square.

The toast having been drunk and accorded musical honours—

Mr. Ince, who was again received amid loud applause, returned thanks for the compliment, and added that he wanted to cultivate their powers of observation. He illustrated his remark by saying that last August he had occasion to visit Mr. Sowerby at the Royal Botanical Gardens, having to obtain some specimens for the purpose of a botanical examination. Mr. Sowerby then mentioned an incident concerning the celebrated Rob Roy Macgregor and a great duke. It appeared that they visited Egypt and were conducted to the presence of the Khedive, whose custom it was to present illustrious visitors with a mummy. The duke brought his mummy home, and while examining it discovered a few grains which he duly planted, being certain in his own mind that they must be some thousands of years old. The grains proved fertile and the result was reported to Mr. Sowerby, who, however, was sceptical as to the supposed age of the grains. An inquiry in Egypt revealed the fact that the mummies had been kept under some stables, and further examination showed that there was a hole in the case containing the mummy, and that the grains must have entered it; the grains turned out to be ordinary domestic oats. It was a very good thing, Mr. Ince added, for those engaged in scientific pursuits to cultivate the powers of observation.

GLASGOW CHEMISTS AND DRUGGISTS' ASSISTANTS' ASSOCIATION.

A smoking concert under the auspices of the Association was held in Ancell's Rooms, Virginia Street, on October 23. Mr. James Robb, President, occupied the chair, and there was a fair attendance.

An enjoyable programme consisting of songs, readings, etc., was carried through in an effective manner by Messrs. Bruce, Crail, Allan, Winton, Laing, Leiper, Livesey, Henderson, Davidson, Cairncross and others.

The usual fortnightly meeting was held in the Waterloo Rooms, on Wednesday evening, October 28. Mr. James Robb, President, in the chair.

Mr. Alexander Laing, one of the Vice-Presidents, delivered an address on "The Future of Pharmacy."

Mr. Laing in commencing said that he had set himself the task of answering several pertinent questions in connection with the problem how chemists might live comfortably by hindering the public from dying comfortably. Referring to the question why chemists are not richer he said he would like to see them in a position of greater dignity, to which if they could assert themselves they had every claim. It was quite natural when three delicate plants tried to grow where the soil afforded only nourishment for two that one of them would die, or that all three would linger on in a condition of natural debility, and the struggle for existence became severe when the nourishment that should go to enrich the plants was absorbed by weeds. Weeds were of a pushing disposition, and when once they got rooted anywhere they would flourish at the expense of plants of the more delicate and higher order. If the plants were British pharmacists and the weeds grocers, drapers, etc., the conundrum was answered. If it were only in regard to patent medicines that competition with such persons became necessary he thought pharmacists would add to their dignity by discarding them altogether. People generally were unconscionably ignorant about medicines and had a firm conviction that the chief aim of a druggist was to dupe them. A bottle of water with a nasty taste and thirteen pence profit out of every shilling was the popular photograph. But their position from the aspect of profit might be totalled up by saying that with an education above the commercial and a calling at the least semi-professional, they had less scope than the trader and a turnover measured by shillings by the side of pounds in other businesses. Then they had given their services on Sundays and holidays until the public looked upon them as a due. On the other hand they had the privilege of selling poisons, but in doing so they were more concerned for the welfare of the public than for their own interests. The fate of the Pharmacy Bill showed that Parliament had more regard to the claims of unregistered assistants and grasping employers than to the interests of pharmacy. The Bill was weak because the Council did not take counsel before making up its mind and then it stuck to its own baby. Had the Bill passed it would have been still-born, for a curriculum was practically in vogue at the present time and that comprised the chief work of the Bill. If they were to be guardians of the lives of the public let them claim compensation in other matters. What was the advantage of passing an examination and debarring themselves from taking that part in public affairs for which other citizens had leisure merely for the sake of selling poison. He would have chemists strike against the necessity for taking out a medicine stamp licence or placing a stamp on any article they sell. He would like the whole order of pharmacists to join in demanding the repeal of the Poisons Act. He knew Parliament would not dare to grant the request, and if it did pharmacists would not suffer much; but it would be the means of calling attention to their claims and then they could demand redress. The law relating to the sale of poisons was flagrantly infringed in Glasgow almost openly day after day. Then whilst the medical man might ring the changes on half a dozen or so official drugs pharmacists had to be acquainted with the whole of the Pharmacopœia and also keep up with and stock every new preparation introduced. In Glasgow it was computed that there were three doctors' shops to one qualified druggist, which was right enough if they were run fair; but many shops were owned by unqualified druggists, who were assisted in evading the law by medical men. The first requisite for the future of pharmacy was a united body of druggists, and the Pharmacetical Society was the true and natural nucleus round which to gather. Mr. Laing said he held no brief from the Society; he was not even an associate. But the Society was what its members made it, and if the collective forces of pharmacy joined it they could mould it to their interests and will. Then the Society could with a firm voice present its petition to Parliament, and ask for that protection which is given to the professions of medicine, law and dental surgery, and the exclusive right to deal in medicines. There would then be no more quackery; no duplicating saturated solution of Blaud's pills, or concentration of triple phosphates. What was a pharmacist worth if he could not himself make up any preparation the medical profession could legitimately use? He had more respect for the tinctures, syrups, and pills made by his own hands, or under his immediate observation than for any similar preparations purchased ready made. The future pharmacist must be honestly his own stockmaker wherever practicable. There was a noble principle in the medical profession which chemists would do well to emulate, that any discovery that was likely to be of general service should be made the common property of the whole craft. Mr. Laing concluded by appealing to pharmacists to show an honourable spirit of independence in asserting their dignity as a profession, and avoiding that sphere of unnatural and degrading competition which shames every principle of political economy, and is alike disreputable to those who practise it and those who encourage the practice.

A discussion followed in which Messrs. McKellar, Crail, Bruce, Robertson and Robb took part, the general opinion being that chemists should as far as practicable prevent medical men from prescribing proprietary medicines, or the future pharmacist will be little else than a middle man between the manufacturing chemist and the patient.

Proceedings of Societies in London.

THE WESTERN CHEMISTS' ASSOCIATION (OF LONDON).

At a Committee meeting held on October 28, the following gentlemen were appointed the officers for the ensuing year:—Mr. Long, President; Mr. Parker, Vice-President; Mr. J. H. Mathews, Hon. Treasurer; Mr. Andrews, Hon. Secretary.

It was resolved to hold the Annual Dinner at the Holborn Restaurant on Wednesday, November 18.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Local Secretaries.

Sir,—Your very excellent articles on the appointment of local secretaries deserve a hearty response from all chemists who wish to see the Pharmaceutical Society represent all the members of our craft, and I regret to see that you have justly to complain of the indifference, and want of interest shown by the trade in such an important matter.

We are too often inclined to blame the Pharmaceutical Society for not doing what we, who are ourselves the Society, ought to do, and progress will never be made until we awaken to the fact that our Society can only be strong and energetic when each individual member of the trade does his very best, either through himself or more effectually through his local secretary, to rally and efficiently equip all the members in his own locality for the keen warfare with stores, "cutting grocers" and illegal trading.

Now, how can this be best done? In the first instance by appointing men of energetic, genial, frank and honourable character, to the post of local representative; then by letting the local secretary know where there are cases of illegal trading in poisons, etc., so that he may inform the Society of these cases. For it is impossible that the Pharmaceutical Society can put a stop to these illegal traders when they are not made aware of their existence either through the local secretary or direct to Bloomsbury Square.

Next, by having a room for occasional meetings of the members in the district. This can be had now at the examination centres. But in many towns that are not centres for examination the members of the craft have no special place of meeting together and discussing matters affecting the trade, such as additions to the B.P., synonyms and uniformity in prices, or to discuss legislative measures that are before the House of Commons, and prepare petitions to members of parliament on legislation affecting the whole trade.

In a former letter I wrote regarding the indifference and laziness of local secretaries that I myself knew, and it was because after bringing matters such as you refer to in last week's Journal before their notice, and asking them to take action in these matters, and finding that they would do nothing whatever in the matter, that I characterized them as lazy and indifferent. And this occurred in more than one instance, or I would not have made such a grave charge against them, and, at the same time, I appealed to the craft to nominate for the important office of local secretary men who are willing to work for the common weal, and for the apparently far off millennium of professional etiquette and common brotherhood as it already exists in the medical and legal professions.

I apologize for taking up so much of your valuable space, and trusting that a brighter and a happier day is in existence for our much abused Pharmaceutical Society.

PROGRESS, M.P.S.

The Sale of Poisons.

Sir,—In your issue of last week your correspondent, Mr. T. H. Powell, roundly accuses wholesale druggists of neglecting to take "common precautions" in the matter of the supply of poisons to their customers. The indictment is severe, but if, as affirmed by Mr. Powell, the practice of sending out packages containing poisons without labelling them as such obtains generally, then, as a body of wholesale distributors of drugs, we could have none other than a legal cause for complaint if a strong prejudice were to set in against us.

Without affecting to possess a knowledge of the plan adopted by other drug houses, or presuming to dictate to them with respect to the storage of poisons, and the manner of their presentation to retail pharmacists, we may briefly state the precautions against risk of errors taken by our firm. In both wet and dry departments separate rooms are set apart for all deadly drugs, which are dealt out only, or put up to order, by competent assistants. The wrapper or bottle containing a scheduled poison is labelled with the name of the article, the word poison, and bears the firm's name and address. Further, as a distinguishing feature, the wording of the label is printed in red ink.

That poisons should be supplied in "bottles of such peculiar shape that accidents would be impossible" seems wholly unnecessary, as they, for the most part, simply act as carriers between the wholesale trade and retail chemists.

HEARON AND CO.

Collodium Belladonnæ B.P.C.

Sir,—Reading Mr. Conroy's excellent paper on collodium belladonnæ, I came to the conclusion that the fault in the preparation was due to the alkaloids existing in the extract as salts. I would suggest to the authors of the formula to add to the spirit of camphor used to dissolve the extract f℥ij of liq. ammon. 880 in the f℥iiss spirit camphor.

The free alkaloids would be readily soluble in the ether. The formula would then stand:—

Ext. Belladonnæ	℥v.
Sp. Camphor	℥iiss.
Liq. Ammon. 880	℥ij.
S. V. R.	℥iij.
Ether Rect	℥xii.

Dissolve and decant, or filter and add, pyroxiline 136 gr. Dissolve. I think this would overcome the difficulty.

JOHN LINFORD.

NOTICES OF MEETINGS.

Pharmaceutical Society.—Wednesday, Nov. 11, at 8.—Evening Meeting in London.—Lecture on "Evolution in the Flower," by Professor Green, M.A.

Pharmaceutical Society.—Wednesday, Nov. 11, at 8·30.—Evening Meeting in Edinburgh.—Inaugural Sessional Address, "Botanical Enterprise in Relation to Pharmacology," by Professor I. Bayley Balfour, M.D., F.R.S.E.

Chemists' Assistants' Association.—Thursday, Nov. 12, at 9.—Discussion on "The Importation of Foreign Chemicals," opened by Mr. J. C. Umney.

Brighton Junior Association of Pharmacy.—Wednesday, Nov. 11, at 9.—Short Papers.

Glasgow Assistants' Association.—Wednesday, Nov. 11, at 9.15.—Paper: "The Method of Science," by Mr. J. P. Gilmour.

Erratum.—On p. 344, col. i., in Dr. Stevenson's evidence, for "He estimated the aconitine in a dose as approximately *one-thirteenth* of a grain, and that was about half the quantity that had proved fatal to a healthy adult," read "He estimated the aconitine in a dose as approximately *one-thirtieth* of a grain, and that," etc.

Inquirer.—You are recommended to communicate respecting the supposed infringement with the Secretary, 17, Bloomsbury Square.

*** We have been compelled by want of space to defer the publication of several communications.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Bennett, Yates, Johnston, Foster, Proctor, Stead, Blount, Williams, Browne.

EVOLUTION IN THE FLOWER.

Notes of a Lecture delivered at an Evening Meeting of the Pharmaceutical Society, Wednesday, Nov. 11, *by*

PROFESSOR J. R. GREEN.

The flower has a special importance to us in studying the life history of the plant. It is the indication of its endeavour to discharge the second of the duties of the organism, the preservation of the species or the propagation of the race. It consists of parts whose meaning is only evident when regarded from this point of view. On a stalk there are superposed successive whorls of modified leaves; a conspicuous outer ring, often composed of two sets of leaves, known as sepals and petals, and within this two other whorls, the stamens and pistil. Of these the stamens develope in their club-shaped heads, or anthers, a number of grains of various forms, known as pollen, which give rise to what is the male element in reproduction. The pistil or collection of carpels developes the ovules, in which we have the female cell ultimately produced. The problem of reproduction involves the transference of pollen from stamen to carpel in an organism which itself is passive and motionless. The pollen must reach a particular portion of the carpel known as the stigma, which is usually its uppermost part, and here the changes leading to fertilization are initiated.

It has been found by Darwin and others in long continued experiments that the best offspring is produced when pollen from one flower is applied to the stigma of another flower, either on the same plant or on another plant of the same species. This cross-fertilization, as it is called, has given rise to various curious and interesting mechanisms to secure it.

The original flower was probably one of a very humble type, such a one indeed as we now find on our forest trees. It had no particular colour and was not conspicuous among the foliage. It produced large quantities of pollen and was often provided only with stamens or with pistil.

It was fertilized by natural agencies, of which the wind was the most usual.

From such a type the various highly-coloured, scented, and curiously-shaped flowers we now know have been developed.

In the order of such development the aid of the insect world has been prominent. To effect the change from wind-fertilization to insect-fertilization is the initial difficulty; that once effected, various modifications would soon ensue, and those that were advantageous to the plant would be preserved by natural selection.

Now, insects are largely feeders on pollen, and it is easy to see how the vast amount of pollen produced by such a flower would attract an insect to visit it. The successive visits of the insect to various flowers would result in the deposition of pollen from one on the stigmas of others, so that the first insect-fertilized or entomophilous flower would arise. It would be in character, such as would be due to the influence of quite a short-lipped insect, with a feebly developed sense of colour. We find instances of these still existing, quite simple in structure, wide open, regular in shape, and offering only pollen to the insect, and either white or yellow in colour.

But many flowers offer another attraction than pollen, in the shape of honey. It is not uncommon to find honey secreted by other parts of the plant than the flower. If we suppose that this secretion of honey at some time came to be poured out on the flower, such a flower would have an increased attraction for an insect, and this property, possibly arising accidentally at first, would be perpetuated, and so the nectary come to be a regular part of the flower.

A further development would follow in the shape of various mechanisms for the shelter of the honey from rain, and so lead to its being hidden in tubes or spurs, and accessible only to particular insects.

This development, so briefly sketched out, has not proceeded along one line. Many visitors have been attracted by flowers, and each has led to particular modifications. I shall to-night consider only two of these, the fly and the bee.

The fly is an insect of a low order of intelligence, shy and lazy. It is attracted both by pollen and by honey, and the structure of its mouth enables it to eat both of these.

Its peculiar characteristics have led to the development of flowers which secure it in a kind of prison and retain it for a few days, ultimately releasing it. Such are the flowers of Aristolochia and Arum. In both these the fly enters by pushing past a fringe of hairs which are set at an angle inclined forward. The insect is by these prevented from going out. The stigmas of the flowers are ready to receive pollen on its entrance, and if it has emerged from another flower it is dusted with pollen, which as it crawls over the stigmas it leaves behind it. After a day or two the stigmas in the prison fade, and the anthers ripen and discharge their pollen, with which the visitor becomes coated. At this time the hairs wither and the fly is enabled to escape and to visit other flowers, where the same programme is repeated.

The low intelligence of the fly is taken advantage of by the so-called grass of Parnassus. In this a number of shining knobs are developed in part of the flower near the stamens, and from a distance these look as if coated with honey, and the fly, deceived thereby, visits flower after flower and effects fertilization.

A higher type of flower visited by flies is seen in Veronica, where honey is hidden in a small tube in the centre of the flower. To reach it the fly is obliged to hold on by the stamens, and in so doing it dusts its body with pollen, which on a visit to another flower is deposited in the stigma, this being so placed as to touch the insect before the stamens do.

The conspicuousness, however, which first attracted the fly also attracted other insects, whose visits did not always lead to the desired end. Even highly organised flowers still suffer from this disadvantage. The flowers of the Columbine, Oxlip and Bean are still visited by short-tongued bees, which cannot reach their honey in the legitimate fashion. These bite holes in the petals and steal it without benefiting the flower.

We have to look to this fact for the explanation of arrangements to protect the flower from these

depredators. We have these seen best in the so-called bee-flowers.

Bees as a class of insects are characterised by more intelligence and greater industry than flies. They have a higher colour sense and a more complex mouth. With these endowments we co-relate the fact that unlike flies they store up food for their young. Some of the more interesting types of bee flower are seen in the Leguminosæ, where elaborate mechanisms lead to the dusting of the visitor with pollen on the part of his body to which the stigma of the next flower must be applied. In Lotus the pollen is forced out of the flower by a sort of piston, made of the dilated ends of some of the stamens. This is made to work by the weight of the bee when it alights upon the flower. In the Broom the same effect is secured by a sort of explosion which takes place when the bee commences its search for the honey of the flower.

In the Violet a curious cup-like hinged projection has been developed which opens as the tongue of the bee, coated with foreign pollen, passes down the tube of the flower, but closes and covers up the stigma, when it is withdrawn carrying pollen from the flower's own stamens.

In the Barberry and in the Cornflower the stamens have become endowed with a peculiar irritability which subserves the same purpose of dusting the visitor with pollen.

In Salvia, the sage, a curious modification of part of the stamen into a lever leads to the pollen falling on to the back of the bee, where the stigma of the next flower visited finds it.

The various forms of orchids introduce us to still more elaborate mechanism, rendering fertilization without insect aid impossible.

The development of colour in flowers and the explanation of the various markings on the petals must be studied also in connection with insect life.

Probably white and yellow flowers were the earliest, the first distinction being drawn thereby between flower and foliage. These were visited probably by lowly forms of insects as they are to-day. When honey began to be secreted and hidden more distinctiveness was needed, and the insects with a high colour sense became the agents of further modification. The markings on the petals, usually straight lines or rows of dots, pointed the insect to the part where the treasure lay. So the development of blues and reds accompanied the evolution of the elaborate mechanisms already described.

Of lowly forms, with easily accessible honey, Müller has shown 60 per cent. are visited by flies, as against 3 per cent. by bees, while of reds and blues it can be noted that the reverse obtains. Flies visit yellow or white flowers more than twice as frequently as red or blue ones.

REPORT ON MEDICINAL PREPARATIONS CONTAINING POISON.

The following report, addressed to Mr. Ernest Hart, Chairman of the Parliamentary Bills Committee of the British Medical Association, appears in the *British Medical Journal* for the 7th inst.:—

"Analytical Laboratory, 20, Victoria Street, Westminster, S.W., April 6, 1891.

"Dear Sir,—In accordance with your instructions in reference to the analysis of medicinal preparations containing substances included in the Poisons Schedule of the Pharmacy Act, 1868, and commonly sold under the designation of 'patent medicines,' I have selected for the purpose of analysis several of those which are reputed to contain such poisons, and the following are the results I have obtained:—

No.	Morphine. Grains per fluid oz.	Strychnine. Grains per fluid oz.
1	2·58	—
2	0·20	—
3	0·45	—
4	2·50	—
5	3·11	—
6	0·67	—
7	0·15	—
8	—	—
9	0·08	—
10	0·14	—
11	—	0·05
12	—	0·10

13 contained 1·6 grain aconitine in the fluid ounce.

"Most of the preparations above referred to are prepared according to private formulæ, and the impropriety of the term 'patent medicine' as applied to them is shown by the fact of their composition being kept secret; while in the case of their being really the subject of letters patent, their composition would necessarily be disclosed in the specifications of the patents relating to them.

"The preparations Nos. 1, 4, and 5 contain amounts of morphine nearly equal to that required in the tincture of opium of the British Pharmacopœia, and therefore they are undoubtedly poisons within the meaning of the Pharmacy Act, 1868, and to which the provisions of that Act relate, namely, that they shall be sold only by duly registered persons, and that they shall be labelled 'poison,' with the name and address of the person qualified to sell them.

"The preparations Nos. 2, 3, 6, 7, 9 and 10 contain morphine in smaller amounts and approximate more in strength and general character to the compound tincture of camphor or paregoric of the British Pharmacopœia. But as they are 'preparations of opium or of morphine' they are by the terms of the Pharmacy Act 'poisons' to which the provisions of that Act apply.

"However, only three of these preparations are sold with poison labels attached, Nos. 2, 4 and 5, and all of them are largely sold by grocers, general dealers, stores and other unqualified persons, without any precaution or restriction. Nos. 1 and 2 contain small amounts of prussic acid, which would augment their poisonous effects if overdoses were taken, though the poisonous character is chiefly due to the presence of morphine. No. 8 contains prussic acid without morphine, and the agreeable character of the preparation is calculated to render it dangerous in the absence of a caution label.

"The preparations Nos. 4 and 5 are practically identical with the tincture of opium of the British Pharmacopœia, though sold under other names and with a medicine stamp, in order to bring them within the exemption of 'patent' medicines, provided by the 16th section of the Pharmacy Act. There is, however, nothing to justify their being so regarded, and they appear to be simply illustrations of the devices by which the demand for narcotic drugs is supplied, and the protective provisions of the Pharmacy Act are evaded with impunity.

"The preparations Nos. 11 and 12, though containing different amounts of strychnine, are sold under the same name, and in neither instance is the poison label used.

"The preparation No. 13 is intended for external application, and it is labelled 'poison.'

"I have given the results of my analysis under numbers, in case you might wish to publish them, and for your private information add below the names of the several preparations. Yours very truly,

"Benjamin H. Paul."

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, NOVEMBER 14, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

PROPRIETARY MEDICINES CONTAINING POISON.

ON several occasions the sale of proprietary medicines containing poison has been under consideration by the British Medical Association, and in consequence of the repeated occurrence of cases of accidental or suicidal poisoning, in which preparations of that kind have been the cause of death, a strong opinion has been expressed that the indiscriminate sale of such preparations without regard to the provisions of the Pharmacy Act, constitutes a serious source of danger to the public. The recent report of the proceedings of the Parliamentary Bills Committee of the Association shows that this subject has not been lost sight of, and Mr. ERNEST HART, as the Chairman, drew attention to the fact, that the Government has distinctly announced its intention, when occasion arises, to prosecute the sellers of proprietary medicines that contain poison and are not labelled "poison" as the Act requires. As the verdict of a coroner's jury would be the occasion most likely to lead to such action on the part of the Government, public safety in regard to the sale of proprietary medicines containing poisons would only be partially protected in that way, and it is now intended to provide further protection by preventing the illegal sale of such preparations. With that object a number of them have been submitted to analysis, the results of which, showing the kind and amount of poison present, will be found at page 386. The Committee of the British Medical Association contemplates making the facts thus established available for public and legislative purposes by calling upon the Pharmaceutical Society's Council and the Solicitor to the Treasury to institute a series of prosecutions.

A resolution was unanimously adopted by the Committee, authorizing the adoption of that course, and requesting the Chairman to take such steps as may seem most advisable to induce the Pharmaceutical Society to put in force the power entrusted to it by Act of Parliament, with a view of preventing the sale of proprietary medicines containing poison by persons not otherwise authorized for the sale of poisons. In the course of the proceedings reference was made to a recent case, in which a woman was believed to have died from the effects of an undue consumption of cough lozenges containing morphine. At the inquest held in that case the coroner is reported to have remarked that there is no restriction on the sale of patent medicines however poisonous they may be. This remark, however, is not quite correct, unless its application be limited to the irregular practice that prevails in regard to the sale of such medicinal preparations. The prosecution instituted by the Treasury* two years ago is distinctly at variance with such a view as the coroner's remark appears to convey. That prosecution showed that the Government regards the sale of proprietary medicines containing poison as being covered by the provisions of the Pharmacy Act, 1868, and the intention then expressed on behalf of the Public Prosecutor of pressing the matter whenever occasion arose left no room for doubt as to the construction which the Government intended to put upon the Act. It may be expected that the British Medical Association will now provide the occasion that is required.

At the evening meeting of the Pharmaceutical Society last Wednesday in Edinburgh, a vote of thanks was passed to Professor Bayley Balfour, on the motion of Mr. Stephenson, seconded by Dr. Cleghorn, and a full report of the lecture will appear in this Journal next week.

* * *

In the Journal of 31st October mention was made of the probability that a fatal case of lead poisoning, which has recently occurred at Wakefield, might lead to a public inquiry into the condition of the water supplied to that town. The coroner's inquest, opened a fortnight ago, was adjourned in order to ascertain what steps would be taken by the Local Government Board in regard to the numerous cases of lead poisoning that are stated on medical authority to have occurred at Wakefield, and are alleged to be traceable to the water supplied by the Wakefield Corporation. A letter from the Local Government Board has now been received by the Leeds coroner, in which it is stated that having considered the representations made to its inspector by the Wakefield Urban Sanitary Authority, in reference to the death attributed to lead poisoning, it is deemed inadvisable to intervene in a case which is the subject of inquiry by the coroner. At the same time the Board realises the importance attaching to the general subject of the impregnation of moorland water with lead, which has been receiving attention from the Board, and will be further investigated on its behalf. In the meantime another death from lead poisoning has occurred at Wakefield. If the information furnished in reply to inquiries addressed to medical practitioners in the Wakefield district may be taken as a measure of the danger to be apprehended from the presence of lead in the water used for domestic purposes it must be very serious. It is stated that during the months of July and August there were no less than 175 patients under treatment for lead poisoning, and that in some parts of

* *Pharm. Journ.*, xx., 805.

the district nearly all the inhabitants show the characteristic signs of the influence of lead. At present some uncertainty prevails as to the source of the lead said to be present in the water, and it is a question whether it results from the action of the soft water upon the leaden pipes through which the water is conveyed or whether the impregnation takes place at an earlier stage.

* * *

At the annual meeting of the National Wholesale Druggists' As oc ation of the United States, which was held in Louisville last month, the question of "cutting" came under consideration, and eight "conditions" were adopted as a basis upon which a systematic attempt might be made to confine dealings in proprietary articles to persons who will retail them only at their full price. The proceedings were the outcome of the action taken by the American Pharmaceutical Association in May last, and the "conditions" were the result of joint deliberation between the representatives of that Association, the Wholesale Druggists' Association, the Proprietors' Association and the Retailers' League. The "conditions" provide that manufacturers and owners of proprietary preparations agree to sell their products only to druggists, wholesale dealers in proprietary medicines and established agencies, and that the wholesale dealers and established agencies shall not sell such articles, except at full retail prices, to retail dealers who will not undertake to maintain full retail prices. In the event of a breach of this agreement the name of the offender is to be placed on a "cut off list," and whilst it is there he is not to be supplied by any of the parties contracting except at full retail prices. The "conditions" having been adopted, a resolution was passed expressing the opinion that the success of this or any plan is dependent upon a thorough organization of retail druggists throughout the United States, and pledging the Wholesale Druggists' Association, as soon as this is effected, to give every aid in supervising and publishing the "cut off list" of names, when these are reported by the associated retailers, provided that upon consultation with counsel such publication shall be found to be legal. It will be seen, therefore, that much of the potency of this plan is dependent upon the decision as to whether an offender's name can be published in the "cut off list" without breaking the law.

* * *

In the list of persons who were on the 9th instant elected to the office of Mayor for the ensuing year, we notice the following :—Burnley : Mr. William Parkinson, Chemist and Druggist ;—Canterbury : Mr. William Mount, Pharmaceutical Chemist ;—Chippenham : Mr. J. C. Cole, Pharmaceutical Chemist and Local Secretary to the Pharmaceutical Society ;—Hereford : Mr. W. F. Chave, Pharmaceutical Chemist ;—Hyde : Mr. Joseph Wild, Pharmaceutical Chemist, for many years Local Secretary to the Pharmaceutical Society ;—Nottingham : Mr. Richard Fitzhugh, Pharmaceutical Chemist ;—Rye : Mr. W. A. Waters, Chemist and Druggist, Local Secretary to the Pharmaceutical Society. In Scotland, Mr. John Buchanan, Chemist and Druggist, has been elected a Councillor of the Royal Burgh of Cullen, and Mr. William Ramsay Kermath, Chemist and Druggist, has been elected to the office of Baillie at St. Andrew's.

The necessity of providing for the adequate instruction of students who intend to follow pursuits involving scientific knowledge and training has just been forcibly expressed in a memorial addressed to the General Medical Council. This memorial suggests the propriety of including in the curriculum of study for medical students the subjects of hygiene and preventive medicine, inasmuch as they are subjects upon which every medical practitioner should have some precise knowledge in order to satisfy the requirements of his daily avocations. The memorial bears the signatures of between three and four hundred medical officers of health, physicians, and surgeons.

* * *

A case is recorded in the *New York Medical Journal* of a patient who swallowed a quantity of iodoform that had been ordered for external application. Twenty-four hours afterwards he was attacked with violent headache, colic and diarrhœa, which lasted through the following day. On the third day the pains disappeared, though the irritation remained. The breath, too, stank of iodoform for several days, and a disagreeable taste remained in the mouth for a long time.

* * *

In the current number of the *Lancet* Dr. Sang records a case of fatal poisoning by epsom salts. A woman of about thirty-five years of age, having obtained "twopennyworth of salts," emptied the packet, containing four ounces, into a tumbler, added sufficient hot water to nearly dissolve the salts and drank the whole. When Dr. Sang was called in, shortly afterwards, he found the woman suffering from a burning pain in the stomach, difficulty of breathing and a sense of loss of power in the limbs, but there was no vomiting or purging. An emetic of thirty grains of zinc sulphate failed to act, and before a stomach-tube could be obtained the patient fell into a collapse, followed by death about one hour and a quarter after taking the salts.

* * *

At a recent meeting of the Royal Horticultural Society an enormous flower of a species of *Aristolochia* was exhibited from Kew. The flower was 22 inches long by 18 inches broad, and had a tail 34 inches long ; it was of a creamy tint, flushed with rose, and was marbled with purple veins and had a velvety black throat. The plant has been identified by Mr. Hemsley as *Aristolochia gigas*, Lindl., and is said to be very nearly allied to *A. grandiflora*, L., a species described by Dr. L. Planchon as distinctly poisonous to animals and evidently possessing very marked properties. This, like several of the allied species, possesses a fetid odour like that of decaying animal matter, which doubtless causes insects to visit the flowers and cross-fertilize them. An illustration of the flower of *A. gigas* is given in the *Gardeners' Chronicle*, November 7, p. 553.

* * *

Another curious plant, *Stapelia gigantea*, from South Africa, and known from its evil odour as the "great carrion flower," attracted considerable attention at a subsequent meeting of the same Society on account not only of its odour but of its singular resemblance in appearance to a star fish, the five fleshy lobes of the corolla being of a biscuit colour, with close, wavy red veins, and the centre of the flower crimson.

Transactions of the Pharmaceutical Society.

EVENING MEETING IN LONDON.

Wednesday, November 11, 1891.

MR. MICHAEL CARTEIGHE, PRESIDENT, IN THE CHAIR.

The second evening meeting of the Session took place on Wednesday, the 12th inst., when Mr. Michael Carteighe, President of the Society, took the chair at 8 o'clock.

The PRESIDENT, in opening the proceedings, said he would first supplement what he had done five weeks ago, by presenting to Mr. Garnett, as the winner of the silver medal prizes in the Society's School of Pharmacy, two important books, the 'Pharmacographia' and the 'Science Papers,' which were presented by Mr. Thomas Hanbury in memory of his brother, their author. On the last occasion the stock of those books in the hands of the Society was exhausted, and he was unable, therefore, to present them; but on placing the matter before Mr. Hanbury that gentleman very generously purchased from the publishers a number of copies of the 'Pharmacographia,' and also presented the Society with a number of the 'Science Papers.' He would, therefore, now present these books to Mr. Garnett.

The PRESIDENT then invited Professor Green to deliver his lecture on—

THE EVOLUTION IN THE FLOWER.

A *précis* of this lecture, which was beautifully illustrated by a large number of lantern slides, will be found at p. 385.

At the conclusion of the lecture—

The PRESIDENT proposed a cordial vote of thanks to Professor Green, and congratulated the Society on having such a Professor of Botany attached to it.

Mr. HAMPSON seconded the vote of thanks, which was carried with acclamation and briefly acnowledged by Professor Green.

The meeting then adjourned.

DONATIONS TO THE LIBRARY AND MUSEUM.

At the meeting of the Library, Museum, Laboratory and House Committee, held on Wednesday, the 11th inst., the following Donations were announced, and it was ordered that the thanks of the Society should be communicated to the respective donors:—

To the Library in London—

City of London College, Calendar, 1891.
From the COLLEGE.

Mason Science College, Calendar, 1891.
From the COLLEGE.

Owen's College, Calendar, 1891.
From the COLLEGE.

Royal College of Surgeons of England, Calendar, 1891. From the COLLEGE.

Nova Scotia Institute of Natural Science, Proceedings and Transactions, vol. 7, part 4.
From the INSTITUTE.

Geological and Natural History Survey of Canada, Annual Report, 1888–89. From the SURVEY.

West (W.), Additions to the Freshwater Algæ of West Yorkshire, 1891.

— Notes on Danish Algæ, 1891.
From the AUTHOR.

Balland (A.), Recherches sur les cuirs employés aux chaussures de l'armée, 1891.
From the AUTHOR.

Taylor (A. S.), Manual of Medical Jurisprudence, 12th ed., by T. Stevenson, M.D.
From the EDITOR.

Berthelot (P. A. D.), Étude sur la neutralisation des acides et des bases par la méthode des conductibilités électriques, 1891.

Demont (L.), Contribution à l'étude chimique du chloroforme, 1891.

Deschamps (G.), Étude comparative des codex français, 1891.

Gérard (E.), Recherche sur quelques corps gras, 1891.

Hugounenq (L. J.), Recherches nouvelles sur les vins, 1891.

Perrot (E.), Contribution à l'étude histologique des lauracées, 1891.

Poulenc (C.), Sur un nouveau corps gazeux, pentàfluochlorure de phosphore, 1891.

From the ÉCOLE SUPÉRIEURE DE PHARMACIE DE PARIS.

To the Museum in London—

Specimens of the root of *Gypsophila Arrostii*; of Kattah, freed from Catechin by the filter press, from the N. W. Provinces of India; of Catechin and of Catechu freed from Catechin, from Oudh; and of a section of the trunk of *Santalum Freycinetianum* from Hawaii.
From the DIRECTOR, Kew Gardens.

Specimens of the Ordeal bean of Madagascar (*Tanghinia venenifera*).
From Mr. F. J. SCOTT ELLIOT.

Specimen of Japanese refined camphor.
From Messrs. HEARON SQUIRE and FRANCIS.

Specimen of a gall on *Rubus fruticosus* and of some unnamed crystals. From Mr. LE FEVRE.

Specimen of the root of *Atropa mandragora*.
From Mr. J. BURT.

To the Museum in Edinburgh—

Specimen of the fresh fruit of *Podophyllum peltatum*. From Dr. ALEXANDER PATERSON.

Specimen of Chinese Varnish.
From Mr. W. B. DENYS.

To the Herbarium—

Specimen of a species of Curcuma.
From the DIRECTOR, Kew Gardens.

Forty-three specimens of British plants.
From Mr. G. C. DRUCE.

Specimen of the fruits of *Mangifera indica*; of half ripe tamarinds; of East India tamarinds; of areca nuts preserved wet; of specular iron ore in cubes, from Herat; of Podophyllin from *P. Emodi*; of Thymol from Ajowan seed; of the fruit of *Adansonia digitata*, and of Indian pastille tapers; of seeds of *Entada scandens*; of Butea kino and of seeds of *Strychnos potatorum*.
From Mr. J. W. BOWEN.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

On Wednesday, the 4th inst., the monthly meeting of the Council was held at the Society's House, No. 67, Lower Mount Street, Dublin, the Vice-President, Mr. T. W. Robinson, in the chair.

The other members of the Council present were Messrs. Hodgson (Treasurer), Beggs, Charles Evans, W. F. Wells, McCormack, Boyd, Lyons, Grindley, Dr. Burnes and Simpson.

A letter was received from Mr. David Morrow stating that he intended to present himself at the examination for the licence and had served three years and eight months with a registered druggist, and he desired to

know whether he could complete the required term by serving two years and four months with a pharmaceutical chemist.

Mr. Beggs: Certainly.

The Registrar was directed to reply in the affirmative.

A letter was read from Mr. Richard Blair, of Cork, enclosing a subscription and asking to be proposed a member of the Society upon the condition that the *Chemist and Druggist* was supplied to him.

A letter was read from Mr. J. W. McNeight, associate druggist, asking that a subscription which he had paid on behalf of Mr. Daniel Brogan, associate druggist, should be refunded.

The Registrar explained that Mr. McNeight had included Mr. Brogan in a number of gentlemen whose election as associate druggists he proposed, and had paid subscriptions *in globo* for all, not knowing that Mr. Brogan had previously paid his subscription in the month of February, which, however, only covered the balance of the commercial year.

Mr. Boyd said the case would be met by informing Mr. McNeight that Mr. Brogan would not be a member next year unless the second guinea was paid.

A letter was read from a candidate at the October Preliminary examination who had been rejected, asking could he be allowed to present himself at the Preliminary examination to be held next January.

Mr. Wells: You cannot allow him to come in sooner than six months after the examination at which he was rejected.

The Registrar was directed to write to the gentleman to that effect, but further informing him that he could go in at the next examination on the old curriculum, if he should so desire.

A donation was received from the Mason Science College of a copy of the Calendar for the session 1891–2.

On the motion of Mr. McCormack, seconded by Mr. Beggs, thanks were voted to the donors.

A number of reports were discussed and adopted.

Public Dispensing Appointments.

The Vice-President said the next business was the consideration of the following resolution, which was passed at the general meeting of the Society held in October:—"That the Council of the Pharmaceutical Society use every means in their power to secure the rights of their licentiates to public dispensing appointments for which they are qualified, and in order to do so that they communicate with the Local Government Board with a view to the general amendment of the warrants still unamended, and that a direction be asked from the Local Government Board as to the duties of persons holding such appointments."

Mr. Wells said the resolution was passed in reference to an appointment made at the Grand Canal Street Dispensary of the South Dublin Union. The Dispensary Committee advertised for a "pharmaceutical chemist or apothecary," and they appointed an apothecary in consequence of a letter which was written to them stating that if they required a gentleman to perform the double duties of dispenser and prescriber they should appoint an apothecary. But with that matter the Council had nothing to say. All that they desired to do was to place their licentiates in such a position that all the appointments as dispensers in poor-law unions throughout Ireland would be legally open to them. He found that under the existing regulations, even if the Committee at the election in question had appointed a pharmaceutical chemist, the Local Government Board would not have ratified the appointment. In proof of this, he would read a letter from the Local Government Board, dated September 14, 1891. Mr. Wells read the letter, which referred to the proposed appointment of a compounder of medicines for the Grand Canal Dispensary, and proceeded:—"I am to point out that the order under the seal of the Local Government Board at present in force provides for the appointment of an 'apothecary' as the compounder of medicines at the dispensary in question. I am to add that in this case of a dispensary where a sealed order is in force authorizing the appointment of an apothecary only, a pharmaceutical chemist cannot be appointed to discharge the duties, except the original sealed order be previously withdrawn or amended, which is only done on application to the Local Government Board to that effect, and no such application has been made by the South City Dispensary Committee." Sir George Owens spoke to him (Mr. Wells) on the matter, and on his telling him that a sealed order was in existence he said he did not know anything about it, and that had a pharmaceutical chemist obtained a majority he would have declared him elected. Another member of the Committee told him (Mr. Wells) that he never heard of the order, and that he voted for the pharmaceutical chemist, and he promised that if he found that such a sealed order was in existence he would do his best to have it repealed. He (Mr. Wells) now asked the Council to adopt the following resolution:—"That the Local Government Board be requested to receive a deputation from the Council *in re* the appointment of dispensers to the Poor Law Unions." If it should turn out that the Local Government Board had no power to approach the unions in which sealed orders existed, the deputation could at all events get a list of those unions, and the guardians could be written to pointing out the difficulty they would be in some day if they did not get the sealed orders repealed. But as the matter now stood, if the pharmaceutical chemist had been chosen at this election it would not have been ratified by the Local Government Board, and the guardians would have had to apply to get the sealed order rescinded, and afterwards to advertise a fresh election, which would have taken about two months.

Dr. Burnes: The Local Government Board would place us in a peculiar position if they were to tell us to wait on all the poor-law unions in Ireland and ask them to get the orders repealed.

Mr. Wells: The Local Government Board told us that they had no power to ask them to withdraw the sealed orders. I believe the reason of the orders is that they only wanted apothecaries to fill the appointments.

Dr. Burnes: It never was intended to be a slight upon pharmaceutical chemists.

Mr. Wells: Never, because you have a letter from Mr. Banks stating that our men are perfectly eligible for the appointments. But if we do not point out to the unions that the sealed orders are in existence you will never get them repealed. In the case in question the Committee did not know that the order was in existence.

Mr. Beggs seconded the motion of Mr. Wells.

Mr. Wells read a letter of the Local Government Board of the 9th of October, sanctioning the appointment of Mr. William R. O. Barker as "compounder" of medicines for the Grand Canal Street Dispensary. The Vice-President suggested that it would be better to write to the Local Government Board without sending a deputation.

Mr. McCormack: I think it would be better for a deputation to put our views before them.

Mr. Hodgson: It would be far better to have an interview.

Mr. Wells said he was of the same opinion.

The motion of Mr. Wells was then put and unanimously agreed to, and on the motion of Mr. Beggs, seconded by Mr. Lyons, the following gentlemen were appointed a deputation to wait on the Local Government Board:—The Vice-President, and Messrs. Hodgson, Wells and Grindley.

The Official Organ of the Society.

The Vice-President said the next business on the agenda paper was the consideration of the resolution passed at the annual meeting to the effect that the *Chemist and Druggist* should be adopted as the official organ of the Society.

Mr. Wells said they were all aware that the Council had discussed this matter on a few other occasions and were strongly of opinion that a pharmaceutical society should have the *Pharmaceutical Journal* as its organ. But the Council had been written to several times within the last few years by their licentiates asking them to adopt the *Chemist and Druggist*, and gentlemen would remember the letter which they had heard read earlier in the meeting. The matter was considered at the annual meeting, with the result that eight or nine members declared themselves in favour of the *Pharmaceutical Journal* and only a few more in favour of the *Chemist and Druggist*. But that was hardly a fair result, because the discussion of the subject after having been begun was postponed until after the scrutiny was taken, in relation to the election of the new Council; and when the question was put it was after eleven 'clock and most of the members had gone away. But in obedience to a direction from the Council the Registrar sent queries to every member of the Society, and also to every druggist and associate, asking for their opinions, and the result had been as follows: Something over 200 queries had been sent out and to these 168 replies had been received. Of these, 125, viz., 75 pharmaceutical chemists and 50 druggists were in favour of the *Chemist and Druggist*, 32 pharmaceutical chemists and 2 druggists were in favour of the *Pharmaceutical Journal*. One of the replies asked the Council to adopt the three journals and let each subscriber take whichever he liked best. But that could not be done; the Council would have to adopt one of the journals. The editor of the *Chemist and Druggist* was prepared to give them very favourable terms if they adopted his journals, but if they adopted all three journals, he would not give them his less than 10*s*. a head. He (Mr. Wells) thought they should be largely guided by the wishes of their subscribers in the matter. Some of their licentiates had said that if the *Chemist and Druggist* were adopted they would cease to subscribe. He should be sorry that they went that far, for he thought it was their duty to support the Society, not on account of the journal they got, but on account of the good the Society did them. However, they could not please everybody. The *Chemist and Druggist* was a well-conducted journal and in a trade point of view would be far more serviceable to their members and associates than the *Pharmaceutical Journal*. For those who were purely pharmacists no doubt the *Pharmaceutical Journal* would be the better paper. He now moved that the *Chemist and Druggist* be adopted as the official organ of the Society, from January 1, 1892. Last year, when they were contending, the *Pharmaceutical Journal* did not write a single article to help them. Had they done so it would have been of great benefit to them in the House of Commons, because the other journals were writing very strongly against them, and the articles they wrote were brought in to the House and shown there. He (Mr. Wells) had a conversation a few days ago with the editor of the *Chemist and Druggist*, who said to him, "Do you think that if we become your official organ we shall have to swear by everything you say." His reply was, "No; but if you become our official organ and if things crop up against us we expect that you will help us."

Mr. Grindley said he seconded the motion with great pleasure.

Mr. Hodgson said he did not oppose the motion, at the same time he was of opinion that the *Pharmaceutical Journal* was more in accordance with the status of the Society than a mere trade journal.

Mr. Simpson: Yes; that has been our opinion all along from the very first. No doubt being the Pharmaceutical Society of Ireland we ought to keep ourselves as much in alliance with the Pharmaceutical Society of England as we possibly can. It would certainly keep our status with the members of the English Society very much higher than if we adopt the *Chemist and Druggist*. I am sure every pharmaceutical chemist in Ireland has the same feeling. It has been so in all the past discussions. But every word that Mr. Wells has said as to the trade journal is true, and if we do not adopt it, it is very likely that we shall lose a great many of our subscribers.

Mr. McCormack: I think we ought to take the views of the majority of our members. The majority are in favour of the *Chemist and Druggist*.

Mr. Simpson: It will lower our status.

Mr. McCormack: I do not know that.

Mr. Beggs: I do not think it.

Mr. Wells: I cannot overlook the fact of our subscribers being in favour of the *Chemist and Druggist*.

Mr. Lyons: As far as the North of Ireland is concerned the chemists there are almost entirely in favour of substituting the *Chemist and Druggist*.

Mr. Wells: Of course we owe the British Society a good deal, for they have given us their Journal for some years at a loss to themselves, but I do not think they care very much whether they supply us or not.

Mr. Grindley: As a matter of fact they never helped us in any way.

The motion of Mr. Wells was then put and carried *nem. con.*

The Society's School of Chemistry and Pharmacy.

The Vice-President moved pursuant to notice that the Senate of the Royal University of Ireland be asked by memorial to inspect the Society's School of Chemistry and Pharmacy, with a view to accepting its certificate. It would be a great advantage to the Society if the certificates of its professors were accepted by the University.

Mr. Wells seconded the motion, which was agreed to.

Attendance of Members of the Council.

Mr. Beggs moved that in future the attendance of the members of the Council at the several meetings of its committees be printed in the annual voting papers. The practice which he recommended was followed with advantage in the Dalkey Township.

Mr. Grindley: It will be a step in the right direction to give the attendances at the committees.

Mr. Wells seconded the motion, which was unanimously carried.

Licentiate Apothecaries.

Mr. Wells moved, pursuant to notice, that an addition be made to regulate "Finance No. 2" at page 99 of the calendar. The regulation as it at present stood was as follows:—"The fee for a licentiate of the Apothecaries Hall of Ireland to be registered as a pharmaceutical chemist shall be three guineas." He proposed to add after the word "guineas" the following words:—"But such apothecary shall not be registered unless he shall give evidence to the satisfaction of the Council that he has served a *bonâ-fide* engagement for a term of four years as apprentice or assistant with, and in the sole employment of a pharmaceutical chemist or apothecary keeping open shop." He did not make this motion through any ill feeling towards the Apothecaries' Hall, but simply for the purpose of redressing a great wrong which was suffered by their licentiates and also by the public. At the time when the existing regulation was made the apothecary, before he got his diploma, had to serve an

apprenticeship with an apothecary who kept open shop. Now under the system of the conjoint scheme it was only necessary for the candidate to produce a certificate of having passed through a course of three months training in practical pharmacy. That might only mean that the gentleman had gone to some hospital or to a lecture for an hour twice a week during the three months. He was sure that the Governors of the Apothecaries' Hall would see that it was a great wrong both to pharmaceutical licentiates and to the public that men trained in that way should have the same qualification as men who had to work so hard for their qualification as the Society's licentiates. The latter had to go through four years' professional study, which included 100 hours at practical chemistry; and after having paid their money and passed their examinations they were registered as pharmaceutical chemists. The other men who were really trained as medical practitioners were registered as such, and then came there, paid their three guineas each, and got registered as pharmaceutical chemists. Then one of these gentlemen was looked on as a doubly qualified man, and they had been putting up for an appointment as a dispenser, although he might know nothing of pharmacy.

Mr. Simpson said he had much pleasure iu seconding the motion. This matter had been under discussion amongst the apothecaries themselves, and they were coming to the conclusion that the three months' training in practical pharmacy was too short.

The motion was put and carried.

The Vice-President, by permission of the Council, read the following letter, which had come too late to be mentioned in the agenda paper:—

"Dublin, November 3, 1891.

"Dear Sir,—At a meeting of the court held on the 30th ult., the following resolution was passed, which I have much pleasure in asking you to lay before the Council of the Pharmaceutical Society at their next meeting:—'That the licence of the Pharmaceutical Society of Ireland be taken in lieu of the certificate in practical pharmacy from candidates seeking the special licence of the Apothecaries' Hall, and that a candidate possessing the "pharmaceutical licence" shall be exempt from examination in practical pharmacy.'

"I am, dear Mr. Ferrall,

"Sincerely yours,

"Robert Montgomery, M.R.C.S.E.

"*Secretary and Registrar.*"

Mr. Charles Evans moved that a reply be sent to Dr. Montgomery thanking him for his courteous letter, and expressing a hope that the Council would receive a further communication from the conjoint body.

Mr. Beggs seconded the motion, which was unanimously agreed to.

On the motion of Mr. McCormack, seconded by Mr. Beggs, Dr. Cosgrave, Dr. Falkner, and Dr. Montgomery were re-elected Examiners.

On the motion of Mr. Beggs, seconded by Mr. Wells, the following gentlemen were elected members of the Society:—Mr. Edward J. Boileau, 3, Prince of Wales Terrace, Balls Bridge, Dublin; and Mr. Maurice J. O'Connell, 8, North Strand Road, Dublin.

On the motion of Mr. Wells, seconded by Mr. McCormack, Mr. John Baxter, of Ballymoney, was elected an Associate Druggist.

On the motion of Mr. Gibson, seconded by Mr. Wells, the following were elected Associate Druggists:—Messrs. John Gray, Armagh; Patrick Gribben, Magherafelt; William Maxwell, Londonderry; Samuel M. Reid, Belfast; Robert Spence, Castleblaney; and Jacob Walsh, York Street, Belfast.

On the motion of Mr. Wells, seconded by Mr. Beggs, Mr. William H. Griffin, 29, Mountpleasant Square, Dublin, and Mr. Richard Blair, Cork, were nominated for membership of the Society.

Mr. Alfred Clements, of Cootehill, was nominated for election as an associate druggist.

Some financial business having been disposed of—

The Council adjourned.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of this Association was held on Thursday, October 29, Mr. W. Lloyd Williams, President, in the chair.

The minutes of the previous meeting having been read and confirmed, and some new members proposed, the President called upon Mr. Ellwood to read his paper on:—

The Pharmacopœia Standards of Purity—Drugs and Chemicals.

BY T. A. ELLWOOD, F.C.S., A.I.C.

We must never expect anything that is artificial to be perfect, nor is it possible to find the statements of an individual or a collection of individuals, correct in every particular. All books are open to criticism, adverse or favourable; even the text-books written "by authority" must submit to this crucial test as to their value. It is with one book only that I this evening have to deal, a book lauded and condemned, used and abused, the outcome of true knowledge, savoured with idiosyncracies—"The British Pharmacopœia." Though this book has received much adverse criticism, in the which I have frequently heartily joined, and may do so again, yet I may say at the outset I have found it, if not more complete, certainly more accurate than any of the Pharmacopœias of other nations. Though not so full, it is yet certainly full enough, and if it lacks what we should naturally expect to find there, it, makes up the deficiency by including much that we should condemn to obscurity or oblivion. And in our first thoughts of criticism, let us bear in mind that it is about six years old, during which six years the fashions of medicine, of medicine prescribers, medicine makers and medicine takers have changed either for better or worse.

It is not with processes that I have specially to do this evening, but with products and their purity. The processes for many things have been left open by the wise insertion in the preface of 'Our Book' of the words, "It is left optional with the manufacturer to use the processes given, or others by which products may be obtained that will accord with the description, and tests given for their identification."

I have always been an advocate for a high standard of purity of drugs, and hence my condemnation on that point will be extremely limited. The chemist and druggist is looked upon as the man above all men who should be free from suspicion. His mysterious symbols have in the past created an awe in the minds of the public, which lingers more or less up to the present day; but as such awe leaves the mind of the coming race, its place must be supplied by respect and confidence; and this is only inspired by knowledge and accuracy on the part of the chemist and a purity in all his merchandise.

With this brief introduction and slight digression I will at once introduce you to the substantial part of my evening's paper.

I will first treat of a few inorganic chemicals, then some organic, and lastly some organic drugs in general.

The analyses and observations that I shall refer to extend over a period of from eight to ten years, and I may say that the results have not been specially prepared for this paper, but are indiscriminately chosen from my laboratory note books.

I. Inorganic Chemicals, Potassium Cyanide.—

This chemical, though not ordered for any internal use, is nevertheless official and is sometimes used medicinally. According to the Pharmacopœia it is employed in the purification only of bismuth. The official method of preparation is here at fault, for I am told by manufacturers that it is impossible to get a B. P. article by using the B. P. process; that is one containing 95 per cent. of real cyanide of potassium. The question then that presents itself is this: "Is the Pharmacopœia standard too high?" I say certainly not; for some manufacturers are prepared to send out an article at a reasonable price, that they will guarantee to be pure, and I have frequently estimated samples of such, which yield over 99 per cent. of KCN. It is here necessary to caution you against the use of fused KCN, the strength of which I have found to vary considerably.

The following results of analyses of different samples will show that the crystalline only is a reliable article:—

Example.	Character.	Result.	Date.
A . . .	Fused cakes	70 p. c.	Jan. 1885
B . . .	Fused lumps	40 p. c.	July 1885
C . . .	Crystalline	98 p. c.	Feb. 1886
D . . .	Fused cakes	79 p. c.	Jan. 1887
E . . .	,, ,,	24 p. c.	Mar. 1887
F . . .	Crystalline	98·2 p. c.	May 1890
G . . .	,,	99·4 p. c.	Aug. 1890
H . . .	,,	98·9 p. c.	Jan. 1891
I . . .	Fused sticks	17·2 p. c.	Sep. 1891

These results will speak for themselves.

Inference.—The B.P. had better leave out the method of preparation, but retain or raise its present standard of purity.

Potassium Hydrate.—This chemical, owing to its deliquescent nature, is very variable in its composition, according as we use dry or moist samples. According to the authority 56 grains require for neutralization 900 grain measures of oxalic solution; by equation it should require 1000 grain measures—

$$2KOH + H_2C_2O_4 2H_2O = K_2C_2O_4 + 4H_2O$$
$$56 = 1000$$

Thus 10 per cent. of impurity is allowed for. This is correct if the alkali is first well dried in the water oven and quickly weighed, but if taken in the ordinary sticks even from a stoppered bottle it very seldom equals the official requirements. Remington states that it usually contains 30 per cent. of moisture, but I presume he includes the water of hydration as well, calculating from the formula K_2O,H_2O. Dunstan found that ordinary samples contain 78 and 79 per cent. of alkalinity, together with nitrate or nitrite of potassium 1 per cent., which latter the Pharmacopœia mentions nothing about, and neither would it contain any if made by official directions. My general results have been as follows—

Sample.	Result.	Date.
A	80·8 per cent.	Feb. 1886
B	62·7 ,,	June 1886
C	92 ,,	Dec. 1887
D	79 ,,	June 1891

Inference.—The B.P. should order KOH to be dried before estimating, it should give a standard for the amount of true KOH without the K_2CO_3 and should insert a test for nitrate and nitrite, demanding their absence.

Potassium Bitartrate.—This chemical having been brought before the notice of the Pharmaceutical Conference at their last meeting but one, needs but little notice. I would, however, protest against the lowering of the standard, as suggested by Cripps at that meeting, as I have found no difficulty whatever in obtaining samples yielding the full requirements of the B.P Indeed, an ordinary sample this week estimated by the B.P. method yielded over 93 per cent., and seldom have I analysed samples yielding a less amount. In January, 1886, an ordinary commercial sample yielded 96·6 per cent., another in February, 1886, yielded 97·76 per cent.

I would like, however, to suggest that the B.P. insert both the acidimetry and alkalimetry methods of testing, also that it limit the amount of calcium tartrate it may contain to 4 per cent. I have, however, never found this impurity to exceed 6·5 per cent.

Calx Sulphurata.—This indefinite compound is always a source of annoyance, as it needs such very careful keeping, or it so soon falls below the official requirements. Officially it is required to contain not less than 50 per cent. of CaS, and freshly prepared it contains that amount, indeed, much more; on estimating after manufacture I have never found less than 56 per cent. The test authorized is a little crude, although it is quite sufficient to prove whether the compound is to be used or not. A quick method for ascertaining approximately the amount of CaS really present, if not of full strength, is to filter after applying official test, wash the precipitate, make up the filtrate to a definite volume, and imitate the colour by a standard solution of sulphate of copper. Thus the amount of copper actually precipitated can easily be calculated, and from that the CaS present in the original sample.

The following results were obtained thus during April of the present year:—

Sample.	Calcium sulphide yielded.
A.	42·8 per cent.
B.	37·6 ,,
C.	46·3 ,,
D.	29·8 ,,

Inference.—The B.P. standard is rather too high, or another method of preparation should be resorted to, giving a more accurate compound.

Reduced Iron.—This preparation is supposed to owe its virtues to the presence of metallic iron in minute state of subdivision, not less than 50 per cent. of which should be present according to official statement. This amount is certainly not excessive, the United States Pharmacopœia demanding 80 per cent. being present, which is excessive. Notwithstanding the low standard required by the B.P. how often it falls below the 50 per cent. This I think must be due to carelessness in making, as samples made under my own supervision have always contained the full amount and have at times exceeded 70 per cent. In the preparation there is no necessity for drying the hydrogen, and in the estimation there is no necessity for the use of KI, as the iodine will readily combine with the iron.

These results may be interesting:—

Sample.	Metallic Iron.	Remarks.
A	62 p.c.	Made under own supervision.
B	74 ,,	
C	69 ,,	
D	43	Not less than 7 years old.
E	23 ,,	Commercial samples.
F	54 ,,	
G	43 ,,	
H	3 ,,	

Ferri Carbonas Saccharata.—The Pharmacopœia states that this preparation contains carbonate of iron (if reckoned as anhydrous) forming about one-third of the mixture. It may do so, but I have not been able to find it, although I have estimated more than a hundred commercial samples, that is, if the sugar was present in correct proportion. I must, however, confess that I have not estimated a sample immediately after it han been made. The United States Pharmacopœia cos-

tains a much more satisfactory preparation made from sulphate of iron 10 parts, bicarbonate of sodium 7 parts, sugar 16 parts, which is authorized to contain 15 per cent. of ferrous carbonate.

The B.P. estimation is decidedly good, using as it does phosphoric acid as a solvent. I cannot quite agree with Proctor that it is immaterial which acid is used, all giving like results. I have found discrepancies equalling 2 per cent. by using the different acids.

The general average of the samples analysed, omitting several which contained only half the amount of sugar present, three samples which were mixed with sugar of milk, and two which contained sulphur, was 28·6 per cent.

Inference.—A preparation containing less iron would be preferable, as being more reliable and likely to retain its full strength; a test should also be inserted for the amount of ash left on incineration.

II. ORGANIC CHEMICALS.—In order not to prolong this paper beyond the limits of time usual at our meetings, I must refer to a few only of the organic chemicals that are marked in my note-book.

QUININE.—This to be official must not contain more than 5 per cent. of sulphates of other cinchona alkaloids. I consider that this amount is too high, as it is now easy to make quinine sulphate, containing not more than 1 per cent. of other sulphates, and hence the B.P. should insert a statement to that effect. Probably by the tests adopted by the B.P. less than 5 per cent. would pass unnoticed, but then other tests should be inserted.

ACONITINE—This official alkaloid, being such a highly poisonous derivative of monkshood, ought to be of very definite composition, and the characters and tests should therefore be very emphatic. But instead of this we read at the very commencement, "A white, usually amorphous solid." If only usually amorphous, the statement implies that it is sometimes crystalline, and here is the fault. Are the crystalline and amorphous identical in chemical composition and physiological action? Doubtless not. Then why not order the one most likely to be definite, which is the crystalline? A crystal of definite composition was commercial previous to the issue of the 1885 B.P., and I maintain it should have been the one embraced therein. It will, however, now be better, perhaps, to wait until the investigations by Professor Dunstan and his helpers are completed before deciding which is the most reliable aconitine for medicinal and pharmaceutical use.

CHLOROFORM.—This preparation does not keep very satisfactorily, undergoing various decompositions, as pointed out by Stark in a paper read before this Association during a previous session. The official instructions order 1 per cent. by weight of ethylic alcohol to be added as a preservative. To be put in a bottle furnished with an accurately ground stopper and kept in a cool place. I would suggest that not less than 2 per cent. of ethylic alcohol be added, as it could then be kept more easily without decomposition.

III. GENERAL DRUGS.—ASAFŒTIDA.—The Pharmacopœia says that this drug should yield not more than 10 per cent. of ash, and that 50 to 60 per cent. should be soluble in rectified spirit. The German Pharmacopœia looks for a higher standard of purity, and requires it to yield not more than 6 per cent. of ash. A Chicago report upon the analyses of various samples states that it usually contains a far higher percentage of ash than even the B.P. allows, the amount varying from 19 to 56 per cent. I am sorry for the purchaser of the sample yielding 56 per cent., as it must most certainly be a wanton adulteration. I here again must hold with the very fair requirements of our own official text-book, as I have found from fourteen analyses in no instance a very high percentage of ash and in no instance so low as 6 per cent. The samples in each case being taken fairly, for of course by rejecting the outside it is possible to get as low as 2 or 3 per cent. of ash. I here give analyses of six samples:—

Sample.	Vol. Oil.	Ash.	Soluble in S.V.R.	Chips and Leaves.
	Per cent.	Per cent.		
A	4	7	56	·5
B	10	8	59	1·2
C	6	12	48	3·4
D	8	8·2	54	1·
E	9	6·8	62	·8
F	5	14·	48	6·3

The ash in each instance was taken without removal of extraneous matter, and in a porcelain crucible. The oil was distilled.

Most of the samples were tolerably free from water, which was not estimated.

As asafœtida is used for its volatile oil in the preparation of spiritus ammoniæ fœtidus, I think the B.P. should give a standard as to the least amount of the volatile oil it should contain for use in such preparation.

KAMALA.—As I think the use of this drug medicinally is almost obsolete, I would suggest that it be expunged from the Pharmacopœia entirely. As there are no official preparations of it, it could thus easily be dispensed with, and should there still linger a few medical gentlemen who would swear by its virtues, they could equally order it as an unofficial preparation. But as it is still official it comes within my province to refer to it. It evidently had the consideration of the Pharmacopœia authorities, for they changed the statement which in the 1867 issue read "it should be free from sand and other earthy impurities" to read "on ignition in air it should yield 4 or 5 or at most 10 per cent. of ash."

'Pharmacographia' says it should yield, if pure, not more than 1·37 per cent. of ash.

A reader of a paper before one of the German Societies states that out of forty-five samples analysed only three yielded less than 6 per cent., only eleven yielded between 6 and 10, the remaining twenty-eight yielding 10 and upwards.

I can vouch to its correctness in a few instances, the usual amount of ash being from 40 to 75 per cent.

Examples:—

Sample.	Ash.	Date.	Adulteration.
A . .	40 per cent.	Dec. 1884	Sand
B . .	45 ,, ,,	Dec. 1885	Fe_2O_3 and Sand
C . .	72 ,, ,,	,, ,,	Sand
D . .	38 ,, ,,	Aug. 1890	,,
E . .	42 ,, ,,	May 1891	Fe_2O_3 and Sand

Inference.—This drug should be omitted from the B.P., or if it is of special therapeutic value, the portion possessing physiological action should be identified, isolated and made official.

OPIUM.—Much has been the criticism of this most useful drug, and I am not alone in declaring the Pharmacopœia standard as too low; as I have before said, pharmacists should keep only the best of drugs and chemicals and the authority above all others should be free from the suspicion of countenancing adulteration, or recognizing it if it is carried on. In the last drug adulteration is countenanced, in the present one I think it is encouraged. The Pharmacopœia states that it should yield not less than 9·5 per cent. and not more than 10·5 per cent. of morphine on analysis, according to instructions given. The characters of opium are

further given as being usually covered with portions of poppy leaves and scattered over with the reddish-brown chaffy fruits of a species of Rumex. This description corresponds to that of Smyrna opium; which variety I have never found to yield less than 12·5 per cent. If the Egyptian variety were included or intended, it would then be different, as I find the average yield of this opium is 4 to 6 per cent. of morphine. Of course by a judicious mixture of the two, which doubtless is performed, we are able to get a sample yielding the requisite amount of morphine, but then it would not agree with the characters given in the B.P. Appended are a few analyses of commercial Smyrna opium :—

Sample.	Morphine.	Moisture.	Remarks.
A . . .	18· p. c.	10·5 p. c.	Purchased before the issue of the 1885 B.P.
B . . .	16·5 ,,	12·2 ,,	
C . . .	14·3 ,,	12· ,,	
D . . .	11·5 ,,	14·4 ,,	Estimated since 1885 issue of B.P.
E . . .	18·6 ,,	12·7 ,,	
F . . .	13· ,,	8· ,,	
G . . .	13·2 ,,	13· ,,	

Inference.—The standard is too low, the percentage of morphine varies. The B.P. should order opium to be *standardized* by addition of some inert substance, and should revise the characters given.

Lemon Juice.—I have, in a previous paper before this Association, suggested that the B.P. standard should be slightly lowered, as not being in accordance with nature's product.

Elaterium.—This drug is official for the preparation of elaterin, which is used in pulvis elaterini compositus. The method for the estimation of elaterium is the same as for the preparation of elaterin, and is, as pointed out by Ransom and Jones in a paper before the Pharmaceutical Conference an unsatisfactory method, yielding very discordant results. They recommend exhausting with chloroform, evaporating, exhausting with ether, redissolving in $CHCl_3$, and again evaporating and exhausting with ether. This method is very satisfactory. The B.P. only admits the English as official, for it states that it "does not effervesce with acids; boiled with water and the cooled mixture treated with iodine, affords little or no blue colour." The Maltese invariably contains both starch and chalk. Analyses:—

Sample.	Elaterin.	Variety.
A	22·6	English.
B	27·1	,,
C	19·7	,,
D	17·2	Maltese.
E	13·8	,,
F	15·	,,

I would suggest that the Maltese should be made official for the manufacture of elaterin only, and that the method of preparation and estimation be modified in accordance with the paper by Ransom and Jones in 'Year-Book of Pharmacy,' p. 442. Date 1886.

Scammony.—This is a very unsatisfactory drug, and I consider its retention in the Pharmacopœia is not justifiable. As long ago as 1874 the subject was brought up before the Pharmaceutical Conference, Mr. Giles asking why scammony and the resin from the root were both retained in the Pharmacopœia. The very unsatisfactory and absurd reason given by Professor Redwood being, "Some advocate the use of resin of scammony, and others consider the virgin scammony more active and reliable, and it was thought, as there were two preparations similar in their effect, that at least we might give an option to medical men to select which preparation they would prescribe." As I have before pointed out, medical men now order drugs unofficial, and could thus retain their favourite if not authorized. The B.P. states that ether removes 75 per cent. of resin, the remainder being chiefly soluble gum and a little moisture. If virgin scammony is obtained it answers these tests fairly well, but as it is frequently employed in powder, seldom have I found such powder to answer the official tests. The quantity of resin may be correct, but the residue is of a very different character to soluble gum and moisture. I am inclined to think that *Pulvis scammonii* consists mainly of resin from the root, with common gum acacia and a little starch. Out of twenty-seven samples of scammony recorded in my note-books only five answer the B.P. tests for purity. I would not suggest altering, but expunging this from the next Pharmacopœia, for already it is limited to one preparation, namely, the mixture.

Jalap and Jalap Resin—The B.P. demands that jalap tubercules shall yield not less than 10 per cent. resin, of which not more than one-tenth should be soluble in ether. With regard to the first statement, I consider that the yield of resin is low, and that thus use of inferior drugs is encouraged. With regard to the second statement, I think that the range might be extended, and allow 20 per cent. to be soluble in ether, for by reference to a paper by White before the School of Pharmacy Students' Association, I find he states result of analyses of the resin to yield very discordant results, only 2 out of 6 analysed reaching the B.P. standard of purity. Results of my analyses corroborate this, but I further find that the better the tubercule the better is the resin obtained, as the following table will show :—

Sample.	Resin	Resin soluble in Ether.
A	10·4	12·2
B	15·	10
C	13·	10
D	16·	8
E	14·2	8
F	12·	9·5

Krameria.—Of all the botanical characters given in the B.P. there is only one open to criticism, and that is the description of rhatany. Two varieties are official, the names given in the text being *Krameria triandra*, or Peruvian, and the *Krameria Ixina* or savanilla. It is the latter that requires correction, and it will be an advantage to students to remember this. It was pointed out by Mr. Holmes at a meeting of the Pharmaceutical Society, April, 1886, that the description given in the Pharmacopœia for Savanilla rhatany really refers to the *Krameria argentea*, or Para rhatany, which is now in commerce under the name (falsely, so) of Savanilla. This is not a serious mistake, nor is it likely to be misleading; it is only advisable to know the true source of the drug we use.

Goa Powder or chrysarobin.—This drug has very vague characters given in the B.P We may ask, Is it an active principle or does it contain an active principle ? Doubtless the latter, therefore the official tests might give some idea as to the amount dissolved by boiling benzol, and of the amount that can be crystallized from the benzol solution. The colour tests I have found to vary so considerably with this drug that I do not think any reliance can be placed upon them whatever. But considering the very unsatisfactory corrections that have been made, namely, by inserting after characters and tests, "as purified by solvents," not mentioning what solvents are to be used for purification, there is no wonder that the characters and tests vary. Let us hope that in the next issue of the B.P. more definite instructions will be given, or that the drug itself will be substituted by chrysophanic acid, though I think the latter has a different action physiologically to that of goa powder.

Lard.—The standard of purity for this is very high,

but as few pharmacists make it, I think the B.P. might advantageously include a few more tests as to purity. As one of the chief adulterations is cotton-seed oil, the test ought to be included. Doubtless Bechi's test is the most reliable if carefully performed, which is as follows: 5 grams of clear melted fat are heated with 20 c.c. of absolute alcohol and 3 c.c. of an alcoholic solution of $AgNO_3$, containing 2 grams in 250 c.c. for ten minutes on the water bath, with continuous shaking. In the presence of cotton-seed oil a coloration appears, which may also be observed in the fat itself on solidifying; and, if the alcohol be decanted off and the cake of fat dissolved in ether or petroleum spirit, in its cold solution. Having proved the presence of cotton-seed oil, the amount present can be approximately estimated, according to Fairley and Cooke, by means of the sp. gr., lard being ·89 and cotton-seed oil ·897.

VINEGAR.—By official sanction this may contain ·1 per cent. of sulphuric acid, the original idea being that the acid has a preservative action upon the vinegar. I think that idea is now abandoned, and hence vinegars are free from sulphuric acid. I would suggest that the next issue of the Pharmacopœia should discountenance its presence, by saying that no precipitate or only a slight turbidity should be given with barium nitrate. It may be interesting to note here the very varying strengths of vinegar in every day sale.

Sample.	Real acetic acid.	Sulphuric.	Hydrochloric.
A . . .	5·5	traces	none
B . . .	4·26	none	none
C . . .	3·	traces	none
D . . .	0	none	3·2
E . . .	1·8	none	2·4
F (pickle)	0	1·	3

Many of the common vinegars seem to be adulterated with mineral acids and coloured with burnt sugar, and probably still more are composed of acetic acid and coloured. Hehner has worked out a method of distinguishing between them, based upon the amount of malt extract they contain.

I have but briefly touched upon a few of the many drugs and chemicals of the Pharmacopœia. I think I have referred to quite sufficient to show the necessity of testing for ourselves the statements of others. Doubtless when the next Pharmacopœia is issued there will be many changes; the new drugs constantly being introduced will have had a trial, some of them demanding, as in the B.P. Addendum, official recognition. I have not touched upon the Addendum at all, nor have I referred to the boiling points, melting points, and specific gravities of substances, nor to the tests for the alkaloids. There still remains to be discovered a satisfactory test for some of the most powerful of these. We, as pharmacists, require chemical tests, not physiological. Tests reliable and conclusive, not enveloped with doubt. Inorganic testing is on a sound basis, but at present it is far from the case with organic testing, most of the tests being isolated and not group reagents. When shall we have good chemical tests for aconitine, atropine, cocaine, and many others too numerous to mention? I had intended to criticize some of the vagueness of the tests for organic substances included in the B.P., but will leave that for another paper or for some one else to take up. I think the volumetric estimation of chemicals might be advantageously extended by introduction of new solutions, such as permanganate of potassium in acid or in alkaline solutions. I have also referred to the amount of sugar in saccharated carbonate of iron. Why should not sugar estimation be adopted, and the test solution be included with the volumetric solutions? I would further suggest that the Pharmacopœia mention the impurity tested for when using the various test solutions. Thus under aqua destillata we have inserted eight different tests, not one of which says the object of the test. You will say, "You should know that." Yes, but does the young student, who refers most to the B.P. and grinds at it as well, in order to imbibe some of its precepts, know? The man that knows the use of each of the tests would know what to test for without their insertion; therefore, if not for the beginner, then why insert them at all? You will say my statements are not in accordance with my opening remarks; that the Pharmacopœia taken all through is tolerably accurate. My object in bringing this paper before you was not to prove its accuracy, but to criticise its inaccuracies, which task I have unflinchingly performed. Books that will not stand criticism are not worth reading, and I am sure I cannot class the British Pharmacopœia issued by authority in that category.

The President then called upon those present to discuss the interesting paper they had listened to.

Mr. Helbing observed that the preparation of such a paper involved a great amount of labour. One point which struck him was the difference between what the Pharmacopœia required as indicated by the tests given and the quality of the drugs they obtained. Mr. Ellwood had stated that the tests were in some cases too lenient; he (the speaker) believed in most instances he had been correct. Although all the requirements of the Pharmacopœia could be fulfilled, how was it that pharmacists did not obtain preparations up to that standard? In the case of reduced iron, not only should it contain the standard quantity of iron, but it also should be absolutely free from sulphur. Yet he hardly ever met with a sample of reduced iron entirely free from sulphur, although, no doubt, manufacturers could produce a pure product. There had been recently a great deal of discussion about chloroform, particularly in reference to the point as to whether the addition of alcohol were necessary or not. The chloroform produced by Pictet's process excited special interest. In the first instance it was said that an absolutely pure and ideal preparation could be obtained, but even with this the addition of alcohol seemed to be necessary to preserve it. So that it was very doubtful whether the success anticipated with the product would be obtained. He did not quite agree with Mr. Ellwood as to kamala, in which between 40–75 per cent. of ash was found. Most samples in commerce contained such an ash, but by carefully sifting the drug a kamala could be obtained equal to the requirements of the Pharmacopœia. Kamala seemed to be much more largely used in Germany, and greater attention was given to its preparation than in England. No doubt such an article as the Pharmacopœia required could be obtained if the necessary pains were taken. With Mr. Ellwood's remarks on opium he agreed on the whole, but thought it would be a great mistake to raise the standard amount of morphine above 10 per cent., as all the preparations and doses would be thrown into great confusion. Lard was one of the most difficult substances to obtain pure; by "pure" he meant lard not only free from cotton-seed oil and other admixtures, but also free from water and from rancidity. Pure lard in this last respect was very hard to get; it was only obtainable if the pharmacist bought his own supply in the crude state and refined it carefully himself. In respect to the Pharmacopœia standards of quality a great improvement could be made, as also in the methods of purification. He would like to see a test inserted for cocaine; the official requirements in respect to this article were by no means such as might be expected, and nearly all the preparations on the market

were much better in quality than they were strictly required to be.

Mr. Wilson stated he had a sample of chloroform submitted to him during the past year, which on testing by the B.P. method developed an odour much resembling that of turpentine. Could Mr. Ellwood suggest the likely cause of this?

Mr. Walton remarked that in some parts of the country kamala was much used as a remedy for tænia, and suggested that its therapeutic attributes were not the result of an active principle, but were due to the irritating action of the stellate hairs.

Mr. Robins said he had examined many samples of cream of tartar and he found the average amount of calcium tartrate present was about 8 per cent., although samples issued by Messrs. Howard only contained 4 to 6 per cent. He thought the B.P. standard for lemon juice too high.

Mr. Frank A. Rogers called the attention of the Association to a statement he had seen in one of the medical or trade journals, that the botanical source of opium as stated in the B.P. was altogether wrong. He asked had Mr. Ellwood seen this statement, and if so, what was his opinion.

Mr. Stead drew attention to other chemicals and preparations other than those mentioned by Mr. Ellwood which frequently did not answer the B.P. requirements. As examples he quoted potassium iodide, tartaric acid, and orange wine.

Mr. Mason said he thought that most of them had lost sight of the fact that the B.P. was intended not only for the British Isles but also for the colonies. It was true that India had a Pharmacopœia, but in Australia, in the Dominion of Canada, and in all but India the British Pharmacopœia was the legal book of reference. And in saying this or that article is not required and ought to be expunged one ought not to forget the colonies. In the matter of the processes of manufacture it was very essential that the manufacturer should be considered. This the Pharmacopœia authorities had done. With regard to cyanide of potassium, Mr. Mason said the cake or fused used in electro-plating was of fairly good quality, and contained, he believed, about 60 per cent. He did not agree with Mr. Ellwood's suggestion of adding more alcohol to chloroform. For physiological reasons it was necessary to avoid any large quantity of alcohol. In his opinion 0·2 per cent. was quite sufficient and more was unnecessary. Referring to crude drugs on the market he remarked that the Board of Trade had a committee appointed which had the drugs offered for sale thoroughly examined and also fully described on the catalogues of sales. At the time when the 1885 B.P. was published there was a great cry out about the standard percentage of morphine in opium. Of course, if now the percentage was altered in any way it would affect all the preparations of opium.

The President said he emphatically endorsed the observations which Mr. Ellwood had made in his introductory remarks. If there was one thing more than another that lifted the pharmacist above the level of the ordinary trader it was his personal loyalty to the Pharmacopœia, and the ability to assure his clients that the preparations passing through his hands were in absolute accordance with the authoritative standard. It was the aim of that Association, in common with the Pharmaceutical Society, and he believed with every other association of pharmacists in this country, to press home to the individual the duties and privileges which attached themselves to him as a member of a craft and as a servant of the public. Loyalty to the Pharmacopœia meant not only the necessity of steering clear of selling articles which were inferior to its standards, but for the sake of uniformity it might exclude certain commercial products, which by the virtue of their wider application in the arts were sometimes of greater strength than medicine demanded. The stronger solution of ammonia of trade had a s.g. ·800. The solution of ammonia made by simply diluting this with two volumes of water was not the Pharmacopœia article, yet this irregular procedure was a matter of every day occurrence. Commenting upon some of the points raised, Mr. Williams said chloroform when carefully stored was an article as little prone to decomposition as any they handled, a remark confirmed by the very wide experience of Mr. Mason. The samples of reduced iron which contained sulphur would, in the majority of instances, derive that impurity from the use of the persulphate in its preparation. The Pharmacopœia ordered the perchloride, to remove the risk of such a contamination. A powerful remedy like amyl nitrite merited a more accurate definition than the statement that "about 70 per cent." should distil between 90° and 100° C. The description appended to guaiacum resin was too loose; it admitted samples consisting of little more than fragments of wood, almost as freely as "tears." An actual percentage of resin soluble in rectified spirit should be insisted on. The President concluded by urging the members to familiarize themselves with the operations involved in determining the physical and chemical characters of the chemicals passing through their hands, and advised them to keep notes of their results for future reference.

Mr. Ellwood, in replying, said he had only touched on some of the drugs and chemicals in the Pharmacopœia, as of course it was an impossibility to discuss all in an evening's paper, and reminded his hearers that he had referred to products not processes. He thought that chloroform had been so well talked over by his audience that it was unnecessary for him to add more. With reference to the cyanide of potassium used in arts he would mention a "gold" cyanide sent out by a well known firm never contained less than 96 per cent. KCN. He agreed with Mr. Helbing that it was possible to get a kamala yielding not more than 3–4 per cent. of ash, but he referred more particularly to that described in the Pharmacopœia. He thought that an improperly cleansed bottle would most probably account for the odour of the sample of chloroform described by Mr. Wilson. With reference to the percentage of tartrate of calcium in cream of tartar, he thought that mentioned by Mr. Robins somewhat excessive. Mr. Allen some fourteen or fifteen years ago may have stated that the average was 12–15 per cent., but he thought the average amount was 4 per cent. Broadbent had also placed it at that figure in a recent paper. He had never specially tested samples of iodide of potassium, but thought the cause of that chemical turning brown when exposed to sunlight might possibly be a good subject for investigation. He thought that it was most probable that the present description of the botanical sources of opium was fairly correct.

SOCIETY OF CHEMICAL INDUSTRY.

London Section.

A good number of members of the section were present at Burlington House on the evening of Monday, November 2, for the opening meeting of the session, Mr. T. Tyrer being in the chair.

A paper was read by Mr. W. C. Young, consulting chemist to the Lea Conservancy Board, entitled "*Volatile Organic Matter in Potable Water and a Simple Method of Estimating Dissolved, Fixed, and Volatile Organic Matter in Water.*" The author having convinced himself that a portion of the organic matter in natural waters is volatile, has devised a method by which the total organic matter, as well as the portion which is volatile, can be estimated, the method employed being a modification of the old "loss on ignition" method, the alteration in the pro-

cedure being, it is claimed, sufficient to remove the objections to that process. The proposed plan is carried out as follows:—0·5 grm. of dried and ignited sodium carbonate is added to 1 litre of the water to be examined, which is then distilled in a conical iron still of about two litres capacity attached to a tin worm condenser. When 970 c.c. has been distilled over, the residue from the still is transferred to a platinum basin and evaporated to dryness on the water-bath. The residue is taken up with a little distilled water free from organic matter, filtered through an asbestos plug into a platinum dish, evaporated to dryness on the water-bath, heated for an hour in an air bath at 150° C., cooled, weighed quickly, ignited gently and weighed again. The ignited residue is dissolved in water, excess of sulphuric acid added, and titrated with standard permanganate of which 1 c.c.= 0·0001 grm. of oxygen. The weight of oxygen lost, thus ascertained, is deducted from the loss on ignition, and the difference taken as organic matter. The fixed organic matter is determined by the same method, save that the sodium carbonate is not added until the concentrated water is transferred from the still to the platinum basin. To determine the volatile organic matter, the distillate from the last mentioned process is placed in the still together with 0·5 grms. of sodium carbonate, and distilled until a residue of only 25 c.c. is left, the rest of the process being conducted in the manner described above, except that the oxygen lost on ignition need not be estimated; the result represents about two-thirds of the total volatile organic matter present.

Platinum would probably be the best material of which to make the still, but of those that have been tried iron is preferable to either nickel or copper. Regarding the process in its chemical aspect, it may be said that by the use of sodium carbonate the whole of the compounds of calcium, magnesium and iron are precipitated, and any combined ammonia freed and volatilized. The temperature at which the residue is ignited is so low that no loss of sodium chloride is to be feared, while provision is made for loss of oxygen due to the reduction of nitrates, although the correction is seldom of importance. Various organic bodies submitted to the process gave the following results:—

	Taken.	Found.
Cane Sugar . . .	0·02 gram	0·02 gram
Grape sugar . . .	0·02 „	0·0205 „
Asparagin . . .	0·01 „	0·0115 „
Uric Acid	0·01 „	0·0101 „
Albumen	0·01 „	0·0104 „

From the results of a large number of experiments made with waters of various origins it appears that there is no definite relation between the "oxygen required" or the albumenoid ammonia and the total organic matter as determined by this method. It is also noteworthy that the process ranks the water supplied by the Kent Company as containing nearly as much organic matter as that derived from the Thames or New River, although the organic carbon published monthly by Frankland is always much lower in this company's water than any of the others. With this exception the method classifies London waters very much as they have hitherto been ranked. The author further touched upon a matter of much interest to the makers and consumers of so-called mineral waters which have been lately largely prepared from distilled water, the presumption being that the product would necessarily be pure. So far from this being the case, he has found quantities ranging from 0·3 to 0·4 grains per gallon of organic matter in aërated distilled water from manufacturers of repute. In conclusion it was pointed out that the method only gives the quantity of organic matter and not its kind, although some indication as to whether it is of vegetable or animal origin can be obtained from the smell given off by the residue during ignition. In case of doubt it can be decided by recourse to the ammonia process.

The Chairman having invited discussion—

Mr. David Howard, while anxious to exonerate himself from the charge of habitually consuming water as a beverage, was nevertheless glad to hear that the Lea was not so black as it was painted.

Dr. Stevenson, though admitting the value of any well-considered attempt to improve existing methods of water analysis, was indisposed to endorse the author's view that the Kent water was worse than that derived from the Thames or Lea, and considered any result from which such a deduction could fairly be made rather pointed to a defect in the method. He suggested that the organic matter found in aërated distilled water might be derived from the animal charcoal used to filter it before aëration.

Mr. William Thorp emphasized Dr. Stevenson's objections, particularly as the results quoted for the Kent water indicated that the proportion of volatile to non-volatile organic matter fluctuated in a very surprising manner. Although he confessed he had been unable to follow the author's description of the process in every detail, he could not but think that the method was somewhat retrograde in character, being in fact nothing more than a return to the old plan of determining organic matter by loss on ignition, which was now thoroughly discredited.

Mr. Young, in reply to Dr. Stevenson, said that he thought sufficient examples of the process were given in the paper, although time had not permitted him to read the whole of the data available; he doubted whether the organic matter found in aërated distilled water was derived from the animal charcoal, although this might account for the trace of phosphate present. He could only assure Mr. Thorp that the objections rightly urged against the old ignition process were removed by the precautions he had adopted and described.

A paper on "*Some Experiments on Petroleum Solidification*" was then read by Dr. Samuel Rideal, lecturer on chemistry at St. George's Hospital. The author stated that although it was well known that mineral oils could be gelatinized by the incorporation of soap with them, and many efforts had been made to give this fact an industrial application, yet hitherto no systematic attempt had been made to collect what scattered information existed, or to ascertain the best condition for effecting the operation. Available methods might be divided into three classes. In the first the solidifying agent was ordinary soap, which might be added as such to the mineral oil, or preferably produced *in situ* by saponifying a fat or fatty acid with alkali. Tables were given recording a long series of experiments with various fats and fatty acids, the net result of the trials being that the most readily formed and hardest products were obtained by the use of free fatty acids, although certain fats also gave good results, cocoa-nut oil and castor oil being noticeable in this respect. It was also found that a certain quantity of water was necessary, as perfectly dry soap would not unite with petroleum at the temperature of the water bath. Some interesting products were obtained by blending vaseline with petroleum solidified by means of soap. Thus, when equal quantities of vaseline and refined petroleum were heated together and 10 per cent. of oleic acid and the requisite quantity of dry soda added, a yellow, jelly-like product was obtained, resembling vaseline, but of softer consistency and smelling of petroleum. Such a product might be found useful as a lubricant.

The second class of substances capable of solidifying petroleum was represented by saponin, the use of the bark of *Quillaia saponaria* having been patented for this purpose, but the product was inferior to that

obtained when soap was employed. The solidification of petroleum could also be effected by various other agents to a certain limited extent. Gelatine, albumen, casein, and inorganic precipitants, such as a mixture of alum and ammonia, calcium chloride, borax, and the like, gave imperfect or wholly negative results.

The reliquefaction of these various products could be effected by decomposing the soap with a dilute acid, provided the liberated fatty acid was not itself of a nature to form a semi-solid product with the oil. The question deserved attention, as it became of importance when it was intended to solidify the oil for transport and liquefy it before use. On the other hand, the ready return of the oil to the liquid form was disadvantageous in cases where it was to be used as a solid fuel.

Mr. Stringfellow, whose patents had been referred to by the author, started the discussion by discoursing upon the merits of his saponin process, one of the advantages of which appeared to be that the oxygen and hydrogen in the incorporated water were available as fuel, and enabled combustion of the product to be conducted "in a semi-vacuum."

Mr. Boverton Redwood, dealing with more prosaic matters, remarked that the chief importance of the solidification of petroleum lay in the possibility of using the product as a solid fuel, and intimated that a material of this description would probably be shortly put upon the market.

Mr. D. A. Sutherland pointed out that sundry substances of the kind mentioned by the author had been prepared, but their utility had been limited by their vile smell.

Mr. MacEwan was of opinion that the value of the materials formed by solidifying petroleum depended upon their fusibility, and asked for specific information on this point.

Dr. Rideal, in reply, declined to enter into a discussion with Mr. Stringfellow concerning the value of water as a fuel. With regard to Mr. Redwood's communication, he could understand his reticence upon some of the matters concerning which information was still lacking, a reticence to which indeed was largely due his own attempt to collect what scattered knowledge was already public property. He was obliged to Mr. MacEwan for his reference to the melting points of the solidified products which he had described, as he had unintentionally omitted to give them the prominence which they should have had; they varied between 42° and 140° C., according to the nature of the solidifying agent used.

NORTH AND NORTH-WESTERN CHEMISTS' ASSOCIATION.

At the annual general meeting of the North and North-Western Chemists' Association, held at the Railway Hotel, West Hampstead, West-end Lane, the previous minutes having been signed, the Hon. Secretary read the first annual report, which consisted of a *résumé* of the year; number of meetings ten, number of members sixty-one. The report was voted satisfactory. The Hon. Treasurer also read a report showing a balance in hand.

Mr. Hyne proposed, and Mr. Holding seconded, that Mr. Parkes should be President.

Mr. Hyne proposed, and Mr. Parkes seconded, that Mr. Holding should be Vice-President.

Mr. Chapman proposed, and Mr. Long seconded, that Mr. Hyne should be Treasurer. Carried *nem. con.*

Mr. Parkes proposed, and Mr. Holding seconded, that Mr. Pinchen should be Hon. Secretary.

Mr. Long proposed, and Mr. Hicks seconded, a vote of thanks to the retiring officers.

On the proposition of Mr. Long, an amalgamation with the Western Association, to hold the annual dinner at the Holborn Restaurant on Wednesday, November 18, was unanimously agreed to, and the Dinner Committee, consisting of the Treasurers and Secretaries of the two Associations, was appointed to carry out the arrangements.

Provincial Transactions.

LIVERPOOL PHARMACEUTICAL STUDENTS' SOCIETY.

The usual fortnightly meeting of this Society was held on Thursday, 5th inst., Mr. H. Wyatt, jun., President, in the chair. Three new members were elected.

Mr. Mitchell drew attention to the B.P. formula and process for preparing Nessler's solution, which seemed to be greatly at variance with those given by other authorities.

Mr. E. Davies, F.C.S., F.I.C., delivered a lecture on "Fats and Saponification," in the course of which he mentioned that it had now definitely been proved that margaric acid does not exist, the substance so-called being a mixture. The word "ester," which has of late years been substituted for ethereal salts, was proposed as far back as 1852 by Gmelin. Foreign fats were detected in butter by the saponification process; the only foreign fat which cannot be thus detected being cocoa butter. He (Mr. Davies) expressed himself as confident that a process would be devised sooner or later to detect this adulteration. Volatile fatty acids were detected in butter by the index of refraction. The saponification test was also used to detect mineral oils in vegetable oils.

At the close of the lecture Mr. Davies gave some practical illustrations of the process of saponification and of the detonating power of nitro-glycerine.

A hearty vote of thanks to Mr. Davies, brought the proceedings to a close.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The second meeting of the fourteenth session, being the first open meeting, was held in the Pharmaceutical Scciety's House, 36, York Place, on Wednesday, November 4, at 9.15 p.m.; Mr. John Lothian, President, in the chair.

The minutes of last meeting having been read and approved, the Secretary read the report of the Committee on the Association Prizes competition. Only two competitors had entered for examination, but both had made a very creditable appearance. The prizes had been awarded as follows:—First prize (value £2 2*s.*) to Mr. Robert Robertson, 1, Brandon Terrace, with 85 per cent. of marks; second prize to Mr. J. Mackintosh Cameron, 17, North Bridge, with 65 per cent. of marks. Mr. Crowden's special prize ('British Pharmacopœia and Addendum') for a report on the botanical excursions, was awarded to Mr. Thomas Weir, 40, Dublin Street, and Mr. J. Findlay's special prize ('Martindale's Extra Pharmacopœia') for the best addition to the Herbarium, to Mr. J. B. Maclaren, 139, Princes Street.

The President then presented the prizes to the successful candidates, the first prizeman receiving a class ticket for Dr. Stevenson Macadam's lectures on chemistry and the second prizeman, Richter's 'Inorganic Chemistry' and Bentley's 'Materia Medica.'

Mr. John Findlay then gave an interesting practical demonstration of the methods of preparing the official volumetric solutions and the application of the official volumetric tests. Several estimations were made, and the results calculated on the black board, the whole of the official solutions being referred to and fully explained.

Mr. Donald McEwan then read a paper on "Field Botany." After alluding to various reasons which had been adduced why pharmacists should study botany, he urged on the younger members the practice of field botany as a means of increasing their interest in the dry details of structural botany. He advised all members to take up the subject as a hobby, which was a means of physical as well as mental relaxation. It increased the pleasures of life through bringing them into closer contact with nature, as well as added a charm to memory through bringing to mind past holidays. He referred to the opportunities afforded for this branch of study by residence in Edinburgh through the variety of conditions found in its vicinity—its hills and valleys, lochs and rivers, moorland and cultivated ground. After describing the method of examining plants *in situ*, he referred to the collecting of specimens, giving hints as to what plants should be studied so as to get specimens suitable for a herbarium. He advised all members to form a herbarium for themselves, as well as to bear in mind the one belonging to the Association. He also described the method of preserving and mounting specimens. In a further note on the "Association's Herbarium" Mr. McEwan gave a short sketch of its history. He expressed the opinion that the 200 specimens contained in it out of the 1000 and more flowering plants recorded from the vicinity, called for some effort on the part of the Association. He suggested the appointment of a Curator, whose frequent reports and appeals to members might be the means of awakening interest in and leading to additions being made to the herbarium, so as to make it more complete and worthy of the Association.

Owing to the lateness of the hour Mr. McEwan deferred his "Notes on Recent Additions to the Herbarium" to a future meeting.

On the motion of the Chairman cordial votes of thanks were awarded to Mr. Findlay and to Mr. McEwan, who had charge of the arrangements.

Mr. John Findlay was unanimously elected Vice-President in room of Mr. J. H. Hoseason, who had removed to Manchester.

Parliamentary and Law Proceedings.

Copper in Preserved Peas.

In the High Court of Justiciary, Edinburgh, before Lord Justice Clerk and Lords Rutherford Clark and Trayner, on Friday afternoon, the appeal at the instance of Peter Fyfe, inspector of nuisances, Glasgow, against Malcolm Campbell, came up for hearing. It will be remembered that the complaint was originally tried before Sheriff Birnie in Glasgow, and was to the effect that on June 26, 1891, the respondent sold to a sanitary officer one tin, containing 1 pound preserved green peas, the same being mixed, coloured, stained or powdered with copper or sulphate of copper to the extent of ·005 per cent. or thereby of copper (which is equivalent to 1·4 grains or thereby of sulphate of copper per pound of peas) and so rendered injurious to health, contrary to the Act 38 and 39 Vict., cap. 63, sec. 3. It was admitted or proved that the respondent sold the tin of peas and that the tin bore a statement that a minute quantity of copper had been used by the manufacturer to improve the colour of the peas, but they were guaranteed not injurious. The Sheriff held that it was not proved that the peas had been rendered injurious to health and assoilized the respondent without costs. Against this decision the inspector appealed, and the Sheriff, at his request, stated the following as the question of law for the opinion of the superior court. "Keeping in view that the statute has for its object the preservation of the public health, and that the evidence was nearly balanced, ought the respondent to have been assoilized."

Mr. Ure, for the appellant, on Friday, in addressing their lordships, held that the document which had been transmitted by the Sheriff simply set forth what the witnesses had stated, but not what had been held proved.

Mr. Salvesen, for the respondent, demurred to that statement.

The Lord Justice Clerk: He may not have set forth the facts he has found proved, but he has certified what he has found proved in a general form.

Mr. Ure proceeded to read the Sheriff's statement. It stated that the analyst drained off the water and analysed the peas. Sulphate of copper in large doses is a poison. It is used as a medicine, the ordinary dose for an adult being from one-fourth to two grains repeated two or three times a day. Sulphate of copper is found in several natural products used for food to an equal or greater amount than 1·4 grains per pound. Sulphate of copper forms with peas albuminate of copper, which is insoluble, and does not enter the system. The evidence was conflicting as to whether a portion is not again rendered soluble by the acids of the stomach, and then enters the system. Insoluble portions, in some cases, cause indigestion, but to an immaterial extent. Peas can be greened with chlorophyll, which is admittedly not injurious to health, but the process is more expensive, and the peas are said not to be so palatable. The medical witnesses for the prosecution were of opinion that even a couple of tablespoonsful of the peas sold might be injurious to young or delicate persons, especially if repeated; that the sulphate of copper is accumulative; that it would be dangerous to fix a minimum which could safely be used as food, and that it should not be sanctioned by the medical profession to however small an amount. On the other hand the witnesses for the defence thought that such a quantity as had been used could injure no one, and excepting one medical witness, that sulphate of copper is not cumulative.

Lord Trayner: Is that next paragraph one of the things admitted or things proved?

Mr. Ure: I cannot answer that question. "The city analyst (the document stated) did not think in the present state of opinion there would be a conviction. One witness for the prosecution who took two grains of sulphate of copper in solution before lunch, and a little less than two grains before dinner, suffered in the evening from marked colic pain in the abdomen and slight diarrhœa; another had diarrhœa and indigestion from eating tinned peas. Several witnesses for the defence and their families used peas of the same or similar brands as that sold—one witness for seventeen consecutive days, without injurious effects."

Lord Trayner: I suppose that man who took the peas did it upon principle.

Lord Justice Clerk: Another took the grains but no peas. One had diarrhœa and indigestion from eating green peas.

Lord Rutherford Clark: All I can say is it will probably stop eating green peas.

Mr. Ure proceeded to point out the question of law which the appellant desired to raise. Upon whom did the onus rest? Their lordships would notice that the Sheriff indicated plainly that he held the onus to rest upon the prosecutor. He inferred that from the way he as a magistrate stated his finding. The question of law was, did the onus lie upon the man who produced the foreign ingredient or upon the prosecutor? The Court would observe the question of law was really not stated. "Keeping in view that the statute has for its object the preservation of the public health and that the evidence was nearly balanced, ought the respondent to be assoilized?" He maintained that was not a question of law.

Lord Trayner: That is for him to say whether the balance leads the one way or the other.

Mr. Ure went on to say their lordships would see that it did not enable any one to argue the real question here, because the learned Sheriff apparently thought the onus was upon the prosecutor, but it did not follow that he would refuse to convict if the onus was the other way. When he said the evidence was nearly balanced he gathered that he thought the balance would be one way or the other.

Lord Justice Clerk: Can this particular clause amount to an onus which can be stated.

Lord Rutherford Clark: The Sheriff says that it is not proved to him that the foreign ingredient had rendered the peas injurious to health. What do you make by that.

Mr. Ure: I quite agree to that. You can read that as meaning that the Sheriff had thought that the weight of evidence was to the effect that the introduction of the foreign ingredient had not rendered the article injurious.

Lord Justice Clerk: Just suppose, for instance, the following fact was proved, the peas were particularly injurious to health.

Mr. Ure: Then I should have nothing to say; but the Sheriff held it was not proved that they were innocuous.

Lord Rutherford Clark: He must negative or affirm, but he says I hold it not proved.

Mr. Ure: That is to say he puts it upon the prosecutor to prove they were injurious.

Lord Rutherford Clark: He says distinctly, I cannot find it proved that they were injurious to health.

Mr. Ure: Then the question my client would desire to raise is whether if the evidence were equally balanced the Sheriff ought not to have convicted.

Lord Justice Clerk: The evenly balancing of evidence would not be proving.

Mr. Ure held that under the Public Health Act where the evidence was equally balanced, and where a man introduced a foreign ingredient into an article of food he ought to be convicted unless he could show it to be innocuous.

Lord Justice Clerk: It is quite legal to put anything into an article of food. Pepper, for instance, is a foreign article of food; so is sago. Is every person who puts some pepper over some cabbage liable to be prosecuted unless he can prove that the pepper in a particular case was not injurious to health?

Mr. Ure: Certainly not; but where the foreign ingredient is introduced and evidence is evenly balanced as to the injury to health, then in that case I would maintain the prosecution was correct in this appeal. We are all agreed that sulphate of copper in sufficient quantity is poison.

Lord Justice Clerk: Then the charge is that he put in such a quantity as would render the article injurious to health. That is the charge you must make, and unless you can make that charge you have no relevant case.

Mr. Ure: I prove by the prosecution that the introduction of these ingredients is injurious to health.

Lord Trayner: The Sheriff says you have not.

Lord Justice Clerk: The Sheriff does not believe in your skill.

Mr. Ure: Because there is a difference of opinion as to whether or not the article is poisonous; and the doubt ought to be solved in favour of the prosecutor.

Lord Rutherford Clark suggested the prosecutor should raise another case, and

Lord Trayner added they might charge this man over again with another tin of peas.

Mr. Ure remarked that that would be too elaborate a remedy.

Lord Trayner thought this was a waste of time. The charge was that of selling a thing which was not an offence, even under the statute, unless it was injurious to health. The Sheriff found that these peas were mixed with this foreign matter. Upon the rest of the evidence he was satisfied that the complainer had not made out the tenour of the charge that it was injurious to health. Was he not entitled to think so, and what more could he do?

Lord Justice Clerk: Where do you find the onus put upon the defenders?

Mr. Ure replied, in section 24 of the Act, which he quoted, as also the 8th section.

Lord Justice Clerk: It is stated here that a man who ate some green peas had diarrhœa and indigestion, but it is not said that it was the respondent's peas.

Mr. Ure, in concluding his argument, maintained that under the Public Health Act in the sections he had quoted, onus was thrown upon the defender, and concluded by asking their lordships to remit back to the Sheriff to state a proper question of law.

Mr. Salvesen, replying for the respondent, held the judge in the lower court had stated in the point sufficient to show his mind upon the facts as they were submitted to him. He did not think it was a question of law.

Lord Justice Clerk: He has been good naturedly endeavouring to state a case but he has not succeeded.

Mr. Salvesen: His attitude was simply this,—I would not have granted a case, but as the public prosecutor insists that there is something in this case which should go to a higher court I shall do my best to state a sort of case for him. That is in effect how this case came to be stated.

Lord Justice Clerk: The prosecutor on being asked what his question of law would be, would be unwilling to state it.

Mr. Salvesen: On the contrary, I have the draft of a case with the proposed corrections made by the appellant's agent, but it is more a question for your lordship's decision.

Lord Justice Clerk: Let us hear it.

Mr. Salvesen: This is the proposed question put by the appellant's agent—"Whether under the Act of Parliament libelled on a merchant may with impunity sell an article of food which has been mixed coloured or stained to an unknown extent (especially when this has been done in a foreign country) with an ingredient or material which in minute quantities may, or may not injure the health of the consumers, and in large quantities must do so; or whether, having regard to the object and nature of the statute and the position of the complainer acting for the public interest, the facts proved do not require in law a conviction of the respondent." The sole question in this case, Mr. Salvesen continued, was whether the peas were, or were not, injurious to health. An unequivocal answer had been given by the Sheriff to that after duly weighing the evidence. If the other party had suggested a question of law which the Sheriff had refused to state he would have understood that, and then the Court might have remitted back to the Sheriff the question they proposed to raise. It really came to this. It was the exigency of his friend's case that they had driven the Sheriff to try and extract some question of law which was not in the mind of any of the parties. It was, he maintained, an impossibility for a judge when the evidence was evenly balanced to incline to one side or the other.

Mr. Lees, for the appellant, followed Mr. Salvesen. What they desired to know was simply whether the Sheriff held the onus lay upon the complainer or the respondent. He took it that a settlement of the way the onus lay was unquestionably a question of law. It was a fair reading of the 24th section of the statute that in such a case as the present the duty of the respondent was to satisfy the court or a jury that where he had mixed a poisonous ingredient with an

article the substance was not injurious to health. If their lordships admitted that the onus lay with the appellant then he must concede the whole onus; but if, on the other hand, they did not, he would ask the Court to request the Sheriff to say where the onus lay. In fact, Mr. Lees said this was a question as between the Sheriff and the Professors of St. Mungo's College, the former stating that the peas were not injurious to health and the latter affirming that they were.

After some consultation between their lordships—

Lord Justice Clerk said: Upon the main matter of the argument of the appellant it does not appear to me a matter on which we are called to decide at all. I may have an opinion upon it, but I should be sorry to decide particularly upon a case which is unsatisfactorily stated, where no question of law is put to us. It appears to me the Sheriff here is endeavouring to state a case, raising a question of law; but he has practically found himself unable to do so, under the desire to enable the party to come here and get a decision of this Court. The question put to us does not put any question of law at all; therefore I think that is self-sufficient ground for dismissing this appeal. I may say further, while the case in my opinion is very unsatisfactorily stated, containing as it does large statements of what witnesses on this side said, or what the witnesses on the other side said, without any finding of the fact on matters detailed, I do find the Sheriff has given a distinct opinion of what he thought in a matter of fact, namely, that he found for the respondent in respect that it is not proved that the peas had been injurious to health, which was the matter charged. The only matter which was charged against the respondent was an offence under the Act, and without the peas being injurious to health there can be no conviction. That has not been proved.

Lord Rutherford Clark concurred in dismissing the appeal.

Lord Trayner assented, remarking that the Sheriff had stated what to his mind was sufficient to show that he could not state a question of law.

The appeal was thereupon dismissed, expenses being allowed to the respondent.

Supposed Case of Poisoning.

The Deputy District Coroner (Mr. H. W. Gould) held an inquest at Stoke Canon, on Friday, Nov. 6, on the body of Caroline Molland, 52 years of age, who died on the previous Wednesday.

The husband of the deceased said he had just left her when he heard her scream out that she was poisoned, and that Holman and Ham had sent her the wrong stuff. He ran to her and found her paralysed and in great agony. He asked her what she had been taking, and she replied "my drops." Deceased stated that the drops were brought home on the Tuesday night, and witness knew that the Thorverton carrier had called. His wife died half an hour after she was taken ill. Witness knew that his wife was in the habit of taking some drops, but did not know what they contained. She had cried to him scores of times, and said she could not live without them, having been accustomed to them for so many years. She knew witness was averse to her taking the medicine. He did not know for certain where his wife obtained the drops, but had seen "Holman and Ham" on small empty bottles. He had often seen deceased in a very excited state, but he put it down to "that cursed stuff," as he always called the drops, rather than to strong drink. He had refused her money to buy the drops, particularly lately, although she had cried to him for it. This had been going on for years, and several years ago Dr. Davy asked him if she was responsible for her actions. She was queer and excitable at times, but was not so on the morning of her death. She had never attempted or threatened to take her life. As far as he knew the drops were not prescribed by a doctor. They used to be purchased at Mr. Harris's at Exeter. He thought his wife only had them brought once a week, but from what he had heard since he believed she must have had them much oftener.

The stepson of the deceased said his mother told him she had been poisoned, and that the wrong stuff had been sent. On his suggesting that he should put her on a chair she objected, saying her legs were stiff. She first complained of pains in the legs; then in her stomach; and at last in her throat. In the cupboard he found five bottles, one of which was partly full, and another was lying down on a piece of paper with the cork out. The deceased drank, but he had not seen her the worse for liquor for the last six months.

Phillip Foale Rowsell, member of the firm of Holman and Ham, chemists, Exeter, said for the last eighteen months he had been in the habit of supplying deceased with medicine according to the following prescription: 1½ oz. solution of morphia to 1½ oz. of water. She was supplied with this quantity on Tuesday. The bottle was brought in by a carrier, who said it was for drops of medicine for Mrs. Molland. The prescription was made by one of the apprentices named W. J. Hodges, who put it up without any authority. The fact was witness left the bottle on the counter, and on the carrier calling Hodges made up the drops. Witness thought he was qualified to do so.

Dr. Puddicombe, of Silveston, said he saw the deceased at quarter-past nine on Wednesday morning. She was then quite dead. He had made a *post-mortem* examination. There were no marks of violence, and he found all the organs, excepting the liver, perfectly healthy as far as he could see. The liver was slightly softer than usual, which could be accounted for by some slight fatty degeneration. There was nothing to account for the death.

At this point the inquest was adjourned in order that the contents of the stomach might be analysed.

Poisoning by Arsenical Weed-Killer.

Mr. Hillman, the Sussex coroner, resumed an inquiry at Crowborough, on Tuesday last, into the death of William John Wesley.

Deceased died on October 11, after having partaken of some home-made gooseberry wine, from a cask which had previously contained "weed killer." The inquest had been adjourned, in order to allow of an examination of the viscera of the deceased by the Home Office analyst, and with a view to tracing the history of the cask.

The deposition of the witnesses examined at the previous sitting of the Court having been read, Dr. Thomas Stevenson (official analyst to the Home Office) was called, and read a report of the results obtained from his analysis of the stomach, its contents and a portion of liver. Both the stomach and portion of liver yielded a distinct quantity of arsenic. There was no arsenic found in the contents of the stomach. The cask contained 5½ gallons of wine and there was about 11 ounces of arsenic in solution in the liquid. He also found 2 ounces of white arsenic in lumps at the bottom of the cask. Altogether, he found over 13 ounces of arsenic. There would be enough poison in the cask to kill 3000 adult persons. The witness exhibited the lumps of white arsenic (slightly discoloured by the wine).

By the Coroner: The substance extracted from the cask would come within the Arsenic Act, which forbids its sale, except under certain restrictions.

Cross-examined by Mr. Neve, representing the Acme

Chemical Company: He had no means of telling how long the arsenic had been in the barrel. The arsenic would no doubt in time go to the bottom by reason of its weight, and might account for his finding the lumps at the bottom of the barrel.

H. A. Grinrod was sworn, and deposed that he was the manager of the Acme Chemical Company, formerly the Agri-Horticultural Chemical Company, which carried on business at Tunbridge. It was not a registered company. The company consisted of himself and a Mr. W. Baldwin, who traded under that name. The barrel produced had probably come from his firm at some time or other. It might have been in the year 1887, and might have been the identical cask sold to Mr. Charlton, a seedsman of Tunbridge Wells, in April of that year. The book he produced had an entry to the effect that a barrel of "weed killer" was sold to Mr. Charlton on April 29, 1887. There was no doubt the cask had contained weed killer, which was composed of white arsenic and soda crystals. These two substances were boiled together in certain proportions. The firm used to put 2 lbs. of white arsenic to the gallon of water, but they used less arsenic and more soda now. No doubt if the weed-killer stood a long time it would precipitate arsenic.

By the Coroner: The cask would leave the firm with the name and address painted on it, and with a label stating the nature of the contents of the cask. For the last two years they had painted the word "poison" on their casks. They also paste on a red label bearing directions for use and a caution as to the dangerous nature of the stuff. The word "poison" is printed on the label. That label had been in use ever since the firm commenced business. Such a label was undoubtedly originally on the barrel produced. The Acme Chemical Company still manufactured "weed killer" which still contained arsenic, though in less quantity than formerly. He did not keep a book as required by the Arsenic Act and the Pharmacy Act.

A juror suggested that the word "poison" should be branded on the cask, and the witness said that he had now ordered two branding irons with a view to doing so.

A juror asked for information as to the Acts regulating the sale of poisons, and on being informed by the Coroner, remarked on the difficulty with which a small quantity of arsenic could be obtained from a chemist, and the facility with which large quantities could be obtained from unregistered persons.

Mr. Grinrod's examination continued. He was a wholesale dealer in "weed-killer," but not in arsenic. He obtained his arsenic from a London agent.

Cross-examined by Mr. Neve: The firm distinguished their casks from beer casks by painting the iron rims red and both top and bottom red; the name and address of the company is also painted on, and a label bearing distinctly the word "poison" is affixed to the cask. They were not the only makers of "weed-killer;" there might be half a dozen other manufacturers of similar preparations. All weed killers contain arsenic in large quantities. His information also led him to suppose that many private people—notably gardeners—make their own weed-killers from arsenic. Mr. Charlton knew how to make it because he told witness so on one occasion. Mr. Charlton might have made weed-killer in the cask produced. As far as possible the Acme Chemical Company caution the public against using the "weed-killer" for improper purposes. He was aware of the provisions of the Arsenic Act and the Pharmacy Act, and understood that they did not apply to transactions in the ordinary course of wholesale dealing. The barrel was supplied to Mr. Charlton in the ordinary course of wholesale dealing, and he (witness) considered the Acts sheltered him from responsibility in that transaction. He considered "weed-killer" was a preparation of arsenic, and that the provisions of the 17th section of the Pharmacy Act were applicable to it.

Mr. Neve addressed the jury on behalf of his client at considerable length, dwelling on the fact of the large number of private gardeners who made weed-killer for their friends, and holding that the law would be taking a serious step in striking at legitimate wholesale dealers whilst leaving private individuals untouched. He pointed out that thus both the Arsenic Act and the Pharmacy Act clearly exempted wholesale dealers from their provisions. The Pharmacy Act was somewhat wider in its scope than the Arsenic Act, and in section 17 it is found distinctly stated that the provisions there set forth did not apply to sales made in the ordinary course of wholesale dealing. Mr. Grinrod and all similar manufacturers of "weed-killer" therefore were protected by law. The Acme Chemical Company had taken the greatest precautions against accident by the improper use of their "weed-killer," and they courted the fullest investigation.

The Coroner, in the course of summing up the evidence, pointed out that every care had been taken to have the most searching investigation into the circumstances attending Wesley's death. The two Acts of Parliament dealing with the sale of poisons were the Arsenic Act and the Pharmacy Act; if either had been infringed no doubt the proper authorities would take it up. The police were present and had heard the evidence, and a gentleman from the Pharmaceutical Society of Great Britain was also there to take cognizance of what transpired. The jury had not to concern themselves with that matter, though he thought it desirable they should be informed of the efforts made to ascertain if the law had been properly complied with.

The jury, after a short consultation, returned a verdict of "Death from misadventure," and added the following rider:—"That all vessels containing poison should have the word 'poison' plainly stamped or printed on them. In the case of wood barrels the wood should be branded upon each head, and on other vessels a fixed label or stamp should be placed in the most prominent position. When the vessels are empty, if not returned to the vendor, we recommend that the same be destroyed."

Mr. Neve, on behalf of the Acme Chemical Company, undertook that the recommendations of the jury should, as far as possible, be carried out in the future.

Obituary.

Notice has been received of the death of the following:—

On the 29th of September, Mr. William Butler Madgwick, Chemist and Druggist, Andover. Mr. Madgwick had been a member of the Pharmaceutical Society since 1863.

On the 11th of October, Mr. Charles Tyson Mackereth, Chemist and Druggist, Fountain Street, Ulverston. Aged 23 years.

On the 20th of October, Mr. George Stead, Chemist and Druggist, Ann Street, Widnes. Aged 49 years.

On the 26th of October, Mr. John George Palmer, Chemist and Druggist, Market Place, Durham. Aged 33 years. Mr. Palmer was an Associate of the Pharmaceutical Society.

On the 27th of October, Mr. John Henry Wagstaff, Chemist and Druggist, James Street, Westbourne Terrace, London. Aged 89 years.

On the 2nd of November, at Paddington, Mr. Henry Emlyn Barton, Chemist and Druggist, of Kenilworth. Aged 65 years.

On the 5th of November, Mr. Alfred Greenall, Che-

mist and Druggist, South Road, Waterloo, near Liverpool. Aged 48 years. Mr. Greenall had been a member of the Pharmaceutical Society since 1870.

On the 2nd of November, Mr. James Hill, Chemist and Druggist, Southsea. Aged 60 years.

On the 4th of November, Mr. Benjamin Prince, Chemist and Druggist, Frodsham Street, Chester. Aged 85 years.

On the 19th of October, Mr. Frederick March, Chemist and Druggist, High Street, Stamford. Aged 74.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Collodium Belladonnæ, B.P.C.

Sir,—The proverb that "bad wine makes good vinegar" involuntarily comes to mind when one notices the speedy criticism attendant upon the publication of a faulty formula in the Unofficial Formulary. The case of collodium belladonnæ is an excellent instance, and it is in no cynical spirit that I claim this as one of the less appreciated merits of the Formulary. The new target becomes an object of our keenest marksmen, and in this case some very good shooting by Messrs. Conroy and J. C. Umney has resulted.

If warned by the example of politicians, one will have to be careful about disclosing cabinet secrets, but I shall hardly be censured by our worthy chairman, Mr. Martindale, if I take the personal blame for suggesting the desirability of including this formula. The evolution of the preparation is interesting and instructive. It is now more than a dozen years since Dr. H. Miller published in the *Edinburgh Medical Journal* a notice of a preparation of alcoholic extract of belladonna (leaves) twice the strength of the official plaster (1867), the other ingredients being collodion and spirit of camphor. Dr. Miller highly commended its efficacy as an anti-galactagogue, and for the relief of inflamed breasts in nursing women. He called it Emplastrum belladonnæ fluidum.

That the old-fashioned belladonna plasters might well be superseded was evident, and if this substitute had the advantage which medical testimony averred, the perennial nature of the demand was as certain as the axiom of the poet that "hope springs eternal in the human breast."

The original emplastrum belladonnæ fluidum was made from alcoholic extract of the leaves, the alcoholic extract of the root being little known until the B.P., 1885, introduced it for the purpose of making the official plaster and ointment. Since that time, belladonna root has become of far greater importance pharmaceutically than the leaves, and our chief external preparations (plaster and liniment) have employed it exclusively. That a process which seemed to be an advance, although really retrograde, has adopted the extract of the root for making emplastrum belladonnæ fluidum is not remarkable. The brilliant green chlorophyll of alcoholic extract of belladonna leaves is not so pleasing as to make one wish to keep it.

But Mr. J. C. Umney's valuable estimations of the alkaloid in different extracts of belladonna root and leaves (*Pharm. Journ.*, October 31, 1891) show that one sample of alcoholic extract of the leaves was soluble in collodion to the extent of 85 per cent., and it was upon such an extract as this that the preparation made its good reputation.

It would open a new question were we to discuss whether these galenical extracts should be consigned to limbo and replaced by their pure alkalolds. When quinine and morphia have absolutely superseded galenical preparations of cinchona and opium this should also happen, but we see the two classes of remedies both flourishing, and the older one has not yet come to be regarded merely as a survival. As regards collodium belladonnæ, suppose for the present we omit the instructions to "set aside and decant the clear liquid," and direct "the bottle to be shaken," will not every practical consideration have been satisfied?

On the question of the extent of use of the remedy, Mr. Umney thinks it "limited." It would be interesting to hear someone from North Britain on this point. The Formulary may be of particular service when it takes up a good thing having a "local" origin, and adds it to our store of common knowledge. Mr. Maben has made valuable contributions of this nature on a previous occasion.

Leeds. Richard Reynolds.

Dispensing Charges.

Sir,—Although I am a firm and consistent supporter of pharmaceutical chemists individually as against stores, I cannot be surprised from instances that occasionally come under my notice that patients take their prescriptions to co-operative associations.

To quote a recent experience, I prescribed for a patient a powder for local application containing 30 grains of cocaine hydrochlorate, and 60 grains each of boracic acid and white sugar, and I was constrained to agree with my patient that the price of 6*s.* 6*d.*, which he paid, at an establishment certainly not of the first rank, was an exhorbitant one. But on general inquiry I find that hydrochlorate of cocaine, which is sold wholesale in such small parcels as 60 grains, at the rate of 4*s.* 3*d.*, *i.e.*, at about four-fifths of a penny a grain, appears to be retailed at from 3*d.* to 6*d.* a grain. The same prescription taken to the stores has been charged 2*s.* 10*d.*, and allowing that this price is inconsistent with fair trading, from the vendor's point of view, it must be admitted that the shop price is nearly as unfair to the purchaser.

I fear it is the old tale which applies equally to our butcher's meat and other domestic wants; when once an article has the repute of being expensive, it is a long time before the retail customer derives the benefit from improvement in the wholesale market.

Lennox Browne.

"Trade of the Nineteenth Century."

Sir,—In the report of a speech of mine before the Brighton Junior Association of Pharmacy, the accidental substitution of a word has rather obscured a point I was anxious to make. The sentence was: "The man who, though a chemist, despises chemistry; who though a pharmacist looks coldly on pure pharmacy; who, though a druggist, is content to buy drugs wholesale and sell them retail, knowing nothing further about them, their therapeutic action, their history, where they come from, or anything science teaches with respect to materia medica—that man does not understand the trade of the nineteenth century."

The meaning intended to be conveyed was, that he who at this time of day enters upon trade without previous technical and scientific training does not understand his business.

Joseph Ince.

NOTICES OF MEETINGS.

Midland Counties Chemists' Association.—Paper by Mr. Cripps postponed until Tuesday, Nov. 24.

Brighton Junior Association of Pharmacy.—Wednesday, Nov. 18.—Musical and Social Evening.

Edinburgh Chemists' Assistants and Apprentices' Association.—Wednesday, Nov. 18.—Papers: "A Reliable Test for Oxides and Hydrates" and "Note on Tartaric Acid," by Mr. W. B. Cowie, and "Things to Do," by Mr. P. McEwan.

Chemical Society.—Thursday, Nov. 19, at 8.—Lecture on Colour Photometry, by Capt. W. de W. Abney, F.R.S.

Chemists' Assistants' Association.—Thursday, Nov. 19.—Annual Conversazione at the Portman Rooms.

Liverpool Pharmaceutical Students' Society.—Thursday, Nov. 19, at 8.30.—Paper: "The Manufacture of Aërated Waters, by Mr. T. S. Wokes, and "Preparation of Suppositories," by Mr. D. Hetherington.

Western and North-Western Chemists' Associations.—Wednesday, Nov. 18.—Annual Dinner at the Holborn Restaurant.

Sheffield Pharmaceutical and Chemical Society.—Wednesday, Nov. 18.—Paper: "Synonyms," by Mr. G. Ellinor.

Communications, Letters, etc., have been received from Messrs. Horton, Newsholme, Humphrey, Mercer, Scott, Cope, Park, Davis, Billings, Kinninmont, Ivatt, Alcock, Thursfield, Justice, Plebian.

FALSE PELLITORY ROOT.

BY E. M. HOLMES, F.L.S.,

Curator of the Museum of the Pharmaceutical Society of Great Britain.

A few weeks since, a small sample of pellitory root (*Anacyclus Pyrethrum*) was forwarded to me by a wholesale herbalist in London, stating that it had been offered to the wholesale trade, but that there was some doubt as to its genuineness. The only feature noticeable at the first glance was the slightly paler colour of some of the pieces, but on cutting a transverse section and examining it under a lens it was noticed that some of the specimens possessed a structure entirely different from that of pellitory, and that it was quite possible to distinguish the spurious root by this means. Some of the pieces, however, so closely resembled pellitory root in general appearance (figs. 1 and 2) that they

Fig. 1. *Anacyclus Pyrethrum.*

Fig. 2. *Corrigiola telephiifolia.*

might easily be overlooked. It seemed desirable, therefore, to place on record the occurrence of the spurious root, and to point out the features by which it may be recognized.

The apex of the spurious root is generally crowned with small wart-like protuberances, such as frequently occur in senega root and in many of the *Caryophyllaceæ*; these are evidently the remains of the bases of slightly woody, slender stems. The transverse section of the root is of a yellowish-white colour, with three to five pale opaque concentric rings (fig. 3), each one alternating with a darker and narrower translucent horny ring.*

* In this character it recalls the appearance of dandelion root, but in that root the rings are interrupted, narrower and more spongy, and there is a well-marked woody centre of a yellow colour and porous character.

The taste is sweetish at first, leaving after a time a slight tingling sensation, which recalls that of senega. The root possesses scarcely any odour. It is softer and more flexible than pellitory root.

Fig. 3.—Transverse section of the *Corrigiola telephiifolia*, magnified.

In the root of *Anacyclus Pyrethrum* the structure is quite different.

The apex of the root is generally crowned with a tuft of short white hairs. The tranverse section exhibits a single ring of radiating linear vascular bundles, which appears porous and of a yellowish colour, the medullary rays and inner portion of the bark being of a creamy white tint, becoming much darker or of a pale brown hue in badly dried pieces. Scattered over the surface, but much more abundantly towards the circumference of the section, may be seen yellowish-brown oil receptacles, containing the odorous and resinous matters of the root (fig. 4).

Fig. 4.—Transverse section of *Anacyclus Pyrethrum*, magnified.

The identification of the root proved to be a matter of some difficulty, although its appearance seemed familiar to me. A section placed under the microscope showed no starch, nor did tincture of iodine manifest the presence of it.

Thinking, from its resemblance to dandelion root that it might possibly belong to the *Compositæ*, it was examined for inulin, but without result, nor were laticiferous vessels observed in it, nor raphides.

I then sent a portion of it to Professor Radlkofer, of Munich, whose knowledge of the anatomy of the stems of plants is probably unequalled, asking him if he knew any plants of the natural order *Phytolaccaceæ* at all resembling it, for the roots bear a greater likeness to some species of *Phytolacca* than any other plant known to me. He was unable to identify it, but suggested a comparison with other known roots coming from the same district, if possible. Pellitory root being a native of northern Africa, it occurred to me that I had seen a root very like the spurious root in a collection of Morocco drugs presented some years ago by Dr. A. Leared (*Pharm. Journ.*, [3], vol. v., p. 521). On examination of the roots in that collection it was found that the spurious pellitory was identical

in appearance, structure and taste with the root called "towsergent" or "tauzarghente," which had been already identified by me as that of *Corrigiola telephiifolia*, Pour., belonging to the natural order *Illecebraceæ*. The fact that this little plant is glabrous, whilst *Anacyclus Pyrethrum* is hairy, explains the presence of the radical tuft of hairs on the apex of the one root and its absence from the other. Very little is known of the structure of the plants of the natural order *Illecebraceæ* or *Paronychiaceæ*, and that little refers chiefly to stems and not to root structure.

A brief account of the *stem* structure of *Corrigiola* is given in *Ann. des Sciences Nat.*, ([4], tom. xiv., p. 117), but as pellitory root is rarely, if ever used in a powdered state, and in an entire state the root of *Corrigiola telephiifolia* is easily identified, it is unnecessary to enter into histological details in the present note.

NEW PHYSIC.*

The following remarks, from the pen of Dr. B. W. Richardson, are taken from a paper on "Old and New Physic," published in *The Asclepiad*:—

"The contrast between new and old physic in matter of practice is striking. We perpetuate few of the old errors, but we invent new ones for ourselves; we retain many of the old virtues, and we improve or add some by which the signs of such progress as we have made are indicated. In therapeutics the change is phenomenal. Our fathers followed Galen in the view that every practitioner ought to hold all his remedies in his own hand and dispense them himself; the chemist and druggist was the demon. Now it is considered too commonplace for the doctor to dispense his own remedies, and when he does so it is as a sort of favour or necessity—something thrown in, to form, incidentally, or not at all, an addition to the fees for attendance. The doctor's boy with the two-lidded basket is becoming as defunct as the doctor's bill with the red-inked money columns on long sheets of bill-paper. The art and mystery of the apothecary has passed over to the pharmaceutist, who pockets the art and kicks out the mystery. This modified our prescribing altogether. The pharmaceutist pushes his trade industriously to meet our wants, and our wants are many. He grows bolder; he invents for us in advance of our needs. He floods our breakfast-tables with his nostrums, advices, and temptations. He is a professor of materia medica, pharmacology, hygienics, diet and regimen, all rolled into one. He has a new remedy for every day in the year, with two for holy days, so that any remedy that lives for a year has a long life. To the one grand narcotic of the old school, opium, so trustworthy, so obedient, so safe, when correctly mastered, there are now a hundred rivals, and not one its equal. The result is that a large section of practitioners is flying after everything, trying everything, and holding fast by nothing; whilst another smaller section is giving up everything, or, in state of greatest activity, is playing placebo with considerable luck in the play, to their own astonishment."

NEW EDIBLE PRASIOLA.

In the *Botanical Magazine*, published at Tokio, under the auspices of the Tokio Botanical Society, Professor R. Yatabe, D.Sc., describes, under the name *Prasiola japonica*, an undescribed species which grows attached to rocks in clear rapid streams in mountainous parts of the country. He states that in the districts where this alga grows, people collect it in large quantities, especially in autumn, press it and dry it into the form of square sheets, and sell them as an article of food under different names in the different localities, such as *Kawa-nori*, *Shilakawa-nori*, *Daiyagowa-nori*, etc. They are eaten, either slightly broiled or vinegared, after putting them in water, being used in very much the same way as the various kinds of laver, *Porphyra* and *Ulva*.

FERMENTATION OF BREAD.

M. L. Boutroux asserts that the fermentation of bread consists essentially in a normal alcoholic fermentation of the sugar which already exists in the flour. The yeast plays a double part in the process—it produces a disengagement of gas which causes the dough to swell, and it prevents the bacteria, which are parasitic on the starch-grains, from developing, and thus making the dough sour and dissolving the gluten. M. Boutroux finds in the yeast three distinct microbes, two bacilli and a bacterium, but concludes that they play no direct part in the process of fermentation. If they are of any service at all, it is simply in the production of the fermentable substance, that is, of the sugar.

ADULTERATIONS IN LINSEED AND LINSEED OIL-CAKE.

In the *Bulletin* of the Belgian Microscopical Society M. J. Van den Berghe has a paper on the foreign substances found in the linseed oil-cake of commerce, which he finds to be very numerous, among the most frequent being colza, various kinds of mustard, hempseed, poppy, *Ricinus*, *Arachis*, etc. If the impurity consists of portions of the seed or seed-vessel of the foreign plant, he recommends treating the linseed successively with sulphuric acid (2·5 p.c.), soda (2·5 p.c.), alcohol and ether, and then digesting for some hours in the cold with a concentrated solution of calcium chloride. This makes both the pericarps and the testa of the seeds so transparent that the distinctive characters of the various species can be readily recognized under the microscope. The nutritive reserve substances of linseed are chiefly almond-grains and drops of oil; when, therefore, the oil-cake is pure, iodine solution should not give the blue reaction of starch.

COMPOSITION OF CHLOROPHYLL.

Mr. N. Monteverde has made a series of experiments for the purpose of determining the number of distinct pigments present in an alcoholic solution of chlorophyll. If an alcoholic extract of green leaves is treated with baryta-water and the precipitate extracted with alcohol, the solution has a yellow colour. If this is again shaken with petroleum-ether after the addition of a few drops of water, a separation takes place of the yellow pigments, the petroleum ether having taken up the carotin, identical with the colouring matter of the carrot, together with the green pigment, while the alcohol contains the xanthophyll. The pigments contained in the petroleum-ether are termed by the author "upper pigments," those contained in the alcohol "lower pigments." By careful manipulation the whole of the green pigment (upper green pigment) can be removed by treatment with alcohol from the petroleum extract, leaving behind a golden-yellow solution of carotin; this "upper green pigment" is not capable of crystallizing. The alcoholic solution contains, in addition to xanthophyll, a "lower green pigment," which crystallizes in tetrahedra, hexagons, or stars, but most usually in irregular forms. The author believes that living leaves contain only the "lower green pigment," the "upper green pigment" being a transformation product resulting from the action of boiling water or of alcohol.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, NOVEMBER 21, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

DEATH OF MR. THOMAS HYDE HILLS.

WE regret to have to report that, just at the time of sending this number of the Journal to press, information has been received of the death, on Thursday afternoon, of Mr. THOMAS HYDE HILLS.

THE NEW EXAMINATION REGULATIONS.

THE thorough efficiency of the examinations by means of which is obtained the right to carry on the business of a chemist and druggist, or to make use of the title pharmaceutical chemist, is so essential for the protection of the general interests of the public and of the pharmaceutical body, that any steps taken for improving those examinations are of wide-reaching importance. This is more especially the case at the present time, since the establishment of a uniform system of pharmaceutical education still remains to be achieved. From the point of view of public safety the Legislature has restricted the use of the title chemist and druggist, or its equivalent, to persons who are certified to possess a competent practical knowledge of the business carried on under that designation. It has entrusted to the Pharmaceutical Society the public duty of ascertaining that persons desirous of entering upon that business do possess the requisite knowledge, and of preventing those who do not from doing so. This duty has now been performed by the Society's Boards of Examiners for more than twenty years, and the reports of the officers appointed by the Privy Council to watch the examinations in the interest of public safety bear testimony that the duty has been on the whole well performed. But at the same time those reports have for many years past pointed out certain requirements which were not fully provided for by the mode in which the examinations have been conducted, and they have urged the necessity for alterations which would obviate the inherent defects of a mere *vivâ voce* examination. Leaving out of consideration, for the moment, the very large proportion of candidates rejected by the Society's examiners, which has been repeatedly declared by the Government visitors to be due to no other cause than the general incompetency of the candidates and their imperfect early education and technical training, it has been shown by them that the most prevalent deficiency was in regard to practical subjects. The late Dr. GREENHOW, as Government visitor of the examinations, repeatedly drew attention to this fact. Hence his recommendations that the practical dispensing examination should be extended in its scope and duration, and that a practical examination in pharmacy should be added to the *vivâ voce* examination in that subject. It may be inferred that those recommendations were suggestive of the need for such alterations, even in regard to the better qualified candidates. These recommendations naturally attracted the attention of the Boards of Examiners, and on consideration of the subject the suggested alterations were approved of as being desirable. At that time the accommodation afforded by the examination rooms did not admit of Dr. GREENHOW'S recommendations being fully carried out; but in his report, forwarded to the Council by the Privy Council in 1888, when the new examination rooms had been completed, reference was again made to the need of extending the examination in practical dispensing. The object was to give candidates more time and better opportunity of doing their work, so as to lessen any difficulties arising from nervousness which they might experience. It was also urged that the examination in pharmacy should be made more practical by requiring each candidate to prepare some definite compound of the Pharmacopœia. For carrying out that plan it was suggested that the examination should be spread over two days, and that such a division of the examination would recommend itself as relieving candidates from the strain consequent on being examined in six subjects on the same day.

The special report from the Society's Boards of Examiners, to which the PRESIDENT referred at the last Council meeting, may be regarded as the final issue of the deliberations on this important subject. The decision arrived at was to recommend that the examinations in practical dispensing, pharmacy, and practical chemistry should be taken on a day preceding the *vivâ voce* examination, and that candidates who acquit themselves satisfactorily should then go before the whole Board and be examined orally in botany, materia medica, general chemistry, and that part of pharmacy which was not included in the practical examination. By this arrangement it is expected that the oral examination may be got through in half a day, and that the candidates will not be kept waiting for many hours in the examination room under considerable inconvenience. The necessity of such an arrangement for the efficiency of the examination, as well as for the convenience of candidates, is almost self-evident. To be under examination, both orally

and practically, in six subjects on the some day is in itself too great a strain for the great majority of candidates to endure without being placed at some disadvantage, and to have to wait their turn, in an excited and anxious state of mind, would necessarily make the ordeal more trying for them. Moreover, now that the time given to practical dispensing has been extended, and the practical chemistry examination has been added, the examiners have not sufficient time for fully testing the qualifications of candidates. Upon all grounds, therefore, it is evident that the desire which has hitherto prevailed to avoid keeping candidates in London or Edinburgh for more than one day to undergo examination can no longer be acted upon. The attempt to do so would entail hardship and possible injustice upon candidates, besides interfering with the efficiency of the test by which their fitness to be placed upon the Register of chemists and druggists is to be gauged and determined. It is under these circumstances that the Council gave its unanimous approval of the plan recommended by the two Boards of Examiners. This is to come into operation next January, and all candidates for the Minor examination will then have to present themselves on two different days, not necessarily consecutive. In regard to the Major examination alterations having a similar object will be made. The candidates will first undergo a written examination in chemistry and physics, botany and materia medica; then, on a subsequent day, a practical examination on the basis of the new schedule. If the examiners report favourably upon the character of the work done in those four subjects the candidates will be passed without further examination; but if a candidate is found to be weak in one or other of the subjects, he may, at the discretion of the Board, be required to undergo an additional *vivâ voce* examination. That, however, is always to be contingent upon the character of the written and practical work. The examiners are decidedly of opinion that since the Major is a voluntary honours examination it is not desirable to continue to insist upon the full standard of proficiency in all four of the subjects. It is thought that candidates acquitting themselves extremely well in two of the subjects, biological or chemical, should be allowed to pass on that basis. This modification will have the effect of opening up the Major qualification to those who have a special bent in one or other direction. Thus it is hoped that an additional inducement will be offered for taking the higher qualification of pharmaceutical chemist. Besides that the further advantage of a probable reduction of the fee for the Major examination should ensure a larger number of aspirants to that rank.

These arrangements for the alteration of the methods of conducting the Society's examinations are not to be regarded as means of rendering the tests of qualification more stringent or more severe than they have been hitherto. That is by no means the case. On the contrary, the effect of the new method of conducting the examination of candidates for legal qualification will be to increase and assist the ability of the examiners to judge whether candidates possess the scientific knowledge and practical skill which the law demands, and to decide whether they are entitled on that basis to be allowed to carry on the business of a chemist and druggist. It will therefore be a means of enabling the Society to perform more perfectly the public duty for which it was entrusted with the functions of examination and registration. To candidates whose qualifications are deficient the new system will no doubt be a terror. It is well that this should be so. It may be hoped that the objections to the Society's examinations that have been based on the sentimental fallacy that they "kept men out of the trade" are now pretty well exploded, or at least counterbalanced by sounder views. Like the amended schedules, to which reference was recently made, as marking out more distinctly the requirements that must be satisfied before the right to carry on the business of a chemist and druggist can be obtained, so the new method of conducting the examination will, by enabling the examiners to make their tests more searching, serve better to distinguish between real and superficial qualification. The two changes are in all respects complementary, and to candidates who have sound claims to legal qualification both should commend themselves as presenting distinct and just advantages for them. From this view of the matter we may pass to another consideration that should be regarded as of equal importance with the Society's public duty in conducting examinations. The service thus rendered in protecting the interests of the trade during the past twenty years is far from being duly appreciated, though it has been considerable. The number of candidates that have been rejected in the Minor examination is a sufficient proof, and when the interests of duly registered persons are justly considered, the service thus rendered by the Society must be recognized. That it might have been much greater must be admitted; but any deficiency in that respect is due to the absence of co-operation with the Society, for which so large a proportion of chemists and druggists are responsible. The supporters of the Society may, however, be congratulated on the measures that are now to be taken in the amendment of the examinations. Their effect will be to afford greater protection to duly qualified men. They will serve to secure to efficiently trained candidates for legal qualification the advantages they can justly claim on the ground of scientific knowledge and technical skill over others lacking those solid acquirements and only artificially prepared for presenting themselves for examination. That such will be the results of the new regulations may, we believe, be confidently anticipated.

DISPENSING CHARGES.

Sir James Sawyer has rendered good service to pharmacists by his emphatic condemnation of the too general desire for low priced dispensing which has of late been one of the features of the prevailing craze for low priced articles. It has frequently been urged in this Journal that in supplying medicine compounded according to a physician's prescription the value of the work done by the pharmacist cannot be estimated on the basis of the market price or even the ordinary retail price of the drugs or preparations ordered. The money value of these articles is, indeed, altogether a matter of subordinate importance. In regard to the charge made for dispensing medicine there are other considerations of a more professional nature to be taken into account. It is but fair to bear in mind the peculiar circumstances of the case which differ from those of an ordinary trade transaction. First of all there is the technical skill and experience of the dispenser, upon which the patient must rely for the proper observance of the physician's directions. This is a matter which the patient is unable to judge of, and the purchaser of medicine must trust to the knowledge, skill and care of the pharmacist who dispenses medicine, solely upon the ground of his being a man recognized as qualified for the work. That is a position which can only be obtained after a course of education and training similar to that required for a medical man, and for this reason alone the services of a pharmacist in dispensing medicine justly demand remuneration more commensurate with that due to the physician than with the payment made for articles purchased at a grocer's or at a general store. In the latter case a trader doing a very extensive business may be able to supply articles for less than his neighbours, and if the quality of the articles can be judged of by the purchaser there may be good reason for giving a preference to the shop where they can be had at the lowest price. This, however, is not the case with drugs and especially with medicine. The public must trust implicitly to the pharmacist, and he, on the other hand, is entitled to be remunerated for conscientious regard for the confidence necessarily placed in him. In having medicine dispensed it is essential that the precise drugs or ingredients ordered by a physician shall be supplied, that they shall be of proper quality and strength, that neither more nor less than the prescribed quantities shall be supplied; also that they shall be properly compounded and that proper directions shall be given for the use of the medicine. All these matters may involve consequences of life or death, over which the purchaser of the medicine can have no control. To obtain two doses of physic for the price of one might be a commercial gain; but if the double dose were injurious or fatal in its effect, neither that gain nor the liberality of the vendor would benefit a patient. It would be a poor consolation to have obtained medicine at the cost price of its ingredients if, by mistake, one of a poisonous nature were substituted for that ordered. It is to secure immunity from such contingencies and the proper preparation of medicine that the purchaser pays a pharmacist for dispensing. By disregarding this view of the matter and seeking to obtain medicines at mere trade prices, the public not only incurs a very serious risk, but, as Sir James Sawyer remarked, does harm to the advancement of remedial art.

But while the justice of these considerations is enforced it is necessary to suggest that discretion must be exercised by the pharmacist in regard to the charges for dispensing medicine, and that it is necessary to adapt those charges in some measure to conditions affecting the price of drugs. The necessity is illustrated by the case to which Mr. Lennox Browne directed attention in last week's Journal. It must be admitted there appears to be some ground for his opinion that the charge of 6*s.* 6*d.* for the powder he refers to was an excessive one. So far as we are able to judge, it can only be accounted for by assuming that the present price of cocaine had been overlooked, and that the charge was made upon the basis of an old quotation of the cost of cocaine. This article has been the subject of very great variation in price, and at one time when it was as much as 2*s.* 6*d.* per grain, the powder ordered by Mr. Lennox Browne could not have been supplied for ten times the amount that was charged. Since then the cost of cocaine salts has been reduced, but though they have consequently come into more general use cocaine is still a somewhat unusual medicinal agent. Hence it may be that the cocaine used in making up the powder had been purchased when the price was higher, and that the pharmacist was misled by the cost price marked on it. Mr. Lennox Browne justly acknowledges that the charge of 2*s.* 10*d.* made for the powder at the stores is inconsistent with fair trading. Even at the quoted market price mentioned by him the cocaine in the powder would have cost 2*s.* 1½*d.*, without any allowance for the seller's profit, or for his care in ascertaining that it was pure and fit for use. Nor would the sum of 8½*d.* be adequate remuneration for the other ingredients and for the pharmacist's work in preparing the powder. In the case of medicinal articles subject to great variation in price, the pharmacist is placed in great difficulty how to regulate his charges in accordance with prevailing market rates. With all deference to Mr. Lennox Browne it may be pointed out that in such cases it is, to some extent, a necessity that the repute of being expensive should continue to attach to certain articles. Therefore the purchaser of medicine cannot reasonably expect to derive the same advantage from improvement in the wholesale market that he might do when purchasing those articles in quantity. But it is nevertheless necessary that attention should be paid to this point in fixing the charge for dispensing medicine, so as to avoid the reproach of making exhorbitant charges.

On Thursday evening the annual Conversazione of the Chemists' Assistants' Association was held at the Portman Rooms, Baker Street, and was very well attended. For the entertainment of the visitors, who were received by the President of the Association (Mr. W. Lloyd Williams) and his colleagues, an exhibition of a large number of articles was provided, which was supplemented by an excellent concert, and dancing followed the concert.

Transactions of the Pharmaceutical Society.

EVENING MEETING IN EDINBURGH.

Wednesday, November 11.

MR. J. LAIDLAW EWING IN THE CHAIR.

The first evening meeting in Edinburgh of the present session was held in the Society's House, 36, York Place, on Wednesday, November 11, at 8.30. Mr. J. Laidlaw Ewing in the chair.

The minutes of last meeting having been read and approved, apologies for absence were intimated from Dr. J. E. T. Aitchison, C.I.E., F.R.S.; Dr. William Craig, F.R.S.E.; Mr. Maben, Hawick, Vice-Chairman; Mr. Jack, Arbroath; and Mr. Boa.

The CHAIRMAN then said: In rising on this the first occasion on which I take the chair, I may be allowed to say one single word in regard to my esteemed predecessor in the chair. Mr. Gilmour has rendered many great services to the Pharmaceutical Society; and I think he was especially diligent in attendance at meetings such as these. He has thus set to me a very good example, and I shall do my best to follow it. Gentlemen, I congratulate you, and I congratulate the Society on having here to-night the Regius Professor of Botany in the University of Edinburgh to deliver an address. The name of Balfour has been honourably associated with the chair of botany now for two generations. The late Professor Balfour, whose name can never be mentioned in this place but with the deepest respect, was an honorary member of this Society. He took a great interest, I believe, along with the late Sir Robert Christison, in the foundation of the North British Branch, and he was ever willing and anxious to give the benefit of his advice and assistance. Speaking as an old pupil, and I daresay there are other old pupils here, I am sure we will ever cherish a deep veneration for that distinguished man. The present Professor Balfour has filled the chair of botany in our University—I believe the most important chair of botany within the confines of the United Kingdom—with distinguished success. This is not Professor Balfour's first position. In Glasgow, and subsequently at Oxford, he did great service to the science of botany, and I think I can pay no higher tribute when I say he has added lustre here to his former reputation. We all remember that Professor Balfour in the early stages of his career paid a visit to the Island of Socotra. He published after that visit a most interesting monograph, and we connected with pharmacy are indebted to him for his research regarding socotrine aloes. Now he has come to bring before us a most important subject, one which I may say is of great and increasing importance. I think we sometimes forget how extensive the British Empire is. I think we have here on this map pretty fairly shown to us how large it is, and how it comprehends all varieties of climate, soil, and vegetation. Now it is the province of our botanical garden in Edinburgh and of Kew, to take advantage of these different conditions, and in so far as they are able to accomplish this, that all products of importance to medicine may be grown within the confines of the British Empire; and I need not call to your remembrance how, in our own time, by such researches, both at Kew and here, the production of cinchona bark has been completely revolutionized. And now, without detaining you for one single moment further, I will call upon Professor Balfour to deliver his lecture.

PROFESSOR BAYLEY BALFOUR then delivered the following Inaugural Sessional Address on:—

BOTANICAL ENTERPRISE IN RELATION TO PHARMACOLOGY.

BY PROFESSOR I. BAYLEY BALFOUR, M.D., D.SC., F.R.S.

Mr. Chairman and Gentlemen,—I thank you most heartily for the very cordial welcome you have given me, and I also thank you, sir, for the very feeling terms in which you referred to my father. Whilst I know from frequent experience, how deeply cherished his name is by all those who came in contact with him, I myself feel that after what you have said regarding myself, I owe very greatly the position I now occupy, and any work I may have done for the science of botany, to his training. In coming before you to-night, I have chosen as the subject of the address that I propose to deliver, that of Botanical Enterprise in Relation to Pharmacology. As your chairman has pointed out to you it is a subject of very vast importance, and I cannot hope in the time at my disposal to deal with it in all its aspects, and therefore I have been obliged to select one line upon which I shall hope to be able to say something that may be of interest to you. It will be well known to all the members of this Society whom I have the honour to address that one of the most remarkable amongst the many noteworthy achievements of chemical research in these later years of the nineteenth century, is the manufacture in the laboratory of substances for which our predecessors had to depend directly upon the organic world. The extension of such synthetical methods and their application on a large scale in the preparation of materials of great commercial value, are productive of far reaching effect, alike constructive and destructive; for if on the one hand the whole world benefit by the increased supply and the cheapness of the new product, on the other hand individuals and localities concerned in the collection and marketing of the natural substance may suffer by the annihilation of an industry and its concomitant ramifications. As an illustration in point the case of madder and alizarin rises at once in one's mind, and no more striking one could be found. The decadence of madder cultivation since the synthesis of its principle, alizarin, from the anthracene of coal-distillation has gone on apace, and the industry may now be regarded as in great measure superseded. In this, however, as in other instances, man still seeks his goods from the plant world, but draws upon the past in preference to the present, utilising the vast store of organic matter laid by by nature at epochs when there was no one to cull the riches from the plant-growth which clad the earth in profusion. And if modern chemistry has already done such things, who shall say where the limit to its powers shall be? As one after another of the substances we have hitherto known solely as the outcome of the complex metabolism proceeding in the protoplasm of the living body, fall within the number of those which can be made in the laboratory, and become absorbed in the conquests of the practical chemist, it is evident that our information regarding those intricate changes by which they are developed within the living body must become more definite; and our understanding of the mechanism in that wonderful workshop of life—the protoplasm—must grow clearer. Is it then too much to anticipate, as indeed some do, that amongst the triumphs that await the investigator of the future, is the synthesis of protoplasm itself, and thereby the discovery of its constitution and the elucidation of the various chemical and physical phenomena that are exhibited in its life? But however utopian or otherwise are our views of the possibility of chemical research, I think we may all rest assured that for very many years, far beyond the prospect of life of any of us here, the plant world will still be the fount from which will be drawn a large proportion of our drugs, as well

as other useful products, and the link, so old and so strong, between pharmacology and botany is in no danger of a speedy severance. At the same time there is some satisfaction in the contemplation of the capacity of the resources of chemistry to replace in measure natural products, and in thus looking to the artificial for supply should the natural fail. For man is prodigal, and the more so in the midst of plenty. Thrift is one of those acquired habits which require a deal of training to enforce. And no one of you will be altogether unfamiliar with the cry that constantly goes up regarding the exhaustion, constantly in progress, of the natural crops of official plants. And not only of these, but of the sources of many other products. Now it is timber, at another time fibre, then caoutchouc, and so on. In every case there is the same tale of the improvident and thoughtless destruction of the sources of nature's gifts, which, unchecked and uncounteracted, must have the natural ending of all spendthrift courses. I venture to think that it will not be without interest to you to hear something of what has been and what may be done to avert the catastrophe predicted. Therefore, in responding, as I do now, to the invitation to address you this evening your Council has done me the honour to give me, I have thought I might usefully direct your attention to some of the services that botanical enterprise has in the past rendered to pharmacology, and indicate to you the ripe promise that exists for a continuance, and in an increasing ratio, of such services in the future, in the way especially of safeguarding to posterity, and of bringing within reach of a wider circle of humanity the blessings in the form of drugs and economic products man now reaps from the vegetable kingdom. That the scientific study of botany took origin in pharmacology is matter of history; that it has been ever since the handmaid of pharmacology is true, although this practical side of it has not been at all times that which has appeared to the eye of the public the most prominent of its phases. Now, one of the earliest consequences of the interest in plants on account of their medicinal virtues or their economic uses, was the development of a desire on the part of those who had the facilities and means to cultivate the official herbs, and that not only on account of a laudable curiosity regarding their nature, but also with the practical view of maintaining within reach a supply of the remedies derived from them. From this cause those institutions which have in recent times so multiplied in our midst—botanic gardens as we now designate them—were in the first instance established. Leaving out of sight the gardens of which there is mention in classic times, but about which we can now learn so little that is definite, the earliest gardens for the purposes I have specified were created in Italy through the munificence of the Italian nobles, to whom the world owes so much for their enlightened encouragement of the dawn of science, literature and art, after their decadence in the middle ages. The Duke of Ferrara and other nobles at the beginning of the sixteenth century not only founded gardens for the cultivation of drug-yielding plants, but also sent emissaries to various places in many parts of the world to collect seeds and plants for their gardens. Their policy in cultivating plants was soon followed by public institutions, and the newly founded universities in Italy established botanic gardens for the benefit of their pupils, Bologna, Padua, Pisa, following the example in rapid succession. It is noteworthy that here, as in the case of many other institutions, private enterprise and foresight led the way; and in our country the procedure has been the same, although its time was not for some years after the Italian beginning. In the sixteenth century there were in Britain well-known gardens, notably that of Royalty, at Hampton Court, and of old John Gerard, near London; but the first public garden was that founded at Oxford in 1633 by Earl Danby, of which the famous Robert Morison was the first custodian. That of Edinburgh followed in 1670, and as one so near home it may not be uninteresting to you if I refer to the facts of its foundation, as they bring out so clearly the connection with pharmacology. It was forty feet square and formed a plot of the King's Garden at Holyrood. It was secured by Dr. Andrew Balfour and Dr. Robert Sibbald, and by them it was planted with drug-plants from their gardens and from that of the Laird of Livingston, Patrick Murray, an enthusiastic cultivator of plants, and they appointed Mr. James Sutherland intendant of it. This beginning stimulated the town, and in 1676 the Town Council, who, as you know, were then patrons of the University, or Town's College, as it was called, appropriated a portion of the Trinity Hospital Gardens for the purpose of founding a physic garden. The portion of ground is that which lies between the North Bridge and the Calton Hill, where the jail is; that little triangular area with the Waterloo Bridge at the apex, the Post Office, and the North Bridge on the one side, and the Calton Hill covered by the jail on the other side. Of this botanic garden Mr. James Sutherland was also appointed superintendent. The name Physic Garden was given to this garden of the town; and though it has ceased to exist, yet you know that there is still a street which goes by the name of Physic Gardens. Whenever you pass down that street you will bear in mind that there is the spot where the supply of the drugs which were used in Edinburgh for medicine was cultivated 200 years ago. For it is interesting to note that a great part of the stipend of the superintendent of the garden at that time was derived from the sale of drugs cultivated in his garden. Under Sutherland cultivation proceeded very satisfactorily, for no less than 3000 species of plants were cultivated at that time, names of which he published in a catalogue. But there is even a more interesting point in connection with the Edinburgh Garden. In 1700 the University—it was then "the College"—having then a Professor of Botany and not being satisfied with the garden at Holyrood and the Physic Garden at the North Bridge, started a third garden which we may speak of as the College Garden. It was placed under the care of the same Sutherland who had charge of the Physic Garden. That garden must have occupied the site which is now South College Street. It was south of the present college buildings, which did not extend so far as they do now, and in this third botanic garden drug-plants were cultivated, for in the university the teaching of botany in those days was directed chiefly to the properties of plants, and the lectures might be described as "on the medicinal properties of herbs." These three gardens continued for several years, but in 1724 (Mr. Sutherland had retired by that time), the College Garden seems to have fallen into disrepair and was discontinued; but an interesting fact is this, that in 1724, when the garden was demitted or ceased to exist as a botanic garden, it was taken up as a pharmaceutical garden. Certain physicians in Edinburgh—and in those days physicians looked after their own drugs in great measure—certain physicians took possession of this garden and cultivated in it drug-plants. What the ultimate fate of it was I do not know. The two other gardens, the Holyrood garden and the garden at the North Bridge were both given up, and all the plants were transferred to Leith Walk to a new botanic garden where Haddington Place is now situated. That was in 1763, and there the botanic garden or physic garden existed until 1820, when in that year it was removed down to its present site in Inverleith Row. This history, though merely incident to Edinburgh, illustrates the point I wanted to bring out that the cultivation of plants at first was entirely

for the purpose of pharmacology, and that these gardens were the source of supply of drugs used in Edinburgh at that time. Of other gardens in the country I may remind you of the famous Chelsea garden, founded in 1673 by the Apothecaries Company in London. In time the establishment of gardens became general, and even our colonies followed suit. The St. Vincent Garden, founded in 1764, has a remarkable history, though it was unfortunately discontinued in 1830 by the War Office, which by one of these anomalous arrangements resulting from the piecing together of our empire had control of it. But a botanic garden has again been started, and promises to become a very useful centre for the distribution of plants; for St. Vincent possesses a marvellously rich soil and many advantageous situations in various parts of the island. In the last century it received plants from Tahiti, brought by Captain Blight, amongst them the bread-fruit, and many of you will know the history of the introduction of mango and cinnamon into the British West Indies. It was by mere accident, and was owing to the capture by Admiral Rodney of French ships in 1792. The plants on board them were destined for French possessions in the West Indies, but they were taken to St. Vincent and placed in the botanic garden there. Some were sent thence to Jamaica, and thus these gardens performed important functions in rearing these commercial plants. The botanic garden at Jamaica has also an old history, there being no less than three of them on the island at the end of last century. A very interesting story might be made of the vicissitudes a great many of these historic gardens have passed through, but I am content with pointing out that such gardens were founded all over the world, almost wherever a British colony was formed. South Africa has its botanic gardens, in the same way Hong Kong, Singapore, Calcutta and Bombay, and in Ceylon you have no less than five botanic gardens. The idea underlying the institution of the earlier gardens did not, however, govern the work of all such gardens, nor did it continue to guide the policy of even the older ones. As teaching became divorced from the older lines gardens lost in large measure the significance in relation to pharmacology they originally possessed, and this partly from the fact that commercial enterprise provided a substitute for them in respect of the supply of drugs, and partly because the public taste for horticulture being whetted, they became centres of enjoyment and resort, and of the culture of plants interesting from other points of view as well as the medicinal. But the function of botanic gardens was not to lapse into one of mere pleasure-giving and of vicarious instruction. There was in them a latent power which only needed organization to develope, by which they could contribute to pharmacology even greater services than those rendered by them in the past, and could become powerful instruments in promoting the welfare of nations. So far as relates to the British Empire the germ of this organization was sown in 1841 by the creation of the Royal Gardens at Kew, and in this the jubilee year of its existence as a national garden, I am glad to take an opportunity of directing attention in Scotland to the work that has been done there under the three able directors who have successively controlled its destinies—Sir William Hooker, Sir Joseph Hooker, and now Mr. Thiselton Dyer. For the botanical enterprise to which I wish to refer centres in Kew. Briefly, the history of Kew is as follows:—In the sixteenth century there was, as I have said, a Royal Garden at Hampton Court, but the old royal palace ceased to be a residence for royalty from the time of George III. The story is that when George was young he received such a whipping there that he disliked the place, and therefore it fell into disrepute as a royal residence. In 1730 the father of George III., Frederick, Prince of Wales, leased a large extent of the ground that now forms Kew, and converted it into a garden for his own pleasure, and the pleasure of his children; and in 1760 George III. purchased the whole of this ground, and as a botanic garden it became famous, for as you know in the time of George III., there was the greatest amount of enterprise and exploration on the part of Britain, and innumerable plants were brought from all parts of the world, and many of them found their way to Kew Gardens, then entirely the property of the King. George IV. and William IV. neglected these gardens altogether. When our Queen ascended the throne and made an arrangement with the nation as to the Crown property, the question arose, what was to be done with Kew Gardens? A committee was appointed to consider their condition and their future. Fortunately for science, Dr. Lindley, a most sagacious and far seeing man, was selected to draw up a report on Kew Gardens, and I will just quote to you a short paragraph from his report, which will show you the comprehensive view he took. He says:—"A national garden ought to be the centre round which all minor establishments of the same nature should be arranged; they should all be under the control of the chief of that garden, acting in concert with him and through him, and through him with one another, reporting constantly their proceedings, explaining their wants, receiving their supplies, and aiding the mother country in everything that is useful in the vegetable kingdom. Medicine, commerce, agriculture, horticulture, and many valuable branches of manufacture would derive benefit from the adoption of such a system. From a garden of this kind Government would be able to obtain authentic and official information on points connected with the founding of new colonies; it would afford the plants there required without its being necessary, as now, to apply to the officers of private establishments for advice and assistance."

So comprehensive a scheme could of course only be slowly developed. Sir William Hooker, the first director, proceeded with his characteristic energy to lay wide foundations for its achievement. With the basis of the existing collection of living plants to start with it was sought to increase it, especially by the addition of drug-yielding and all economic plants, and now the boast of Kew is that there is hardly a plant of economic value that is known or yields drugs that they cannot produce. Then museums of products were formed in which side by side with the raw material the stages of its purification and manufacture might be sufficiently illustrated, and adulterations and impurities in the case of drugs might be exposed. And again in order to ensure correct naming and proper arrangement of these collections a herbarium and library were created. These, which are the reference stock of the establishment, have been developed in fifty years until now each is unsurpassed in its perfection. Excellent collections of living plants, botanical museums, herbaria, libraries, exist elsewhere, but it is the combination of all of them in such excellence at Kew that gives it its unique distinction without a rival in the world. Of the value of such an institution to pharmacology I need not speak. You all know the difficulties that beset the identification of drugs, the impurities that intentionally and unintentionally find their way into them, the numberless new and reputed valuable drugs constantly coming into the market, and the obstacles there are in the way of tracing a product to its right source. To illustrate how Kew collections have served your science in respect of these matters would involve the mentioning of most of the researches in these lines that have been carried out in recent years. Suffice it that the applicability of

its resources in the solution of such problems is obvious, and is on all hands made use of. Mr. Thiselton Dyer, in an address delivered in 1880, before the Colonial Institute in London, to which I would direct the attention of any of you who may care to know at first hand, and in detail the work of Kew, spoke of Kew as the botanical clearing house for the Empire. As such it has done much for pharmacology, and I will now ask your attention to some of its services, for they illustrate the point I stated at the outset it was my desire to bring before you of how botanical enterprise aids your science.

First let me take cinchona. You know cinchona bark is derived from several species. I have brought up here to-night from the Botanic Gardens three different species to show you it growing. These plants are found naturally only on the Andes of South America, which run south from Columbia, through Ecuador and Peru, to Bolivia. These cinchona plants are extremely limited in their range over these hills. They only occur at certain elevations, and so precise are they in their limitation that when you reach a certain altitude you will not find one plant over the proper line within one hundred yards. These plants yield the well-known cinchona or Jesuit bark which was first sent to us from South America. It is as you know a valuable febrifuge, and the Indian Government, which has to deal with a vast population subject to fevers, was so long ago as 1839 urged by Dr. Royle to try to introduce the cinchona plant into India. He pointed out that it might be grown on the Nilgiris, at Ootacamund, or at Darjeeling in the Himalayas. He urged the Government in vain, and nothing was done until 1860, when Mr. Clements Markham undertook to bring from South America the plants required for India. This was an enterprise of considerable difficulty, because naturally the inhabitants of South America regarded the taking away of any plants from their country as likely to spoil their monopoly. As you know, the yellow bark is got from *C. Calisaya*, which only grows in Bolivia, the crown bark from *C. officinalis*, on the borders of Peru and Ecuador, the red bark from *C. succirubra* in Ecuador, the grey bark from *C. micrantha* and other species in Peru, and the Columbian bark from *C. pitayensis* and other species in Columbia. You will see that the distribution of the species was such that it entailed a number of separate expeditions. It was impossible for one man to go from one place to another and therefore Mr. Markham engaged workers to go to the different regions where the special cinchona grew. To make a long story short, the result of the expedition was that all these plants were bought down to Guayaquil. The simplest plan would have been to take them right across to India, but as so often happens, the Government would not make up its mind in time to charter a steamer, and the consequence was the whole of the plants had to come home to England and then go by the Red Sea to India. You will see from this large map which I have brought to illustrate my remarks that this was a very roundabout way. It is such a long voyage that Kew became as it were a depot. The plants were first brought to England, landed at Southampton, grown at Kew, looked after for a time until they had recovered from the effects of their voyage so far, and then sent out to India by steamer. A great number of them unfortunately died in the Red Sea, but the others reached India in safety. A number were placed in Ceylon, a number were grown at Ootacamund, and the others were sent up to Darjeeling. The plants throve, and now as you know you have an enormous amount of the cinchona bark sent home from India, over and above that used there. It is one of the most profitable industries with which the Government has to deal and look after. In Ceylon again cinchona has spread all over the island to an enormous extent. A few years ago there was a complete failure of *Coffea arabica*, owing to disease, and many of the planters took to growing cinchona. In 1860 there was not a pound of cinchona bark to be got from Ceylon; but in the year 1886 no less than 12,872,384 pounds were imported into Great Britain from that island alone. That will show you what we owe to the enterprise of those who brought the plant from South America, and how valuable the Royal Gardens at Kew are as a clearing house or depot of the Empire. But further it was arranged in connection with this transport of cinchona that use should be made of the botanic gardens at Jamaica, and accordingly a large number of specimens of the plant were sent there. Now the cinchona plantations in Jamaica extend to no less than 2000 acres, and the cultivation of the plant is one of the profitable industries of the island. So much for cinchona. Let me refer to another important drug, and what has happened with regard to it will illustrate the value of these gardens and of botanical enterprise. I will take ipecacuanha (*Cephaëlis Ipecacuanha*). Well, ipecacuanha comes from Brazil. Here is a plant which happens to be in flower just now. It is a plant which comes from a limited region in Brazil, and some years ago there was the usual story that there was a danger of its extermination, owing to the way the plant was gathered—roughly and without any care or regard as to the future. Since 1832 the plant has been grown in the Botanic Gardens here and in Glasgow. About 1866 the director of the botanic garden in Calcutta thought it might be useful to introduce it into India. He set to work and endeavoured to do this, applying both to Kew and to Edinburgh; and in this you will see the advantage of having more than one garden to draw upon. Kew and Edinburgh at once began to try to propagate the plant, in order to give India a supply. Unfortunately, it is a plant which propagates very slowly in the ordinary way by cuttings from the stem, and this process did not result in the propagation of more than a few plants, owing to the smallness of the stock there was to draw upon. But in the course of making cuttings of these plants it occurred to Mr. McNab, the Curator of the Edinburgh Garden, that if he cut up the root into small pieces he might be able to get a number of young plants from it. He tried this and was gratified to find he was successful. Here then there was at once a means of getting a very large number of plants. But further success attended the efforts to propagate the plants. Mr. Lindsay, who is now the Curator of the garden, discovered that the ipecacuanha plant strikes readily from its leaves. It was only necessary to take half of the leaf and stick it in the soil, under proper conditions, and a plant would grow from it. The plants propagated both at Edinburgh and Kew were sent out in Wardian cases to India. They were planted both at Darjeeling and Ootacamund; but unfortunately this is one of the cases where failure is to be announced, partial failure, at least. Although the plants multiplied yet they did not thrive, and no ipecacuanha could be procured from them, sufficient at any rate to constitute a supply of the drug from these places. The accidents of cultivation are curiously illustrated by what happened in connection with the plants from Edinburgh. Most of the plants sent from Edinburgh were propagated from specimens sent to the garden from Brazil by Dr. Gunning for this purpose, and these proved to be of a different, and as it turned out less vigorous, variety than the old plant grown for so long in this country, and from which at Kew the Indian plants were derived, and in the result the whole of the Edinburgh plants that were sent out and their offspring died, so that the share of Edinburgh in establishing ipecacuanha in India was *nil* so far as plants are concerned, and the methods of propagation intro-

duced by Edinburgh are its contribution to the work. Kew kept to the stock of the hardy variety, and its plants and their offspring are thriving, though they have not produced in India a marketable crop. But India has proved to be only the half-way house. Finding it would not succeed there, those engaged in its culture began to look out for a spot where it could be cultivated with some success, and they hit upon the Straits Settlements. Some plants were sent to Singapore, and now it is thriving splendidly. In 1887 the first sample of ipecacuanha from the Straits Settlement arrived in the London market, and we may now rest assured of having a continual supply of ipecacuanha from the East Indies. This is another illustration of the good botanic gardens have done in bringing valuable plants from one place to another. I might also refer to the case of coffee. I have mentioned *Coffea arabica*, how in Ceylon it has failed owing to the attack of fungus. Kew, through its correspondents, discovered there was another coffee on the west coast of Africa, the Liberian coffee. It was proved to be much hardier. Seeds were brought home as well as a large number of plants and were distributed from Kew all over the world. Not only did Kew act in this way, but nurserymen took up the matter and sent out large supplies, and thus *Coffea liberica* is taking the place of *Coffea arabica*. I might also refer to the kola nut. It is derived from the plant I have here, *Sterculia acuminata*. This is a plant which has recently come into very great repute, owing to its containing an alkaloid like theine and caffeine. It is an inhabitant of the West Coast of Africa, from Upper Guinea to the Congo; but Kew, through its correspondents, has succeeded in sending seeds all over the world, and accordingly there is hardly a single British possession with suitable climate in which the kola nut is not to be found. In the West Indies, especially, it is quite naturalized and grows quite freely. One of the most recent pieces of work in this direction that Kew has done is in connection with the gambier plant. Gambier is more especially a tanning substance, but is still used in pharmacy. Its price in the market has gone up enormously, so much so that in many industries in this country they are using other things than gambier, although they would rather prefer it if it could be got cheaper. Just within the last year at Kew they have raised a large number of plants of the *Uncaria Gambier*, which yields the substance and which is a native of the Malay States. I have seen a house filled with these young plants, and they have been transporting them to the West Indies. They were taken out in the spring, but the last report was that they were thriving well, and that in a few years gambier will be supplied in quantities from that quarter. Whilst I have mentioned some of these successes, yet there are sometimes failures. I have referred to the partial failure of ipecacuanha, but it is not always failure of the the plant in growing. For instance, a few years ago, it was thought by the Government of Labuan that the oil palm of East Africa, which is an extremely rich oil palm, might be introduced to the island. Kew took a great deal of trouble to procure seeds. They germinated, and there was a splendid crop of this oil palm, but, unfortunately, the Governor who was interested in these matters left the island, and other men arrived who, apparently, cared for none of these things, have grubbed up these oil palms and planted something else which is, probably, not of so much value. In connection with this work of Kew I may mention another substance—cubebs. The price of cubebs in the market is said to be liable to extreme fluctuations, and there is also a good deal of adulteration of the drug. It would be a matter of very great interest if the cubeb plant could be cultivated as a solid industry like some of our plants. It is very other important to ascertain precisely the genuine plant yielding the product. I have here two plants. This small one has been in the Botanic Garden for years, and was also looked upon as the true source of the official cubebs, and is figured as such in Bentley and Trimen's book. But it has recently been identified as *Piper Chaba* and not the true source. This larger plant, *Cubeba officinalis* or *Piper Cubeba*, has recently come from Kew, where they have a large stock of plants, and has been ascertained to be the true source of the drug. It is a native of Java and adjacent islands, and Kew hopes to be able to introduce it into some of our colonies.

The success of such distribution efforts from a central clearing house like Kew cannot but be influenced greatly by the efficient co-operation of smaller stations of like character in the different regions to which the plants are sent. I have already pointed out how in connection with cinchona the older gardens, such as those of Calcutta, Jamaica and Ceylon Garden, all took share in the operation which led to success, and the stimulus from Kew has now spread far and wide, and the good effect of its efforts have borne fruit in the truly marvellous development and enterprise that have been witnessed within the past decade in the formation of subsidiary centres in our colonies in federation with Kew. Since 1884, no less than seven botanical stations have been founded, namely Grenada, St. Vincent, St. Lucia in the Windward islands, and Antigua, Montserrat, Dominica and St. Kitts in the Leeward islands. And the interest with which their growth is watched by Kew is shown by the fact that the assistant director of Kew made a special visit this spring to inspect them. Again, on the West Coast of Africa stations have been formed at St. Lagos, Gold Coast, and Gambia. Such extension and the proceedings I have previously narrated go far to the realisation of the ideal of a national garden formulated in 1841, and to the creation of a practical federation of the Botanic Gardens of the empire. We hear a great deal nowadays of imperial federation, but certainly in connection with these botanic gardens and their enterprise we have approached to imperial federation. Of course in all such enterprise the function of Kew can only be initiative and supporting. The results of the enterprise from a commercial point of view will depend upon those who are in positions to develope the enterprise to its legitimate end. Kew and its federation may procure information and seeds and plants, grow them and distribute them and give advice with regard to the planting; but there their service ends, and the further steps must be taken by those who are engaged in commerce. No further remarks of mine will make clear to you the enormous benefit to pharmacology, alike in its commercial and its scientific aspect, that has resulted from the enterprise I have pictured. And having this before you, if you survey this map of the world, and see the distribution of the British empire, and the varied climate over which it is spread, you will not, I think, fail to conclude that if so much has been accomplished, and drugs as quinine and ipecacuanha derived from plants of such circumscribed areas in nature, within which it would not be difficult to exterminate them, have been so successfully transported to other regions and secured for all time for the benefit of man, surely there can be no valid reason why all our drugs of scarcity might not be similarly dealt with, and the possibility of exhaustion be put beyond doubt. And the importance of Kew's work does not lie in this alone, for the social aspect of it will be no less apparent to you. It means in many cases the creation of a new industry, and the conversion of barren waste into fruitful land, with the attendant advantages to the people of the areas concerned. It means, too, in many instances restoration to prosperity of areas which by disease of crops have been practically ruined. Witness the change in Ceylon, where before 1861 not one

ounce of quinine was produced, while in 1886, after the failure of the coffee industry, no less than over 12,000,000 lbs. of cinchona bark was imported into Great Britain alone. And I would have you remember that the botanical enterprise centred in Kew is not alone pharmacological. Side by side with this I might have spoken of what it does for economic products of all kinds, in regard to which indeed some of its largest successes have been won. Fibre, rubber, dye, etc., all are dealt with in turn as opportunity requires. And questions, too, concerning disease of crops and their remedies are equally attended to. But although I have had to leave these topics on one side this evening, there is no reason why you should not inform yourselves regarding them. During the past five years there has issued from Kew a monthly 'Bulletin of Miscellaneous Information,' as it is called, in which the various matters coming within the range of its activity are dealt with. The 'Bulletin' is published at the moderate price of 2*d.* each number, so that each annual volume costs but 2*s.* I cannot too strongly recommend every one here, interested as you are in pharmacy, to make a point of acquiring it, at least of reading it. It is certainly one of the cheapest 2*d.* worth to be had, and in time the series will be a mine of information on pharmaceutical and economic topics. In making these remarks I have drifted along one line of a great subject, botanical enterprise in relation to pharmacology, and have left untouched others, and notably that of botanical explorations which, indeed, I had primarily proposed to myself to follow. An account of these and their results in the discovery of drugs would make a very interesting lecture, which I take leave to commend to any one in want of a subject for such a purpose. It is not long ago since in this country there was created, amid expressions of general congratulation, a Board of Agriculture as a Department of Government from which much is expected, even to the removal of all the ills which oppress the occupiers and cultivators of land. Few, I daresay amongst us knew or at least have realized the importance of what I may call the Bureau of Agriculture at Kew, which has for so long been doing yeoman service in the cause of our colonies and possessions, and directly to pharmacology and for various industries at home. I trust I may have brought out the importance of this national institution and interested you in its work.

The lecture was illustrated by the following living plants from the Royal Botanic Garden:—*Cinchona succirubra*, *Cinchona calisaya*, *Cinchona calisaya*, var. *Ledgeriana*, *Cephaëlis Ipecacuanha* in flower, *Coffea arabica*, *Uncaria Gambier*, *Piper chaba*, and *Piper* or *Cubeba officinalis*.

Mr. J. B. Stephenson said: Mr. Chairman and Gentlemen,—I rise for the purpose of proposing a vote of thanks to Professor Balfour for the very able and interesting address he has given us this evening. I think you will wish me to say that we have listened to it with great pleasure and with great interest. I should like this address to be reproduced in our Journal that it may be brought under the notice of our Society at large. Our transactions are sent every week to everyone connected with the Society, and to all parts of the world, and thus, I think, sir, that in addressing us to-night you have been addressing a much larger audience, an audience which is much more intelligent and appreciative than any ordinary mixed audience can possibly be. It is needless, I think, perhaps improper, to dwell at all upon this very interesting address. I am sure Professor Balfour has opened up many a field of interest that we were very little aware of before. It is not usual, nor I think proper to criticise an address on such an occasion as this but I think it is quite legitimate to congratulate Professor Balfour on his felicitous choice of a subject, a subject possessing so many points that are strictly related and bearing upon things in which we take a fervid interest—the history of cinchona, ipecacuanha and kola. I might go a little further, and say I am sure you will all wish me to say how much we feel the kindness of Professor Balfour in coming here to-night, and the honour he has conferred upon us in giving us an address on these subjects. The Pharmaceutical Society in Edinburgh has been exceedingly fortunate in this respect. We have had three university professors within the last few years. We had first the Professor of Chemistry, then the Professor of Materia Medica, and now we have the Professor of Botany. These three subjects cover the whole pharmaceutical field. We have therefore great reason to congratulate ourselves that we have been so fortunate as to secure addresses from men whose words necessarily carry a very great weight with them, and are intrinsically of very much more value than coming from any other body of men. I hope I may go a step still further and say how gratifying it is to see in this respect Professor Bayley Balfour treading in the footsteps of his respected father. I am old enough to have been present at a meeting of the Pharmaceutical Society many years ago, in which the late Professor Balfour gave us an address on the acclimatization of ipecacuanha. I think that was in the teens of the Pharmaceutical Society. I am not sure if the Society had entered its teens, but it was in our hall in George Street. There was a favourable prospect of acclimatizing it at that time, and I recollect quite distinctly the great interest that address created among the whole of us. I do hope that seeing Professor Balfour has seen his way this evening to come here, this will not be the last occasion on which we will have the honour of hearing him. I beg to propose that we accord to him a very hearty vote of thanks.

Dr. Cleghorn (St. Andrews): Mr. Chairman, I came from St. Andrews with no expectation of being here to-night, but I have the greatest pleasure in seconding the vote of thanks to my friend, Professor Balfour, whom I have known all his life, being a friend and pupil of his father. We all came here to-night to be instructed, and we have been instructed. Several things struck me very much in the course of the lecture. He has dwelt very much on the growth at Kew since 1841, and all that is being done there, and the *résumé* has been extremely interesting. 1841 was the year in which I graduated at the university, and a few weeks afterwards I received instructions to be at Portsmouth in four days to go out round the Cape with a large party of recruits. I saw the botanic garden at the Cape, and I have seen the gardens at Calcutta, Bombay, Madras, Ceylon and Cairo, and therefore it interests me very much to hear the remarks on all that has been done at Kew. I went out in the same cabin with Mr. Clements Markham; that gentleman had a large number of Wardian cases which he was taking out from Kew to Ceylon, and I have seen the progress of the experiments which Professor Balfour so well described in regard to the cinchona, very interesting and successful experiments, and I also witnessed the ipecacuanha experiments, which were not so successful. I need only say that we have had set before us to-night an admirable bird's-eye view of all that has been going on during these years.

The Assistant Secretary then read the following communication he had received from the Vice-Chairman of the Executive, Mr. Maben, who was prevented at the last moment from attending the meeting.

Mr. Maben wrote:—Would you allow me, from a distance, to join with those who have already spoken, in expressing my thanks to Professor Balfour for

having honoured the Society by delivering its opening lecture for the session? I would not have ventured to intrude in this irregular way but for the fact that I probably occupy a position that will be occupied by very few, if any, in the meeting. I refer to the fact that I was a member of the botany class some fifteen years ago, when Dr. Balfour delivered what would, I think, be his first course of university lectures, and that being so, I hope it will not be thought out of place for me to support the vote of thanks. I remember quite well that one morning a number of strangers entered the class-room, and one of these gentlemen intimated that owing to the illness of Professor Balfour a substitute had to take his place, and the Senatus had the greatest pleasure in asking Dr. Bayley Balfour to assume the duties of the chair for the remainder of the session. Amid the cheers of the class Dr. Balfour stepped forward, and I make bold to say that the manner in which he took up his distinguished father's work and carried it through for eight or ten weeks to the close of the session, laid the foundation of a reputation for success as a teacher, which subsequent years have only served to confirm and extend. We all know Dr. Balfour's record since that time, but I question if, in any course of lectures he has since delivered, he has expended so much brain force as he did on these. It is gratifying to know that that expenditure of energy was not wasted, for Dr. Balfour's brilliancy of style, his lucidity of expression, his felicity of manner, and above all, the evident reserve of power that lay behind, and lent authority to every word he uttered, these all combined to bring him a popularity with the students which is perhaps unparalleled in university annals. I was not a front-bench man myself, but still I did manage in a way to leave my mark, for in common with some 300 or 400 other students I signed my name to an address that was presented to Dr. Balfour at the close of the session by a grateful class, and if that address is still in existence my name will no doubt be there. The gentleman who presented that address has since achieved world-wide fame. He was first medallist of the senior section of the class, and of course he came from the south of Scotland. He was not then connected with pharmacy, nor is he yet, but he may, by-and-bye, rectify that mistake. That gentleman was Mr. Joseph Thomson, the distinguished African traveller. The first medallist in the junior section was also from the south of Scotland, and he was a pharmacist. That medal was the first fruits of a brilliant curriculum, which came to a fitting close with the gold medal which he earned with his thesis in connection with his graduation as doctor of medicine in 1882, an honour which I may mention was repeated in 1883 in the case of Dr. Balfour, your lecturer of to-night, when he took his medical degree. I refer to Dr. Anderson Stuart, formerly of Dumfries, and now Professor of Physiology in the University of Sydney, who it will be remembered communicated a paper to an evening meeting of the Society in London last session. Professor Balfour will see from these facts that he had quite a distinguished company of students under him in that memorable session, and who shall say that they did not gain inspiration and encouragement from the energy and enthusiasm displayed by the temporary occupant of the chair, which he now so worthily and permanently adorns. These reminiscences are my excuse for taking up your time, and I conclude with the hope that Professor Balfour may be long spared to be an ornament to the university, and that he will in future years again honour the Pharmaceutical Society by similar expressions of his good will to those he has this year given."

The CHAIRMAN said: Professor Balfour, I have very great pleasure in conveying to you our hearty thanks for your most instructive and able lecture. I must also thank you for the trouble you have been at in bringing so many specimens from the Botanic Gardens. I will only further say that I hope this is not the last occasion on which you will favour us with a similar address.

The vote of thanks having been awarded by acclamation,—

Professor BALFOUR, in reply, said: I thank you very warmly for the way in which you have received my lecture. Referring to the reminiscences which Mr. Maben has been good enough to write down, I cannot help feeling that the sympathy that was extended to me by my fellow-students at that time has been always extended to me by my audiences ever since, much I think from the feeling that they always like to encourage any one who is doing his best. I hope, and try to do my best, and I am ever glad if my efforts have pleased. As Mr. Stephenson has said, I hope that what I have said here may reach an audience outside this hall, because I have found so often in speaking to people in Edinburgh about Kew that most of them were quite ignorant of what Kew really is. They have a notion that Kew is a botanic garden, and the popular idea of a botanic garden is a place where there are plants, some of them beautiful, others not, and where you may see lovely flowers and enjoy pleasant walks. Well, Kew is all that. You will find there an assemblage of plants more wonderful than in any other garden in the world. Plants from all parts of the world brought there are arranged in the most suitable manner to illustrate the vegetation of the different regions of the globe. But I have endeavoured to show you that Kew is something more, and if I have been able to interest you, and through you others, in the work done by Kew I shall feel I have done all I had in view.

The Assistant Secretary then directed attention to the following donations and additions to the Museum:

Beck's large binocular microscope and accessories.
Sorby's micro-spectroscope.

From Mr. ALEXANDER KINNINMONT, F.C.S.

Fine specimens of American May apple (fruit of *Podophyllum peltatum*), grown at Bridge of Allan. From Dr. ALEXANDER PATERSON.

Fruit of the baobab (*Adansonia digitata*), Mackay bean (*Entada scandens*), butea or Bengal kino (*Butea frondosa*), clearing nuts, the seeds of *Strychnos potatorum*.

From the MUSEUM, 17, Bloomsbury Square.

Coto bark, root of *Bryonia alba*, bark of *Quillaya saponaria*, fine specimen of castor, gaurana or Brazilian cocoa in lump, flowers of *Calendula officinalis*, bark of *Berberis vulgaris*, olibanum, root of *Sanguinaria canadensis*, bark of *Erythrophlœum guineense*, Chinese cantharides (*Mylabris Cichorii* and *M. phalerata*), and Tonquin beans.

Recently added to the Museum by purchase.

The ASSISTANT SECRETARY explained that the large microscope and accessories presented by Mr. Kinninmont would be available at all times for the use of members and associates who required the use of so fine an instrument for any special purpose.

The CHAIRMAN: I have great pleasure in proposing a vote of thanks to the donors. I wish to speak especially of the great kindness of our esteemed friend, Mr. Kinninmont. He has rendered great service to our Society, both as an examiner, a member of the Executive, and as local secretary in Glasgow. We will preserve this munificent donation with great care, and I am sure it will serve as a lasting memorial of the great interest Mr. Kinninmont has taken in the Pharmaceutical Society and the work of the North British Branch.

The vote of thanks was passed by acclamation, and the meeting then closed.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

The Evening Meeting of the Chemists' Association, held on November 5, was devoted to the reading of the following short papers:—

Tinctures of Ipecacuanha.

BY J. C. UMNEY.

The interesting note on "Preparations of Ipecacuanha," communicated by Mr. W. H. Symons to the British Pharmaceutical Conference at Cardiff, induced me to have further experiments made on the production of tinctures of that drug, in accordance with the formula suggested by him, as well as with spirit of wine of other percentage strengths.

The method suggested (*Pharm. Journ.*, Aug. 29, 1891) consists in percolating 1 oz. of ipecacuanha previously mixed with 1 drachm of a 10 per cent. solution of ammonia, with alcohol of 10 per cent. strength, a possible modification of which to 20 per cent. has been more recently suggested in a communication by Mr. Symons to the *Chemist and Druggist* (Sept. 12, 1891). The sample of ipecacuanha, on which these experiments were carried out, estimated by the process described by Mr. Ransom (*Pharm. Journ.*, [3], xviii., 241), was found to contain 1·65 per cent. of emetine, coinciding with the yield of alkaloid which he obtained as the average of ten samples from different sources. The following table indicates the relative alkaloidal value of tinctures made with alcohol of various strengths:—

	Alcohol, percentage by weight.	Percentage of alkaloid left in marc.	Percentage of total alkaloid (1·66) unextracted.
	Per cent.	Per cent.	Per cent.
One ounce of ipecacuanha first moistened with 1 drachm of 10 per cent. ammonia	10	0·42	25·3
	15	0·28	16·8
	20	0·28	16·8
	30	0·16	9·7
	49 (proof)	0·09	5·4
	84 (rect.)	0·08	4·8
Percolating with one-half menstruum, then adding 1 dr. 10 per cent. ammonia and percolating with remainder of alcohol	10	0·32	19·2

From these figures it will be seen that spirit of wine of 10, 15, 20 and 30 per cent. strength (in combination with ammonia, 1 drachm to 1 oz. of ipecacuanha) only imperfectly extracts the alkaloid from ipecacuanha, more perfect solution of the emetine being effected if the drug be first percolated with half of the menstruum, then the ammonia added and percolation completed with the remaining half, a result agreeing with my former experience when lime is employed under similar conditions (Braithwaite and Umney, "Liquid Extract of Ipecacuanha," *Pharm. Journ.*, [3], xx., p. 252.).

The rate of percolation, as one might expect, varies with the strength of the alcohol employed, a tincture made with 20 per cent. strength, occupying under identical conditions about six times as long as one made with rectified spirit.

Of the tinctures that may be taken to represent the full alkaloidal activity of the drug, that made with proof spirit deposits on standing, but the rectified spirit tincture, viz., one prepared by percolating 1 ounce of crushed ipecacuanha, moisted with 1 drachm of a 10 per cent. solution of ammonia, with sufficient rectified spirit to produce 1 pint, is bright and remains so on dilution with water.

My thanks are due to Mr. F. O. Braithwaite for carrying out the above experiments in my firm's laboratory.

The President alluded to Mr. Umney's previous contributions to the pharmacy of ipecacuanha, and remarked that those who were engaged in the manipulation of pharmaceutical preparations on a large scale were constantly being confronted by questions as to the most suitable menstrua and the best method of proceedure. Pharmacists until recently, apparently, had taken for granted that a drug would invariably be most efficiently exhausted by either proof or rectified spirit, but these ideas should remain suspended until such time as the experiments now in hand were concluded, for it was probable that these generally accepted ideas upon the subject would require modification and amendment.

Mr. Martindale said that ipecacuanha was a source of trouble to the pharmacist. He had hoped to hear Mr. Umney report better results with Mr. Symons' process, as it seemed feasible that it might prove practical with just enough alcohol to prevent fungoid growth to get a good preparation, but now it appeared that proof spirit was required. Of course Mr. Symons' idea of adding ammonia was to facilitate the extraction of the alkaloid, not to have an ammoniacal preparation. He would be glad to see an efficient mode of preparation which did not necessitate the use of chemicals, and in which the alkaloid was extracted in its natural state. The U.S. process, though somewhat roundabout, appeared to be the best of any yet devised. With this process the resinous matter, which was one of the factors in making preparations of ipecacuanha go thick, was got rid of. The treatment with acetic acid and evaporating the acetic extract to dryness, gave results which were comparatively satisfactory. The B.P. wine kept fairly well. The pectinous gelatinous substance extracted from the root by most processes was very troublesome, and particularly required to be dealt with, as it caused considerable deposit.

Mr. Harrison asked Mr. Umney how he estimated the alkaloid remaining in the root after the various processes.

Mr. Garnett inquired if the rectified spirit tincture, when diluted with water, remained clear, and what effect alkalies had upon the preparation so diluted.

Mr. Walton asked Mr. Umney if he had examined the deposit in ipecacuanha preparations; did it consist of emetine or pectinous substances?

Mr. Wilson said did he understand Mr. Umney to say that in every case he had percolated with half the menstruum, then added the ammonia and continued the percolation.

Mr. Umney, in replying, said that although he heartily endorsed what Mr. Martindale said as to the necessity for elegance in pharmaceutical preparations, his standpoint in the case of this particular drug had been its complete extraction, at any rate, so far as alkaloid was concerned. In this instance the tincture of the highest alkaloidal value appeared the most permanent and elegant. The marc, dried at 100° C., had been estimated by the same method (the ammoniated chloroform process) as the original root. He found the tincture when diluted with water did not deposit. In reply to Mr. Walton, he had not examined the deposit in some of the tinctures, as it occurred chiefly

in those which did not exhaust the drug in the first instance and so were not admissable. He had only tried the division of the menstruum in one instance (10 per cent.); in the other cases the method suggested by Mr. Symons had been employed.

Benzene Formulæ.

BY E. F. HARRISON.

Having been asked by the Secretary to contribute a short paper this evening, and not having any notes drawn from my own work suitable for the purpose, I thought it might be not unprofitable if I were to bring before you a new formula for benzene which has recently been put forward, and which may be new to some.

To briefly recapitulate some of the objections to the formulæ previously in use. If Ladenburg's prism formula were correct, an ortho-di-derivative in which the substituting radicals were different would contain an asymmetrical carbon atom, and therefore be optically active: this is not the case. The "diagonal" formula of Claus has much to recommend it, but the modified form of it described below is better. As to Kekulé's formula, six carbon atoms alternately singly and doubly linked do not form a closed ring, according to the hypothesis of Van t'Hoff, and the ring could only be formed by the occurrence of a strain in the molecule. On the other hand, it may be said that six carbon atoms so united form a nearer approach to a closed chain than any other number would. Another point against this formula is that the alternate single and double linkage would allow of two isomeric ortho-di-derivatives, while only one is known.

Loschmidt,* taking the carbon atom as represented by a tetrahedron, has suggested that the molecule of benzene may be formed by the six carbon atoms being attached in such a way that the bases of the tetrahedra all lie in one plane, and that the summits, to which the hydrogen atoms are attached, are all turned in one direction (fig. 1). This meets many of the requirements of the case, as it requires no supposition of strain in the molecule. It shows the perfect similarity of all ortho-derivatives, and why, if the substituting radicals are different, the substance yet remains optically inactive. But since it represents the molecule as unsymmetrical it will scarcely commend itself for adoption.

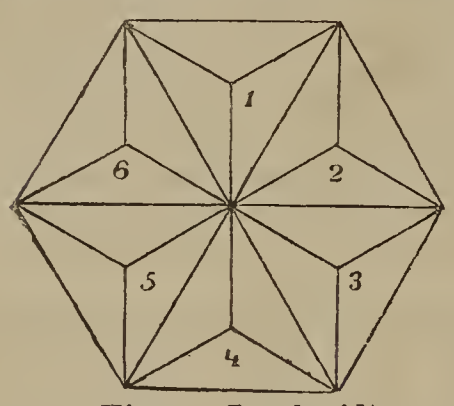


Fig. 1.—Loschmidt.

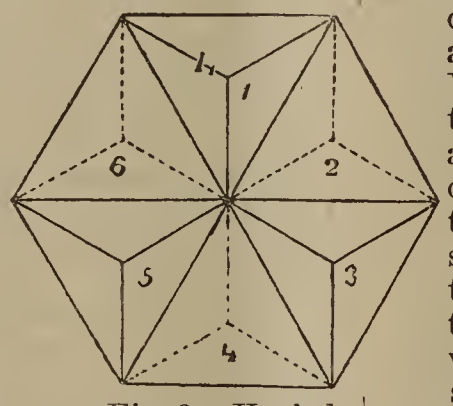


Fig. 2.—Vaubel.

Vaubel† has proposed a structure, similar in that the bases of the tetrahedra are all in one plane, but differing in that their summits are alternately directed in opposite directions, thus making a symmetrical figure (fig. 2). This formula is supported by all the reactions of benzene quite as fully as any of the above mentioned, and in addition affords an explanation of several interesting phenomena which are unexplained by any other formula. When the molecule is saturated, as in the formation of hexahydrobenzene, the central connection between the carbon atoms is broken, and the tetrahedra may be considered to turn on their outer edges, and take up the extra hydrogen, etc., by means of the bonds which were previously attached in the centre. It is thus very nearly the same as the "diagonal" formula of Claus, only it is modified to suit the conception of the carbon atom as a regular tetrahedron.

To come to the facts which specially support this formula, it is well known that in very many processes in which di-substitution products of benzene are produced either the meta- compound only is formed, or else both ortho- and para-, one usually predominating. Now suppose the two substituting radicals repel one another, we shall expect to find them as far from each other as possible in the molecule, that is to say, we shall get ortho- and para- compounds, as in these they will be on different sides. If, on the other hand, they attract each other we shall find them as close together in the molecule as possible; that is, we shall get a meta- compound.

In the symmetrical trihydroxybenzene, phloroglucinol, the three hydroxyls will, according to this formula, all be on the same side. We should naturally expect them to repel each other, and the compound, therefore, to be unstable. As a matter of fact, it very readily goes over into the pseudo form in which the oxygen is in the carbonyl condition, and two hydrogen atoms are attached to each alternate carbon. Here the central bonds are broken, and the similar radicals, now oxygen, are further removed from each other. It is worthy of remark that by Kekulé's formula, it is in this trihydroxybenzene that the hydroxyls are furthest apart, and we should expect that if the above action occurred in any it would be in the ortho-compound, which, however, is much more stable, for reasons sufficiently apparent from Vaubel's formula.

In the case of the phthalic acids we have, in the formation of an anhydride by the ortho-acid alone, a fact which at first sight might seem to tell against the theory. This admits of easy explanation, however. In the para- or terephthalic acid, the carboxyl groups are so distant that we should not expect them to form an anhydride, but in meta- or isophthalic acid the carboxyls are attached to carbons on the same side, and therefore are not very distant from each other. Vaubel supposes that the hydroxyl of one attracts the oxygen of the other; the carbon atoms will accordingly take up a position such that the hydroxyl of each is in the greatest possible proximity to the oxygen of the other, and this will necessarily keep the hydroxyls apart, and so prevent the formation of an anhydride. In the ortho- acid the attraction of the hydroxyls for the oxygen will not force the carbon atoms to take up any special position. They will, therefore, be free to revolve, and in the course of revolution the hydroxyls will sooner or later come into sufficient proximity to combine and split off water. This will be made plainer by the models.

One requirement of a good formula for benzene is that it should be applicable in a modified form to naphthalene and anthracene. The formula for naphthalene is easily formed from this of Vaubel's for benzene, as follows:—

Any two carbon tetrahedra in the ortho-position in the benzene have two pairs of faces in the same plane with each other, one pair in the plane of the bases of all the tetrahedra and another pair. If now we attach the four additional atoms of carbon in such a way that the bases of all of them are in a plane with this latter pair, we obtain a representation of the naphthalene molecule which meets all requirements. If we attached the four atoms so that the bases of all ten were in one plane, we should also obtain a symmetrical figure, but one requiring ten atoms of hydrogen to engage all the bonds, and therefore incorrect for naphthalene.

Similarly, the molecule of anthracene, if built on the same plan with the bases of all the tetrahedra in

* *Wien. Mon.*, xi., 28.

† *Journ. für prak. Chemie*, xv., 137,

one plane, would require a formula $C_{14}H_{14}$; but if the two carbon atoms connecting the two benzene nuclei are arranged with their bases in the same plane as those faces of the carbons immediately adjoining, which are in one plane cutting the plane of all the bases, we have a formula answering all requirements for anthracene; this also will be rendered clearer by the models.

To represent pyridine, the formula for benzene will require no alteration beyond the substitution of a nitrogen atom for a carbon and the hydrogen attached to it, and we can do this without any theory as to the arrangement of the bonds of nitrogen. We know that the three points of attachment of the nitrogen atom must be all in one plane, as we have plenty of instances of nitrogen combining triply with carbon, and that is all we commit ourselves to by adopting this configuration for the atoms in the pyridine molecule.

In conclusion, I would just emphasize the fact that this short paper is only intended as the briefest possible sketch of this new formula for benzene. It is a subject which really requires exhaustive investigation, and I almost feel that I ought to apologise for dealing with it in such a very curt manner.

———·

The President said it was hardly to be expected that the members would criticise this comparatively recent phase of theoretical chemistry, for the subject demanded a much more intimate acquaintance than could possibly be gained by simply hearing a paper read. The endeavour to treat chemistry upon the basis of an exact science was growing very rapidly, and mathematical considerations assisted this development in a very special manner. Perhaps one of the most interesting circumstances connected with the study of chemistry was the development of theories which subsequent experiments proved to be untenable, and the corresponding growth of theories which when first propounded were received with derision. Such a fate befell the speculations of Le Bel and van t'Hoff, though the ideas of these men are now made the foundation for elucidating some of the deepest problems in connection with the chemical science. In tracing the various changes which certain elements or radicals underwent in respect to their position in the molecule, it was of great assistance to use models similar to those shown by Mr. Harrison, though there were disadvantages in employing concrete representations of abstract ideas.

Mr. Strother suggested that when models were employed to illustrate graphic formulæ the different elements in the molecule might be distinguished by a suitable system of colours.

Mr. Plowright agreed with the President that it was impossible to grasp the subject on so short a notice, and expressed a hope that they would soon see the paper in print which would enable them to go thoroughly into the various details.

Results of the Estimation of some Seidlitz Powders.

BY C. E. SAGE.

Now that seidlitz powders are included in the Pharmacopœia Addenda, they should not only be pure and of definite composition, but of a definite strength also. From the following results, however, I find that they are not to be obtained so everywhere yet.

Referring to the subject of strength, I think it would not be legally wrong to make a seidlitz powder either weaker or stronger if a customer asks for such a one, provided the powders are always of the same proportional strength.

The opportunities of adulterating seidlitz powders are numerous, for both powders being white, an admixture of another salt is not to be detected except by analysis.

It was at Mr. Ellwood's instigation that I attempted the analysis of several seidlitz powders, and the following are some of the results which I have obtained during last and this week in the course of my laboratory work at the City School of Chemistry.

First let me give you my method of obtaining these results.

1. The tartaric acid I estimated by titration with standardized solution of soda, using phenolphthalein as an indicator.

2. The contents of the blue paper by titration of one part with standardized solution of sulphuric acid (which I find gives much sharper results than oxalic acid), in order to estimate the amount of bicarbonate of soda present; and of another equal part after burning to an ash and dissolving in water also with solution of sulphuric acid, to estimate the total amount of alkaline carbonates formed by burning the tartrate and bicarbonate. The quantity of standard solution required to neutralize the latter portion, minus the quantity necessary for the bicarbonate, will be the quantity taken by the burnt tartrate.

In using the sulphuric acid solution I ran in a definite excess, and after boiling off CO_2 retitrated with soda solution, using phenolphthalein as the indicator. This method is open to the objection that there are two sources of error, but I think the two errors combined are not as large as the one, would be in direct estimation.

The quantity found in the powders has been the chief fault with nearly all I have examined.

The impurities are only two in number, namely, a serious one, traces of lead, and a harmless one, as far as the public is concerned, namely, moisture.

In no case have I found either sulphate of magnesia or soda present.

I might mention that the prices I have paid vary from 9*d.* for a box containing a dozen to 2*d.* for a single seidlitz, and I have found that the cheapest are not always the weakest or worst.

The following six results I have chosen from my laboratory note book:—

1st.—The white paper (acid).

	Weight in grains.	Amount obtained on treating with NaOH.	Impurities.
A . .	48·92	46·32	Moisture
B . .	36·88	35·95	Distinct traces
C . .	30·63	28·82	of lead
D . .	18·05	Full amount	None
E . .	28·54	26·97	Moisture
F . .	34·44	Full amount	None

So that in no instance did I find one containing the exact amount of tartaric acid, namely, 38 grains.

2nd.—The blue paper.

	Total weight in grains.	Amount in grains respectively of $KNaC_4H_4O_6$ and $NaCHO_3$, found by titrating with H_2SO_4.	
		Tartrate.	Bicarbonate.
A . . .	200·62	137·2	53·96
B . . .	160·34	111·53	41·76
C . . .	143·21	33·31	99·23
D . . .	101·39	Not even a trace	95·8
E . . .	166·51	123·37	39·86
F . . .	187·34	133·5	45·63

I did not estimate the amount of moisture present, but some were very far from dry, C especially, and this may account for the difference in the amount found by titration and the amount taken.

E contained traces of lead.

D was labelled in two places "warranted pure," which evidently meant that it was not contaminated with tartarated soda.

These are a few of the results I have obtained, and I think that if this is the way they are still prepared after the Addendum has been published nearly a

twelvemonth, the inspectors appointed for finding out such discrepancies are not very vigilant.

The PRESIDENT said he hoped that Mr. Sage's specimens had been procured from sources which might be considered unorthodox, for if they came from ordinary pharmacists it was evident they could not congratulate the trade as a whole upon its morality. It was a custom in some places to add a trace of tartarated antimony to seidlitz powders, but he had only met with it in one or two instances. The traces of lead were derived, he believed, from the leaden vessels into which the tartaric acid solution was poured to crystallize. Mr. Sage was one of the youngest members of the Association, and his communication was very gratifying on that account.

Mr. Harrison asked did Mr. Sage take it for granted that the soda contained in the powders was bicarbonate. The dampness of the powders suggested that possibly some carbonate might be present.

Mr. Strother thought that the use of a measure instead of weighing accounted for the short weight.

Mr. Martindale was surprised at the results stated in the paper. Since the publication of the B.P. Addenda one or two prosecutions had occurred, but he thought the falsification in seidlitz powders was becoming a thing of the past. Had Mr. Sage found any sodium sulphate in the place of tartarated soda? He suggested that the dampness of the tartaric acid might be due to the presence of a trace of sulphuric acid. He did not think that many pharmacists now mixed the ingredients for the powder contained in the blue paper, as it could be bought mixed from the manufacturers, who were able to do the mixing much more efficiently than it could be done in an ordinary way. Mr. Martindale drew attention to the fact that if an excess of tartaric acid were used the effervescing liquid which resulted on mixing would be observed to have a peculiar foam due to the formation of acid tartarate of potassium.

Mr. Stead said he agreed with Mr. Sage. He found that seidlitz powders were frequently not what they ought to be. Had Mr. Sage found iron present in any of his samples of acid? He (the speaker) had seen the white papers containing the acid in a box of seidlitz powders distinctly stained, owing to the presence of a heavy metal in the acid.

Mr. Sage in replying said he had procured his samples from as general a source as possible. Two samples from grocers, 2 from large stores, the remainder from chemists. When he commenced the investigation he did not expect to find that such preparations were offered for sale; he had looked for better results. He had not detected any tartarated antimony in the powders, nor carbonate of soda. With reference to Mr. Martindale's suggestion that the tartaric acid might contain a trace of sulphuric acid he had failed to find any.

PYROTECHNY.

T. A. ELLWOOD.

This branch of art includes the production of pleasing scenes by means of fire and fireworks display in general. It must not be supposed to have anything whatever to do with the manufacture of inflammables and explosives, for they form a distinct branch of industry.

The Chinese claim to be the first nation to discover and use fireworks, which they hundreds of years ago introduced into their religious and other festivals; and we have it on record by European travellers that "wonderful fires were used" by this ancient oriental nation. The closeness of these Chinamen, which is their peculiar characteristic, kept the discovery to themselves and to a considerable extent their use also. It was not until the thirteenth century that the western world discovered the properties possessed by certain inorganic substances and chemicals, of giving a remarkable and special character to flame, varying its colour and lustre, its brightness and intensity, and changing considerably its general appearance.

In the present day the manufacture of fireworks for pleasure and occasionally for use benefiting humanity, and for saving of life, has become quite a scientific art, governed by laws and rules.

Their everyday production engaging the services of professional chemists and skilled workmen.

The study of pyrotechny is based upon a knowledge of chemistry, and also requires a rudimentary idea of the laws of mechanics. An intimacy with the subject therefore demands attention of the chemist mechanic.

One of the chief chemical studies of the pyrotechnist is that of *oxidation*, under which will also come that of combustion. The primary oxidising agent is the atmosphere, and the design of fireworks is such as to use this as far as possible. This, however, is not always sufficient for the purpose required, so other agents must be employed, the action of which must be previously studied.

For this purpose the principal salts employed are nitrates and chlorates, their action being chiefly to promote combustion, which has been started by heat or ignition. Those generally used are non-hygroscopic, and solid, not easily volatilised.

Influencing agents are greatly used. These are ingredients which though not themselves producing any special feature, nor evolving or combining with oxygen, yet prevent the too speedy action of the oxidising chemicals, or regulate the process of combustion. Among these are sand, calomel and potassium sulphate.

Having then the oxidising agent and influencing ingredient, we must consider the nature of the active substance; that is, the one producing the desired effect of the pyrotechnist. In the primary position of these we must place those which in contact with the flame impart some special colour to it, such as, strontium for red, barium or copper for green, sodium for yellow, potassium for lavender, a mixture of strontium, copper and calomel for purple. Secondly, we have the ingredients producing brilliancy, such as camphor or magnesium, for whiteness; iron or steel filings, which together with brilliancy also give a sparkling starlike appearance; lycopodium gives a lightning effect; lampblack with gunpowder produces the golden showers.

Fireworks may be classified under four heads.

I. *Single*, consisting of such as are distinct in themselves as crackers, squibs, wheels and stars.

II. *Terrestrial*, those which remain fixed and only evolve their fire, thus producing the effect; these are such as the usual set pieces, mosaics and waterfalls.

III. *Atmospheric*, in which instance the whole case is carried into the atmosphere, and thus produces the effect by its discharge, such as the rocket, Roman candle, tourbillion.

IV. *Aquatic*, are those which are fixed in the water and make their effect apparent, either under or immediately above the surface, or by their constant jumping in and out the water, the discharge taking place above the surface.

The Rocket.—This is both a useful and interesting firework. It is so charged as to leave a hollow down the centre, in order that the fire may be communicated to nearly the whole central portion at the same time. Thus the expanded gases have a surrounding which causes them to propel the rocket forward; it is guided by a stick at the end. It therefore consists of a case, spindle and stick, with the contents. The following forms a good charge:—

Sulphur	1 part.
Potassium nitrate	4 parts.
Meal powder	1 part.

Meal powder consists of a fine black or brown dust, used as a diluent in mixing.

The Roman Candle, another atmospheric firework, made somewhat similarly, may be charged with—

Sulphur	4 parts.
Charcoal	3 parts.
Potassium nitrate	8 parts.

I will now give a few workable formulæ for various other fireworks.

Bengal Light.

Realgar	1 part.
Black antimony	5 parts.
Red lead	1 part.
Sulphur	3 parts.
Potassium nitrate	14 parts.

Pin Wheel.

Sulphur	5 parts.
Potassium nitrate	9 parts.
Meal powder	15 parts.

Stars: (*Red*).

Potassic chlorate	16 parts.
Strontium nitrate	16 ,,
Sulphur	5 ,,
Charcoal	1 part.

Blue.

Potassic chlorate	8 parts.
Calomel	4 ,,
Sugar	3 ,,
Copper sulphide	5 ,,

Green.

Potassic chlorate	16 parts.
Barium nitrate	16 ,,
Sulphur	5 ,,
Charcoal	1 part.

Yellow.

Potassic chlorate	4 parts.
Sodium oxalate	2 ,,
Shellac	1 part.

Mauve.

Potassic chlorate	28 parts.
Calomel	12 ,,
Shellac	4 ,,
Strontium nitrate	4 ,,
Copper sulphide	2 ,,
Stearin	1 part.

Purple.

Potassic chlorate	16 parts.
Sulphur	2 ,,
Calomel	7 ,,
Copper sulphide	8 ,,

In mixing any of the above, it is very necessary to powder each ingredient separately, and to avoid rubbing them together in a mortar. But with the usual care expected of a pharmacist, firework making should become an easy task.

The President in commenting upon Mr. Ellwood's note alluded to the dangers attending the production of fireworks, and enjoined upon any who might feel disposed to attempt a practical illustration of the paper, the great need for care in handling the respective materials, especially after admixture. He mentioned an incident which related to some experiments of his own during the period of apprenticeship, and described the so-called "daylight" fireworks.

Mr. Stead gave an instance of spontaneous ignition of coloured fires, and asked, could Mr. Ellwood suggest a likely cause of the occurrence.

Mr. Rogers asked if Mr. Ellwood knew the composition of the mixture used to produce the very white light which generally accompanied the final discharge at a display of fireworks.

Mr. Ellwood, in replying, said great precautions were necessary in the manufacture of the various compositions, and a good knowledge of chemistry was essential. The probable cause of the spontaneous ignition referred to by Mr. Stead was that one of the chemicals used was contaminated with acid; this reacting upon the potassium-chlorate, would initiate the process of combustion. With reference to white lights or stars magnesium only used to be employed, but now it was customary to mix flowers of camphor with magnesium, the effect being that the light emitted was brighter but not so sparkling.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

The opening meeting for the present session was held on Thursday, Nov. 12, Professor Attfield, F.R.S., President, in the chair.

The election of officers resulted as follows: Vice-Presidents, H. Garnett and E. F. Harrison; Secretary and Treasurer, F. W. Short; Assistant Secretary, H. D. Fuge. Executive Committee, A. J. B. Cooper, E. H. Gane, H. A. D. Jowett and F. A. Sturton.

While the votes were being counted the President explained the nature and objects of the Association, for the benefit of the new members, and then read the remarks he had made in his report as Dean, at the opening of the School, on the propriety of commemorating its fiftieth session. Some observations on this point and on the history of the School were also addressed to the meeting by Mr. Carteighe.

Mr. Carteighe first touched on the foundation of the School, and the pluck shown in founding it only one year after the formation of the Pharmaceutical Society itself as well as the great breadth of views shown by the Founders in regard to the School. They were desirous that the teaching of the School should be thorough in all its branches, and they endowed chairs, and went outside their own ranks to get the very best men of the time for teachers. Such were Anthony Todd Thompson, Pereira, and Fownes. The laboratory of practical chemistry established by them was the first properly equipped laboratory for teaching practical chemistry opened in London. Another noteworthy point about the School was the national character which had always distinguished it; men from all parts of the country visited it, and were in a majority over the Londoners, generally, too, being more successful than the Londoners in the prize competitions. This School too was one of the first, if not the first, to admit ladies to its courses of teaching, and could justly be proud of the result. Coming to the question of compiling a record of the School, the idea commended itself to him as an extremely good one, and suggestions were made as to carrying it out. Ultimately the consideration of the subject in detail was deferred to a future meeting.

A vote of thanks to Mr. Carteighe was then proposed by Mr. W. Lloyd Williams, seconded by Mr. C. Morley, and carried unanimously.

Mr. Carteighe, in responding, alluded to the advantages of such an Association in promoting *esprit de corps*, in giving a man confidence in himself, and thus preparing him for oral examinations, and teaching him to sit still and keep cool under a moral castigation, until his turn came to reply. He also advised members not to attempt original work too soon, but to begin by studies of the work of older workers, and reading papers thereon.

THE WESTERN AND NORTH WESTERN CHEMISTS' ASSOCIATIONS OF LONDON.

The annual dinner of the members of these two associations was held on Wednesday last at the Holborn Restaurant under the presidency of Mr. Henry Long. There was a very large attendance of members and visitors. After the usual loyal toasts had been duly honoured,—

Mr. Hampson rose to propose the toast of "The Western and North Western Chemists' Associations of London." He suggested that the two associations should in future be described under a comprehensive title, such as the "London and North Western." It was a remarkable circumstance to find two associations uniting on such an occasion and dining together, and he was not aware in the history of London Pharmacy that such an event had ever occurred before. It showed there were certain influences abroad. What the influences might be it was difficult to say, but he felt sure that the President, Mr. Long, had something to do with that. Little more than a year ago Mr. Long initiated the North Kensington Association, the members of which now exceeded 120. It was not the small subscription which had been the means of bringing this about, but rather the fact that chemists desired to fraternize and to discuss the salient questions of the hour. The north-western division numbered some sixty members. The fact was that London was so large that it was impossible to institute any association, however efficient, without dividing it up into parts, as the wants of each district differed. The only way to compass the wants of the whole metropolis was by initiating separate institutions, and he hoped the example which had been set at Kensington and Paddington would be followed by other parts of the metropolis. The objects of the association were founded on good fellowship, and chemists were now no longer afraid of each other. The Pharmaceutical Society was suffering under the same conditions that London itself was, namely, it was too large. The result of having various associations would be that chemists would now meet together and discuss the various questions affecting their interests, and decide as to whether or not any particular measure should be supported. As treasurer of the Benevolent Fund he must be allowed to say that the chairman was a friend of his, a friend of the craft, and a friend of the Pharmaceutical Society. He had much pleasure in coupling with the toast the names of Mr. Long and Mr. Parkes.

The Chairman in responding, said the reason he had been so successful in starting the association was because he had been supported by such good friends, who had generously responded to the proposition that such a society should be started. When one hay-rick caught fire it was dangerous for its neighbours, and the movement having started at Kensington it quickly spread to Paddington. These societies had since amalgamated and were now prosperous. One man could lead a horse to the water but a hundred could not make him drink, and so in this case, had it not been for the reciprocity among gentlemen in the room the association would not have existed. Great credit was due for the success which had occurred to Messrs. Andrews and Matthews.

Mr. Parkes said, although the North and North Western Association could not boast so large a number of members as the Western, this was accounted for by the fact that the district was more scattered. Still they had managed to pay their way and to hold many successful meetings, the outcome of which had been that they had made friends where before they did not know they had any. Chemists now had more confidence in each other, and it was this that was required to enable them to carry on their calling with benefit to themselves. Up to the present time they had discussed uniformity in hours and prices, and had come to the unanimous conclusion that it was impossible to have unanimity in either, because the different businesses and localities compelled them to act according to their own lights. At the same time they had come to the conclusion that they might trust each other to carry on their calling in an honorable way without detriment to the business of their *confrères* in any form whatever. To a man the members of the North and North Western Association were staunch supporters of the Pharmaceutical Society.

Messrs. Andrews, Matthews and Hind also responded.

The Chairman then proposed the toast of the Pharmaceutical Society of Great Britain, coupling with it the name of Mr. Michael Carteighe. Inasmuch as the Pharmaceutical Society was the origin of all their good fortune, and all that they had in the pharmaceutical world, he was sure the members would heartily respond to the toast. When he was yet a boy, learning the rudiments, one of the assistants asked him whether he belonged to the Pharmaceutical Society, and upon ascertaining what its objects were he at once expressed his intention of becoming a member and participating in the benefits to be derived from it. He had never regretted so doing, and strongly advised others to follow in his footsteps. The Pharmaceutical Society was really the lifeboat of pharmacy. Among other services it had rendered to chemists was that of getting them exempt from serving on juries. Every member had a voice in the formation of the Council.

Mr. Carteighe, in responding, said the observations made by the chairman pointed to the fact that it was just possible chemists might have been worse off at the present time if the Pharmaceutical Society had not existed. That was a very fair position to take up. In 1841 the Society was established for defensive, but not for aggressive, purposes. From time to time it had prevented the Governments of the day from passing measures, which, if carried, would have made it impossible for chemists to carry on business with satisfaction to themselves. The public was never so much excited as when a case of accidental poisoning occurred. Somebody was punished, and immediately the Legislature was asked to pass some measures for the prevention of accidents in the future. It was necessary in a free country like ours that there should be in every trade or profession an organisation which could properly represent it at the fountain head. This had not been badly done by the Pharmaceutical Society in times past, for it had prevented many things happening which would have been serious to the craft. The carrying on of business in the fierce fight of competition at the present day would be more difficult if they had not the tempering influence of the Society. One might naturally say, if the Pharmaceutical Society was so powerful for defence how was it that so few chemists relatively joined it? He did not know how to explain that except upon the general hypothesis that before a free nation, having general views, chemists declined to associate themselves with any organisation unless they could see immediate danger ahead. It was well worth a person's while to join the Society if only for the purpose of making the Society so strong that it would be able to repel attacks in the future. The Pharmaceutical Society was an insurance corporation. It gave to the corporate body an influence and power over the Government which prevented it from acting hastily. Their power of defence was so great that no measure could be introduced into either branches of the Legislature which was directly contrary to the interests of the craft without it being possible for them to defeat it. That was a strong thing to say, but it was so, and consequently the Council had a right to look upon chemists to support them. It might be said, why not protect us from the onslaught of unfair competition and then we will join you? But how could the Society fight if they had no soldiers? The future of chemists was entirely in their own hands. Those who were not with the Society in the battle of pharmaceutical life were distinctly against them. Inertia was more difficult to overcome than direct antagonism. If they wanted the Society to march forward and to protect the interests committed to its

charge they must join the ranks and say with one voice: "On you go—you represent every chemist and druggist—we have no interest but one, namely, the corporate one, the general good of the whole number." If this were so, individual jealousies and views would be suppressed. If they were not prepared for this it was no use asking the Society to go to Parliament for legislation. It had been said that the poor chemist was a down-trodden man. If he was it served him right. He (Mr. Carteighe) had no sympathy with the individual who allowed himself to be down-trodden when there was a corporate body, which if he joined it would prevent him from being down-trodden.

The remaining toast was "The Visitors," with which was coupled the names of Dr. Onslow Wickham, Dr. Luff and Mr. Warren.

Provincial Transactions.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

At a Council meeting held on October 22, the following were elected officers of this Association.

President, Mr. Geo. S. Woolley; Vice-Presidents, Mr. F. B. Benger and Mr. Geo. Westmacott; Treasurer, Mr. Wm. Stones; Hon. Secretary, Mr. A. Blackburn, 7, Exchange Street, Manchester.

Other members of the Council:—

Messrs. W. Arrandale, T. Booth, J. Botham, W. Bowden, H. Kemp, W. Kirkby, and W. Wilkinson.

The first ordinary meeting of the twenty-fourth session of this Association was held on November 11, in the rooms of the Chemical Club, Victoria Hotel, Manchester.

The chair was taken by Mr. G. S. Woolley, President.

There were also present Mr. F. B. Benger and Mr. George Westmacott, Vice-Presidents, and there was a good attendance of members.

The President, in opening the proceedings, said:—In the first place, gentlemen, I thank you very much for the honour recently conferred upon me, through your Council, of electing me President of this Association. I have now been for a number of years, more even than I care to count up, connected with pharmacy in our city, and have always taken the deepest interest in the welfare of our Association, and earnestly wish it all prosperity. It is universally acknowledged that for the promotion of our general welfare as pharmacists it is desirable that local associations should be maintained throughout the country to enable the members of our craft to meet together, from time to time, to discuss matters affecting the trade. As to the advisability of this, there cannot, I think, be two opinions, and your Council is very desirous that a renewed effort be made to increase the activity of the Manchester Association. In order to do this a considerable importation of younger members is, I think, necessary, for you must not forget that several of those who have been responsible for the conduct of the Association have been engaged upon the work for upwards of a quarter of a century and cannot now be expected to have the energy or be able to devote the time which is necessary for the successful development of the Association. One gentleman has come forward and kindly consented to undertake the duties of Secretary, and I have much pleasure in introducing to this meeting Mr. A. Blackburn in that capacity. To Mr. Wilson, who has acted as Secretary during the past four years, the thanks of the Association are due, and will, I am sure, be accorded by you. In addition to Mr. Blackburn other helpers are necessary, and I appeal to the younger members of our craft to assist when called upon. I should very much like to see a healthy competition for seats in the Council of this Association, and hope that at the next annual meeting we shall have a contested election. To-night we have a paper on "Alkaloids," by Mr. Chas. Turner, whom I have pleasure in introducing to you. In December a lecture will be given by Mr. Wm. Kirkby on "The Microscopical Characters of the more Important Official Drugs," and which will be illustrated by aid of the lantern. I particularly wish it to be known that this meeting will be open to all connected with our craft and who may be interested in this subject. Among the subjects to be brought before you during the session I am anxious that the one suggested by Mr. Kirkby, Pharmacy Law, should have a place. I do not think any of us can say that we know all about it, and I hope that those of us interested will make it a point to be present when the subject comes on. I have now much pleasure in calling upon Mr. Chas. Turner to read his paper.

A paper was then read on "Alkaloids," by Mr. C. Turner, F.C.S., which it is intended to publish in a future number.

At the conclusion of the paper the thanks of the meeting were given to Mr. Turner, on the motion of Mr. George Westmacott, seconded by Mr. H. Kemp. This was followed by a discussion in which Messrs. Franklin, Riding and Wilson took part.

At the close of the discussion on this paper Mr. Kemp drew the attention of the chemists present to the fact that after this year they would be debarred from supplying methylated spirit containing wood naphtha, and consequently a large part of their present trade would be driven into other hands. It appeared that spirit containing mineral oil was quite unsuited for employment in many of the arts and trades.

The President considered that the best course to pursue would be for a large number of those interested in the matter to write direct to the inland revenue authorities, expressing their views and experiencies, when the matter would no doubt receive consideration.

A vote of thanks to the Chairman brought the meeting to a close.

GLASGOW CHEMISTS AND DRUGGISTS' ASSISTANTS' ASSOCIATION.

At the usual fortnightly meeting, held in the Waterloo Rooms on Wednesday, November 11, Mr. Jas. Robb, President, in the chair, a lecture entitled "The Method of Science" was delivered by Mr. J. C. Gilmour.

The lecturer commenced by defining science as organized knowledge, remarking on the difference between it and common knowledge, examples of the latter being found in domestic economy. The simplest form of knowledge, he said, was perception, and went on to refer to perfect and imperfect inductions, stating that all inductions in physical science are only probable. He next referred to analogy, observation, experiment, and precaution. Analogy, being identity of relation; observation, to see what turns up; experiment, turning things up to see what happens and create situations; precaution, to discriminate accurately between what we really do observe and what we only infer from the facts observed. The lecturer gave numerous illustrations in support of the above, then touched on methods of induction, agreement and residues, gravitation, explanation, and concluded his lecture by remarking on the great value of hypothesis to science.

After some remarks by various members the meeting terminated with a vote of thanks to Mr. Gilmour for his very able and interesting address.

Obituary.

Notice has been received of the death of the following:—

On the 11th of November, Mr. George Wilby, Chemist and Druggist, Middleton Road, Banbury. Aged 45 years.

On the 13th of November, Mr. William Leggott, Chemist and Druggist, Bridge Street, Goole. Aged 58.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Collodium Belladonnæ.

Sir,—A question having arisen as to the desirability of introducing this preparation into the B.P.C. formulary, and Mr. Reynolds having been kind enough to mention my name, I may say that although there is comparatively little demand as yet for the preparation in this district, I have been assured by a medical friend that in his locality emp. belladon. fluid. was constantly prescribed. He himself regularly used it, found it excellent for the purpose for which it was introduced, and preferred it to either the ointment or the glycerine of belladonna. I therefore readily agreed to the suggestion made by Mr. Reynolds to introduce the preparation.

As to the formula, I can add nothing to what has been so well said by Mr. Conroy and Mr. Umney. No doubt the formula is not perfect, but the efforts of one or two able pharmacists will soon provide us with one that is perfect. Mr. Umney's discovery regarding the strength of commercial samples of belladonna extract is much more serious, and deserves careful attention.

If I might be allowed, however, I would take exception to Mr. Umney's experiments in so far as they include ext. belladon. B.P. One would not expect a watery extract to be soluble to any appreciable extent in such a menstruum as collodion, or ether, and I am therefore not at all surprised at the results got from these. But this criticism does not affect the valuable and important character of Mr. Umney's communication.

Thos. Maben.

Patent Medicines and the Pharmacy Act.

Sir,—Since clause xvi. refers only to the previous ones, and the word "article" throughout the Act refers to, and means poison, it appears that nostrums containing poison are subject to the provisions of the Act and must be labelled with the name of the poison they contain. But the question arises should they contain two or more scheduled articles, must the names of them all appear on the label? Yet another difficulty, if the proprietary article contains a poison in part I. (such as prussic acid) how can we enter the quantity sold in the poison book?

Prudentia Consilioque Fidens.

A Question of Titles.

Sir,—Having recently observed the new syllabus of the examinations, I was struck by the high standard of scientific knowledge required to obtain the Diploma of the Society. May I venture to revive an almost worn out suggestion:—That the man of to-day, after spending time and money in obtaining the higher qualification, does not get sufficient distinction from those whose aspirations cease with the "Minor." As is well known a very small percentage of the public know the difference between a "pharmaceutical chemist" and a "chemist and druggist." Probably this is why so many are content with the lower qualification. Is it not a misnomer to designate a "Minor" man a "chemist?" Would it not be better to style him a "druggist," and reserve the title "chemist" for the "Major" man, who is capable of upholding it? I am afraid this can hardly be said of the Minor men. I do not wish to convey the idea that the qualifying examination is not of a sufficiently high standard, but that the distinction between the two is not enough.

Justice.

Local Secretaries.

Sir,—I am glad to find that the subject of local secretaries is receiving some attention. As a local secretary in a small town these ten years, I endorse what your correspondent, Mr. Swinn, advocated.

I certainly think there ought to be a sub-local secretary for every district of a large town like Manchester and Salford, say one each for Brook's Bar, Hulme, Rusholm, Cheetham, and in the town proper, one to every twenty chemists' shops.

I find it takes some time to look up the half dozen in my own town who ought to be visited two or three times a year: even oftener than that is required to rouse their interest and show them where their interests lie.

Co-operation is the *bete noir* of the chemist's life. May we not find it grow less terrible if we make it a reality, and apply it to our own concerns and best interests? I should like our Society to issue a circular for distribution by local secretaries, asking for any information they may like to send, and setting out plainly the powers and functions of the Society and their sub-officers.

With regard to the Preliminary examination I should like to see greater stringency required for the existing subjects, rather than any addition to them.

Altrincham. J. T. Clarke.

A Literary Query.

Sir,—Amongst my laboratory handicraft is a small octavo much in use by the apothecaries of the last century, evidently the prototype of the modern 'London Hospitals Squire,' giving the formula in use in the several London hospitals in 1770, diet tables, with a supplement, etc., the title-page being as follows:—

'The Modern Practice of the London Hospitals, viz., St. Bartholomew's, St. Thomas's, Guy's, St. George's, the Portugese, and the Lock, at Hyde Park Corner. The third edition, with a useful index of diseases and their remedies. Printed for Scrowder and J. Coote, in Paternoster Row, W. Griffen, in St. Catherine Street in the Strand, and W. Nicoll, in St. Paul's Church Yard. MDCCLXX.' Is the name of the compiler known? Some bibliographist in the craft might oblige.

33, *Corporation Road, Carlisle.* James Foster.

NOTICES OF MEETINGS.

Midland Counties Chemists' Association.—Tuesday, Nov. 24, at 8.30—Paper: "Indicators in Volumetric Analysis of Pharmaceutical Chemicals and Preparations," by Mr. R. A. Cripps.

Sheffield Microscopical Society.—Tuesday, Nov. 24, at 8.—Paper: "Comparative Value of Microscopical Accessories," by Mr. J. Humphrey.

Glasgow Chemists and Druggists' Assistants' Association.—Wednesday, Nov. 25, at 9.15—Paper: "Shop Life," by Mr. W. L. Currie.

Brighton Junior Association of Pharmacy.—Wednesday, Nov. 25.—Paper: "Photography," by Mr. J. Williamson.

Chemists' Assistants' Association.—Thursday, Nov. 26, at 9.—Paper: "Drugs and Preparations of Use in Dental Practice," by Mr. W. Rushton.

"*Reader.*"—(1) Coto bark was originally received from Bolivia, but its botanical source is not exactly known; probably it is from one of the Laurinaceæ. (2) Japanese wax is obtained from the fruit of *Rhus succedaneum* and possibly other species of *Rhus* (see *P. J.*, [3], x., 608).

Inquirer.—A 3 per cent. solution is employed, the hair having been previously cleansed by digestion with a 3 per cent. solution of carbonate of ammonia and washing with soap. See a paper on "Peroxide of Hydrogen as a means of Bleaching" (*Pharm. Journ.*, [3], xii., 747).

Dispensing Query.—A correspondent asks for the formulæ of "Inf. Pulv. Rad. Ipecac." and "Syr. Morphiæ," ordered in a French prescription.

E. G. Cumber.—No, it should not be rejected.

Notice.—We are compelled from want of space to defer the publication of several communications.

Communications, Letters, etc., have been received from Messrs. Humphrey, Umney, Maben, Ellinor, Hill, Ellwood, Allen, Lucas, One who hopes to be a Chemist, West End, M.P.S, T.J.R.

"THE MONTH."

Tuberculin.

The publication by Dr. Koch of the somewhat unsatisfactory results attending his attempt to free tuberculin from its more objectionable properties (see before, p. 345) has called forth a communication from Dr. Klebs, of Zurich, who professes to find himself in the peculiar position of having to defend tuberculin against its discoverer (*Deut. med. Wochens.*, Nov. 5, p. 1233). For Dr. Klebs is of opinion that not only is tuberculin capable of causing the disappearance of tuberculous tissue and bringing about a perfect restitution *in integrum* in animals infected with tuberculosis, but that the undesirable symptoms observed in human patients are due to special substances that have nothing to do with the healing action and can be removed without injuring it. These substances, Dr. Klebs says, are of the nature of organic bases, and their presence can be recognized by treating a few drops of tuberculin with an alkaloidal precipitant. In attempts to remove these organic bases the best results have been obtained by precipitating the tuberculin with absolute alcohol, to which an addition of sodium chloride may be made with advantage, dissolving the precipitate in water and extracting it by a mixture of absolute alcohol, pure chloroform, and the so-called crystallized benzene. The shaking out has to be done in an apparatus and continued for a long time; a frothy mass is formed which settles very slowly, and considerable loss of the active substance can scarcely be avoided by this method. Another plan is to throw down the alkaloids, it being possible, as a rule, to remove the active substance, which Dr. Klebs calls "tuberculocidin," from the precipitate by treatment with water. The foregoing practically confirms some conclusions published a few months since by Herr Bombelon, a German pharmacist (*Pharm. Zeit.*, June 17, p. 376). These were to the effect that the swelling and necrosis observed after the use of crude tuberculin are due to "tuberculinacrin," a soft resin that is taken up by chloroform, and that the action on the heart depended on the portion of the lymph soluble in alcohol, which might be alkaloidal, glucosidal or an ammonium base. Herr Bombelon considered tuberculin, when purified by treatment with a mixture of three parts of absolute alcohol and one part of chloroform, to be the sodium salt of an acid comparable to ergotic acid, and he suggested that it would be only a step to "hydrargyrum tuberculinicum." In a more recent communication Herr Bombelon recommends a further treatment with carbolic acid to remove another constituent that causes smarting and inflammation at the point of injection (*Pharm. Zeit.*, Nov. 14, p. 714). Briefly the process of purification now recommended by him is to precipitate 5 c.c. of lymph with 20 c.c. of ether-alcohol (which he prefers to chloroform-alcohol), wash the precipitate with another 20 c.c. of ether-alcohol, and after all traces of the precipitant have evaporated dissolve it in 5 c.c. of water, add 1 c.c. of liquefied carbolic acid, shake vigorously, and allow the mixture to stand eight days. The top layer of clear yellow liquid, which collects over a pulverulent layer and a yellow oil at the bottom is then carefully removed and the residue is shaken with 3 c.c. of absolute alcohol and 3 c.c. of ether, which takes up the carbolic acid. The "tuberculinic acid" that separates is again washed with ether-alcohol, taken up in 5 c.c. of water, in which the free acid is difficultly soluble, thrown on a filter, washed with a little more water, and finally with absolute alcohol. The pure air-dried acid, which is described as a light and white compound, can then be added to 2·5 c.c. of glycerine, and the mixture brought up to the original volume of 5 c.c. by the addition of water and sufficient sodium carbonate to bring the acid into solution. The product is represented to be perfectly pure "tuberculine" or "sodium tuberculinicum."

Abrin and Ricin.

The numerous points of resemblance in respect of physiological action between abrin, the poisonous albumose to which the inflammatory action of preparations of jequerity seeds upon the eye is attributed, and ricin, the albumose of castor-oil seeds (*Pharm. Journ.*, [3], xx., 344), has suggested the probability of their being identical. Both possess the property of coagulating the blood in a peculiar manner, giving rise to numerous thromboses, especially in the intestinal vessels; they also affect similarly the mucous membrane of the eye, and they are both converted into non-poisonous substances by digestive ferments. Experiments by Herr Ehrlich have shown, however, that they are quite distinct substances (*Deut. med. Wochens.*, Oct. 29, p. 1218). One peculiar action of abrin is to cause the loss of hair spreading round the point of injection. In toxic properties ricin was found to be about twice as powerful as abrin, but in their action on the membrane of the eye this relation is reversed. Further, it was found possible by special treatment to render an animal immune against abrin or against ricin, but the immunity against one of these albumoses does not involve immunity against the other. The practical inference drawn by Herr Ehrlich from the results of his experiments is that by the use at first of dilute solutions of abrin and ricin, and then carefully and slowly increasing the strength, all danger to the eye in using these substances may be avoided, without diminishing the healing effect.

Tumenol.

The success that has attended the introduction of ichthyol, which is understood to be a product of distillation of a peculiar sulphurous bitumen, appears to have suggested experiments in a similar direction, with the result of the appearance of another claimant on the therapeutist's attention, under the name "tumenol." According to Dr. Spiegel all mineral oils contain a class of unsaturated hydrocarbons, capable of reacting towards sulphuric acid and of being converted by it into still less saturated derivatives; these hydrocarbons are said to constitute the mother substance of tumenol. For the preparation of the tumenol compounds the mineral oil is first treated for the separation of phenols and acids with soda lye, and afterwards for the removal of bases and pyrrol-like bodies with 70 per cent. sulphuric acid. Upon treating the purified oil with concentrated sulphuric acid the unsaturated hydrocarbons undergo sulphonation, with evolution of sulphur dioxide, and a dark coloured acid syrup is formed, from which can be separated, by washing with water and solution of sodium chloride, a mixture of sulphone and sulphonic acid. This is treated with soda ley, to convert the sulphonic acid into a salt, and then shaken with ether

which takes up the sulphone and leaves the sodium salt in the aqueous liquid. The "tumenol-sulphone," after purification, is described as being a dark yellow thick liquid, readily soluble in ether, ligroin and benzol. Although it is insoluble in water it is taken up by an aqueous solution of tumenol-sulphonic acid, to which it imparts a strongly bitter and aromatic taste. Upon analysis tumenol-sulphone gave figures approximating to the formula $(C_{41}H_{67}O)_2SO_2$. Tumenol-sulphonic acid is obtainable as a dark powder, having a peculiar faintly bitter taste. It is easily soluble in water, and the solution can be evaporated to the consistence of an extract without separation taking place; it is, however, precipitated from solution by acids or salts. In a faintly acid solution of gelatin it forms an elastic caoutchouc-like precipitate, that can be drawn out into threads. The alkali salts of tumenol-sulphonic acid are easily soluble in water, from which they can be salted out like soaps. The salts of the alkaline earths and heavy metals are insoluble in water, with the exception of those of antimony and mercury. The acid converts corrosive sublimate into calomel upon boiling; it also reduces ferric chloride to a ferrous salt and permanganate to a lower oxide of manganese, and upon boiling with an acidulated solution of bichromate is converted into an insoluble oxidation product. The figures obtained in an analysis of the calcium salt corresponded to the formula $(C_{41}H_{51}O_{21}SO_3)_2Ca$. "Commercial tumenol" contains both the sulphone, which from its consistence is designated "tumenol oil," and the sulphonic acid, which has been called "tumenol powder." As, however, the acid in the powder form is relatively costly it is used also in a viscous condition. These compounds have recently been the result of a report to the German Dermatological Society by Professor Neisser (*Deutsch. med. Wochens.*, Nov. 5, p. 1238). Professor Neisser states that he has experimented with two forms of tincture, one containing about 10 per cent. of tumenol, the mother substance, dissolved in a mixture of equal parts of ether, rectified spirit and water, and another in which glycerine was substituted for the water. The former when painted on a surface dries readily and completely, but the latter forms a somewhat fatty smeary coating, which holds a dusting powder well. Of the purified sulphonic acid aqueous solutions were used. The tumenol is said to make up very well with zinc-gelatine, and all three preparations were used in the form of ointment, pastes made with zinc oxide and starch, and soap plasters, but for the ointments and pastes the commercial tumenol or the tumenol oil (sulphone) was found most suitable. Professor Neisser considers the tumenol compounds to differ entirely from ichthyol, since they depend for their therapeutic action rather upon their powerful reducing properties than upon the combined sulphur. Summing up the results of two years' experience he says that tumenol will be found useful in nascent eczema, erosions, excoriations, superficial ulcerations and in different forms of pruritus.

Thilanin.

Under the name "thilanin" another substance has been introduced which is represented as being a sulphuretted lanolin, containing 3 per cent. of sulphur, though whether in combination with the cholesterin or with the fatty acids has not been decided (*Pharm. Centralh.*, Nov. 19, p. 678). Thilanin is described as a brownish-yellow unctuous substance of the consistence of lanolin, and is claimed to be valuable as an application in skin diseases on account of its non-irritant property.

Iodo-β-Naphthol.

An addition to the compounds of the aristol class has been made by M. Braille, who describes a compound of iodine with β-naphthol (*Union Pharm.*, Oct., p. 437). It is stated to be prepared by mixing an aqueous solution of 24 grams of iodine and 27 grams of potassium iodide with an aqueous solution of 110 grams of β-naphthol and 40 grams of caustic soda, and adding to the mixture gradually a solution of sodium hypochlorite corresponding to ten times its volume of chlorine. The iodo-naphthol is precipitated as a greenish-yellow powder, which is collected and washed several times with water and dried in the dark. When exposed to light the greenish colour becomes intensified rapidly. The product is said to be odourless and tasteless, insoluble in water, almost insoluble in alcohol and acetic acid, partially soluble in ether and very soluble in chloroform.

Benzoyl-Naphthol.

Another compound of β-naphthol, in this case containing the benzoyl radicle, has been introduced by Messrs. Yvon and Berlioz as as intestinal antiseptic (*Répertoire*, Nov. 10, p. 497). This compound is prepared by heating together, in a glass flask of about two litres capacity, upon a sand-bath, 250 grams of β-naphthol and about 270 grams of very pure benzoyl chloride. The heat is applied so as to raise the temperature gradually to 170° C., at which point the reaction goes on regularly, and is continued at that point for 30 minutes. This part of the operation should be conducted under a hood to avoid injury from the irritating vapour given off. Upon cooling the liquid forms a solid mass, consisting of benzoyl-naphthol and a little naphthol. The crude product is purified by two or three crystallizations from boiling alcohol. In some preliminary experiments benzoyl-naphthol is said to have proved as efficacious as an intestinal antiseptic as either β-naphthol or betol. But over these it is claimed to possess the advantage of being perfectly tasteless and non-irritant, and that its decomposition in the system results in the formation of hippuric acid, a normal constituent of the urine. Benzoyl-naphthol is described as crystallizing from alcohol in microscopical crystals, almost odourless and tasteless, nearly insoluble in water at ordinary temperatures, more soluble in alcohol, the solubility rising rapidly with the temperature, but most soluble in chloroform. It is best administered in small doses of 25 to 50 centigrams, repeated frequently, given in a cachet or suspended in *eau sucrée*; but as much as 5 grams daily may be safely given to an adult.

Strontium Salts in Medicine.

A discussion that has arisen in France out of the use of strontium compounds in the plastering of wines has turned attention to the physiological action of strontium salts. As a result several communications on the subject have been presented almost simultaneously to the Société de Thérapeutique (*Rev. Thérap.*, Nov. 15, pp. 592, 604). In one M. Ferré states that he has obtained with strontium bromide the same advantages as with the alkaline

bromides in the treatment of epileptics, whilst it was better tolerated by the stomach. In a second M. Sée stated that 2 to 5 grams of the bromide, dissolved in water and taken in three doses in the course of the day, had been very useful in relieving dyspepsia, gastralgic pains, cardiac complaints, and Bright's disease. Iodide of strontium had also, in his hands, proved useful in heart disease. In a third M. Paul reported that he had found the administration of a solution of strontium in lactic acid to cause the rapid and complete disappearance of albumen from the urine. In a subsequent communication M. Dujardin-Beaumetz confirmed M. Paul's statements to the extent that in his experience the administration of the lactate had always promptly reduced the albumen by one half. This result he appeared disposed to attribute primarily to the favourable effect of the salt on the digestive organs, which reduced the production of toxines to the minimum. M. Paul uses a solution of 50 grams of "lacto-strontiane" in 250 grams of water, the dose being a teaspoonful night and morning.

Calcium Salicylate.

A demand for calcium salicylate having arisen in Austria, where it is ordered alone or in conjunction with bismuth salicylate as a remedy for diarrhœa and in gastroenteritis, a formula for its preparation has been published by Herr Torjescu (*Zeit. öst. Apot.-Ver.*, Nov. 10, p. 630). A filtered solution of 200 grams of sodium salicylate in 5000 grams of distilled water is treated with 10 grams of liquor sodæ, sp. gr. 1·160, and into this is filtered a neutral solution of calcium acetate, made by heating 100 grams of pure calcium carbonate with just sufficient dilute acetic acid to dissolve it completely. The resulting precipitate is collected on a filter, washed several times with cold distilled water, dried at a temperature not exceeding 35° C., and preserved in a well closed vessel. The product is described as a white odourless and tasteless crystalline powder, soluble in the proportion of 1 in 2000 in cold water, but readily forming a clear solution in water containing carbonic acid; also very easily soluble in dilute acetic, nitric or hydrochloric acid. The dose is from 0·5 to 1·5 gram.

A Basic Salicylate of Bismuth.

The property of ammonium chloride of retarding or wholly preventing the dissociating action of water upon bismuth salts, a property that has been utilized by M. Causse in the preparation of a neutral salicylate of bismuth (*Pharm. Journ.*, [3], xxi., 1169), is, according to the same chemist, also characteristic of sodium chloride (*Compt. Rend.*, cxiii., 547). An excess of mineral acid is generally employed to dissolve oxide or carbonate of bismuth and maintain the corresponding salt in solution. In concentrated solutions of the chloride this excess corresponds to the existence of a hydrochloride of bismuth chloride, $BiCl_3$,HCl. Ammonium or sodium chloride appears to replace the hydrochloric acid in this compound, and as the liberated acid can then combine with more oxide or carbonate a neutral solution is thus obtained. M. Causse has been able to prepare a basic salicylate of bismuth of definite composition by dissolving 35 grams of oxide of bismuth in 40 c.c. of concentrated hydrochloric acid, adding 500 c.c. of a saturated solution of common salt, and then neutralizing with oxide or carbonate of bismuth. Into this solution 500 c.c. of a second solution of common salt, to which 9 grams of caustic soda and 22 grams of salicylate of soda have been added, is filtered, when a precipitate of salicylate of bismuth forms according to the following equation—

$$BiCl_3 + C_7H_5O_3Na + 2NaOH = C_7H_5(BiO)O_3H_2O + 3NaCl.$$

The violet mother liquors are decanted, and the precipitate washed with water acidulated with a few drops of nitric acid until free from colour. The salicylate thus obtained occurs in microscopic prisms; it is decomposed by heat, losing salicylic acid, as well as by boiling absolute alcohol. In other properties it resembles the neutral salicylate previously described, but has probably the constitutional formula—

$$C_6H_4\begin{matrix}COO-Bi\\OH\end{matrix}\begin{matrix}OH\\OH\end{matrix}$$

which accounts for its ready decomposition into salicylic acid and oxide of bismuth.

Crystalline Ferric Oxychlorides.

The formation of a crystalline oxychloride of iron, $2Fe_2O_3$, Fe_2Cl_6, $3H_2O$, was observed last year by M. G. Rousseau (*Compt. Rend.*, cx., 1032), when a very concentrated solution of perchloride of iron was maintained at a temperature of 160°–220° C. for a considerable time. This compound, in prolonged contact with boiling water, undergoes a progressive saponification, and is eventually transformed into an isomorphic ferric hydrate $(Fe_2O_3,H_2O)_3$. At temperatures above 220° C. M. Rousseau has now obtained evidence of the formation of a series of anhydrous crystalline oxychlorides of the general formula $(Fe_2O_3)_n$, Fe_2Cl_6, which by the continued action of boiling water are saponified according to the general equation

$$(Fe_2O_3)_n, Fe_2Cl_6 + 3H_2O = (Fe_2O_3)_{n+1} + 6HCl.$$

At a temperature between 225° and 280°, the oxychloride $2Fe_2O_3$, Fe_2Cl_6 has been obtained, and between 300° and 340° that of $3Fe_2O_3$, Fe_2Cl_6 (*Compt. Rend.*, cxiii., 542). The compounds are isomorphous, reddish to blackish-brown in colour, and do not readily dissolve in dilute mineral acids. Experiments above the latter temperature have not been successful, owing to the bursting of the sealed glass tubes employed; but M. Rousseau believes that compounds may be obtained with a regularly increased proportion of Fe_2O_3, according to the temperature, and that possibly by the treatment of some of the higher members of the series with boiling water, hæmatite will be synthesized, or at any rate a clue furnished with regard to the state of polymerization of that mineral.

Double Chloride of Copper and Lithium.

The position of lithium in the periodic system is generally regarded as an explanation of the different deportment of its compounds to those of other members of the alkali group. Although all the members of the group exhibit great similarity in chemical behaviour, more marked relations are observable between rubidium, potassium and cæsium, and between sodium and lithium. The differences existing between the subgroups are illustrated in a double chloride of lithium and copper prepared by M. Chassevant (*Compt. Rend.*, Nov. 9, 646). The crystals of the compound potassium salt have the composition Cu_2Cl_2, 4KCl, those of the lithium salt correspond to the formula $2CuCl$, $LiCl + 5H_2O$. The transparent grenat-coloured crystals of the lithium salt are especially characterized by their

ready decomposition by water, so that when exposed to moist air they soon become opaque and greenish, ultimately forming masses of fine green needles of cuprous chloride, the lithium chloride separating as a colourless syrup. If molecular quantities of copper and lithium chlorides in concentrated aqueous solution be mixed, green crystals of copper chloride separate, and the grenat-coloured compound is only formed when excess of lithium chloride is present in very concentrated solutions. Heated to 130° the crystals dissolve in their water of crystallization to a brownish-black syrup, which gradually decomposes and evolves hydrochloric acid. An anhydrous compound of a chamois colour can be obtained by drying the crystals at 120° in a current of dry air saturated with dry hydrochloric acid gas.

Influence of Temperature on Colour.

The changes in colour exhibited by many substances when exposed to heat have been little studied, and beyond the description of certain marked changes of colour that occur under the action of the blowpipe and form a ready means of identification of the substance exhibiting them, few attempts have been made to show that these and other colour-changes follow a general law. Schœnbein pointed out that colours grow dark under the action of heat, and in 1871 Houston and Elihu Thomson published their conclusion that "the addition of heat causes the colour to pass from one of a greater to one of a less number of vibrations." In a communication to the *Chemical News* (xxxiv., p. 76) on "Metachromatism or Colour Change," Ackroyd confirmed the observation of a movement of the colour tones "towards the red" upon heating and, supplementing naked eye observations with spectroscopic study, was led to the statement that "metachromatism arises from increased absorption of light with elevation of temperature, the more refrangible increment increasing at a greater rate than the less refrangible." In the current number of the *Philosophical Magazine* (p. 401) Messrs. Nichols and Snow, of Cornell University, present the results of an investigation of the colour-changes that pigments undergo when subjected to wide ranges of temperature, in which the selective reflection that takes place at the surface of the pigments has been systematically analysed and the variations brought about by the action of heat in the amount and character of the reflected light quantitatively estimated. The methods and apparatus employed in the investigation are very minutely and clearly described in the original memoir. In presenting the results of measurements with the spectro-photometer employed it was thought undesirable to reduce the recorded intensities to absolute measure, and Messrs. Nichols and Snow therefore adopted the more satisfactory method of defining the colour by comparison with white as a standard. The ideal white is one which reflects all the wave-lengths of the visible spectrum in the same proportion, but since no such body is known to exist it becomes necessary to select some actual pigment as a reference-standard. The authors of the present paper, for practical reasons, adopted magnesium oxide as reference white, and defined ideal white, in terms of the brightness of which all pigments were to be measured, as a surface which, reflecting all the wave-lengths of the visible spectrum equally well, possesses the same reflecting-power for the wave-length ·5890 μ (region of the D line) as does the smoke film of magnesium oxide. The reflecting powers of magnesium oxide at 25° and 758°, of sulphur at 25° and 103°, of molybdic acid at 25° and 272°, of massicot at 25°, 540° and 825°, and of yellow mercuric iodide at 25° and 122° were thus determined and recorded in terms of that of ideal white. All these substances show with increase of temperature marked decrease of reflecting power passing through the spectrum from red to violet, but in the case of sulphur the diminution is much less rapid than the other yellows until the region of the F line in Fraunhöfer is reached, when the curve trends sharply downwards, indicating very rapid lessening of the reflecting power towards the violet end of the spectrum. The red pigments subjected to investigation were red iodide of mercury at 25° and 122°, red lead at 25°, 145° and 495°, sulphide of mercury at 25° and 220°, and mercuric oxide at 25°, 313° and 523° C. The study of green and blue was a very cursory and incomplete one, being confined to the examination of chromic oxide and "artificial ultramarine." The series of experiments also included measurements of lamp-black and of the oxide of zinc. The latter pigment, from which very definite and well marked results might be expected, as the change of this substance from white to lemon-yellow under the blow-pipe is one of the most familiar of colour-reactions, gave at first most erratic and apparently inconsistent results, owing to other very complex phenomena of radiation being involved. The typical curves show, for the cold oxide, a spectrum weak both in red and violet, with marked absorption in the yellow, but the latter disappears at high temperatures and a maximum is gradually developed in the red. The case is of interest because it is the only one in which reflecting power at high temperatures exceeds that at lower temperatures for any considerable portion of the visible spectrum. Messrs. Nichols and Snow summarize their results as follows:—1. None of the pigments tested equals the ideal white in reflecting-power, even in that part of the spectrum for which its reflecting-power is greatest. 2. The reflexion spectrum of pigments arises from two distinct sources: (*a*) light reflected from the surface of the substance; (*b*) light reflected from the interior faces. The light reflected from the surface is nearly white. Its brightness varies from about 2 per cent. (as in HgS) to nearly 10 per cent. (as in HgO). It is to the light internally reflected that the pigment owes its colour. 3. The effect of heating the pigment is invariably to diminish its reflecting power, the diminution being as a rule more marked in regions of greatest refrangibility. 4. The changes of colour observable when a pigment is heated are due to this unequal loss of reflecting-power, and the effect which has been described as "a shifting of the colour towards the red" arises from the fact that the loss of brightness is least in the red and increases rapidly towards the violet end of the spectrum.

Pictet's Researches on Refrigeration.

It appears from an article contributed by M. du Bois Reymond to *Nature* (Nov. 12, p. 31) that M. Pictet has now had erected in Berlin a small factory, or "laboratoire à basses températures," provided with machinery "intended to withdraw heat from the objects under observation and keep them at any temperature between —20°

C. and —200° C. as long as may be required." An outline has recently been given in these columns (May 30, p. 1069) of M. Pictet's method of working, and reference has been made to results obtained in submitting various liquids and gases to intense cold, as well as the intended application of the process to the purification of chloroform and other chemicals. But there is one other subject mentioned in the paper referred to that is very interesting, though the conclusion drawn, as stated in the article, is suggestive of a *non sequitur*. M. Pictet has arrived at the opinion, on the basis of experiment, that "the slow oscillations of matter which constitute the lowest degrees of heat pass more readily through the obstruction of a so-called non-conductor than those corresponding to a higher temperature." From this he is represented as inferring that it is practically impossible by any amount of packing to prevent the access of a certain amount of caloric to the refrigerating cylinder from outside. Absolute zero is —273° C., but the utmost that M. Pictet judges to be attainable is about —255° C.

Solanaceous Alkaloids.

The surprising statement made rather more than three years since, by Messrs. Schering, that belladonna roots contain practically only hyoscyamine and that atropine obtained from them is probably a product of change occurring during the manufacture, suggested to Dr. Schütte to undertake a thorough investigation of the subject, and he has just published his results in a long and interesting paper (*Archiv*, Oct. 30, p. 492). In the first place the influence of methods of preparation upon the conversion of hyoscyamine into atropine was tested. Dr. Will had already stated that contact with an alkali is sufficient to effect this change and Dr. Schütte found that the same result is produced by repeated recrystallizations from acidulated water, as well as by long keeping of hyoscyamine in solution or in the form of a gold salt. It was further ascertained that in fractional precipitation the gold salt of atropine, if any should be present, is thrown down before that of hyoscyamine, and the inference has been drawn that if any atropine gold salt be thrown down at the commencement of the precipitation in a properly conducted experiment it represents atropine existing as such in the plant part, and that any obtained from a mother liquor after the removal of the hyoscyamine represents a product of alteration. The influence of age and period of vegetation upon the alkaloids in the roots was next investigated. It was found that young fresh roots (1 to 2 years), collected from a basaltic district, whether gathered in the spring, summer or autumn, contained only hyoscyamine, but that older roots (8 years and upwards) always contained, besides much hyoscyamine, a little already formed atropine. Similar results were obtained with roots from old cultivated plants and roots that had been kept several years. The amount of alkaloid was considerably greater in the roots collected in summer than in the spring roots, and fell off again in the autumn, but more rapidly in the old than in the young roots. The averages obtained at the three periods were for young roots 0·127, 0·452 and 0·458 per cent., and for old roots 0·174, 0·358 and 0·280 per cent. Spring and autumn leaves of the belladonna plant both contained principally hyoscyamine with small quantities of ready formed atropine. As to the fruit, the unripe berries of the wild plant contained chiefly hyoscyamine and a little atropine, but the ripe fruit contained only atropine. The ripe berries of cultivated plants, however, yielded both hyoscyamine and atropine, while the ripe berries from var. *lutea* gave atropine and a small quantity of a base probably identical with Hesse's atropamine. Turning to other Solanaceous plants, fresh and old stramonium seeds yielded chiefly hyoscyamine, together with small quantities of already formed atropine and scopolamine. The leaves of the potato plant (*Solanum tuberosum*), besides yielding betaine, gave indications of the presence of an alkaloid having a mydriatic action, which seemed also to resemble a mydriatic base present in *Solanum nigrum* and *Lycium barbarum*. The leaves of *Nicotiana Tabacum* also yielded traces of a mydriatic alkaloid, and lastly the seed, herb and root of *Anisodus luridus* all contained hyoscyamine only.

Urostigma Dolarium.

In a series of articles on the useful plants of Brazil, Dr. Peckolt mentions the milky juice of the *Urostigma Dolarium*, Miq., or "white fig," a gigantic urticaceous tree, as being used by the natives in the treatment of anchylostomosis, which frequently occurs in that country (*N. Y. Pharm. Runds.*, July, p. 166). The milk, which is secreted most abundantly in August, is said to be snow-white, of a creamy consistence, and to have a sweetish taste, resembling almond cream, with a resinous after flavour. The principal action of the milk is attributed to a substance resembling papayotin, and like it possessing the property of digesting fibrin and coagulated albumen, of which it contains about 1·6 per cent. In addition it contains about 5 per cent. of "doliarin," a substance having a weak anthelmintic action. The milky juices of other species of *Urostigma* are also used as popular remedies in Brazil; for instance, that of *U. Maximilianum* as a pigment against aphtha, and that of *U. cystopodum*, given internally as a blood purifier and in syphilis. On the other hand, the juice of *U. hirsutum*, in full doses, is poisonous, and that of *U. atrox* is said to be used in the preparation of the Urari arrow poison.

Carum Gairdneri.

Carum Gairdneri is described by Professor H. Trimble as possessing tuberous fusiform roots in clusters of two to five, having a delicate flavour between that of a nut and a parsnip. He believes that if susceptible of enlargement by cultivation it would soon become a favourite in the vegetable garden. The plant extends from the western fork of the Laramie river, Wyoming, through the Rocky Mountains to Oregon and Washington, and southwards to Utah, Nevada and South California (*Amer. Journ. Pharm.*, Nov., p. 525).

Atropine in Lead Poisoning.

Dr. F. R. Humphrey, in a note in the *Lancet* (Nov. 21, p. 1162), describes several cases of lead poisoning treated with atropine ($\frac{1}{100}$ gr.), and in some of the cases with morphine in addition to the atropine. From the results obtained he concludes that in lead poisoning atropine in full doses relieves the colic and pain in the head in the most rapid manner, keeps the bowels freely open, assists in the return of the bodily powers, and indirectly or directly in the removal of the lead by iodide of potassium.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, NOVEMBER 28, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THOMAS HYDE HILLS.

IT is so long since the subject of this notice was seen as a prominent personality in pharmaceutical affairs that it seems almost an anomaly to be only now publishing his obituary. To some of the younger members of the body Mr HILLS has been known only by name and by the record of good works. The majority of those with whom, years ago, he was actively engaged in pushing forward the improvement of pharmacy and of pharmacists that was inaugurated by his friend JACOB BELL in the formation of the Pharmaceutical Society have now vacated their places. Most of those who remain are beginning to be whitened by the lapse of years. For though the actual death of THOMAS HYDE HILLS is only now recorded, he ceased to be an active member and officer of the Society long ago, the interval between the present time and his retirement from the Council in 1881 having been a blank that could only be watched with regret by his most intimate friends.

The time when Mr. HILLS entered upon his career as a pharmacist was not fertile in opportunities for pharmaceutical education, and it was fortunate if an apprentice chanced to come under the direction of a master by whom he would be properly trained. It may be inferred from Mr. HILLS' success in life that he enjoyed that good fortune. Certainly he was fortunate afterwards, and the wisdom with which he improved his opportunities may well serve as an example.

The characteristics and the career of Mr. HILLS are fully dealt with on another page by one who was formerly a junior colleague of his in the work of the Society. Here we need only remind our readers of his constant devotion to that work in every capacity of associate, member, councillor, treasurer and president. His presence at all pharmaceutical functions was almost invariable. Though not occupying himself with original work he was ever a staunch promoter of education, and with that object made lavish use of his means whenever opportunity offered. His shrewdness and penetration as a man of business were fully equalled by his geniality as a man, while his good services and sound advice were ever rendered with characteristic liberality. These qualities secured him a wide circle of friends, which was still further added to by his admiration for art. Mr. HILLS thus came into intimate relations with members of the artistic, literary, and learned professions, which often gave him exceptional opportunities of exercising his influence for the benefit of the body of which he was a distinguished member.

THE RELATIONS OF PHARMACY WITH MEDICINE.

ALTHOUGH it cannot be questioned that the improvement which has been effected during the last fifty years in the general position of British pharmacy and of its followers is appreciated among pharmacists themselves, it is not altogether so apparent that this is the case with the public or even with the medical profession. From the intimate connection between medicine and pharmacy it is, however, obviously of especial importance that pharmacists should maintain their position as active promoters of the progress made in regard to the treatment of disease. It is equally important, also, that their participation in that work should meet with due recognition from the medical profession. Indeed, it is only in that way that the general public can be justly guided in its appreciation of the pharmacist's services, and protected from misleading influences opposed to the interests of pharmacy. Within the period above referred to, and especially during the latter portion of it, there have been numerous manifestations, both on the part of individuals and of the various bodies by which the medical profession is represented, of acknowledgment that the progress of medicine has been assisted and facilitated by the work of pharmacists. It is unnecessary now to particularize the instances here referred to as having occurred in the past. But inasmuch as any similar occurrence cannot be otherwise than useful as well as satisfactory, attention may be directed to the address recently delivered before the members of the Midland Counties Chemists' Association by Sir JAMES SAWYER. In that address the chief subject dealt with is the progress of the medical art. In depicting the vast advance that has been made in the practice of that art, as well as the subsidiary influences which have been conducive to it, the value of pharmaceutical aid is pointed out, and ample credit is given for the service rendered by the pharmaceutical chemist in making practical applications of the various additions to knowledge, which have resulted from commercial enterprise, scientific research, or manufacturing industry. Defining pharmacy as that branch of medicine which consists in the art of preparing drugs for use in the treatment of disease, he showed that there has been progress in obtaining better drugs, in ascertaining and selecting those parts of plants which more especially possess

remedial virtues, in extracting from crude drugs their active principles, and in perfecting medicinal preparations so as to be more suitable for the purposes to which they are applied. In all these particulars Sir JAMES SAWYER showed that there has been progress in pharmacy, which has not only been useful to the art of medicine, and through it, to the public, but has also raised the general character of the pharmacist's calling and has contributed to bring pharmaceutical chemists, "as brothers, into the great fellowship of medicine." It may be added that the service thus acknowledged to have been rendered by pharmaceutical chemists has likewise been a service beneficial to the entire body of which they are members. And among the circumstances to which progress in pharmacy is to be attributed, Sir JAMES gives a prominent place to the influence and guidance of the Pharmaceutical Society. He regards the progress made in elevating a trade into a profession as having been due to the efforts of the Society, because it was the first body to show that pharmacists, besides being versed in the details of their particular calling, should be men of general education, and the first to insist that their education must be tested and certified by the State. It was, to use the words of Sir JAMES SAWYER, by insisting that pharmacists should be men of education, and that the public must have some guarantee of their being so, that great progress has been accomplished.

Such an expression of opinion from an eminent member of the medical profession will be at least some encouragement to those who have laboured to give effect to one of the most important objects for which the Pharmaceutical Society was founded. As an endorsement of the efforts, as yet ineffectual, to establish a uniform system of pharmaceutical education, it may be hoped that this expression of opinion will not be without influence upon all who are concerned with the future of pharmacy, whether directly or indirectly. Pharmacists especially should be thankful for the thorough manner in which their proper position and their interests as a class have been recognized and enforced. But that does not exhaust all the reasons for referring to Sir JAMES SAWYER'S address. In considering the subject of pharmacy in connection with medicine he dealt not only with the past, but also with the future, by pointing out that it is the highest duty of the pharmacist to share in making perfect the art of medicine. The ideal aim of that art which he sets up comprises not only remedial medicine, but also the possibly still more important branch of preventive medicine, which aspires to become the means of rendering the life of each individual perfectly free from disease and suffering. In working towards the consummation of that high ideal the art of medicine is to be supported and protected by pharmacy. The field of operation is not limited to the preparation of medicine, but extends over dietetics, balneology, climatology, the application of electricity and mechanical resources, as well as various other conditions which have a physical bearing upon growth and stability. Sir JAMES asks pharmacists to accept such an extended scope of therapeutics and to recognize that it is their duty to take part in the work by which that great aim is sought to be attained. Particularizing the additions to our knowledge of the nature, cause, process and prevention of disease, and the various improvements in diagnosis as the two great lines of advance which come within the province of the physician, he pointed out that there is a third line, which it is especially the province of pharmacists to develope in the future as they have done in the past, greatly to their own credit and to the public advantage. That comprises improvements in remedies and in our knowledge of them, the discovery of new remedies and improvements in the selection or preparation and mode of application of remedial agencies. This is a line of action in which pharmacists can co-operate heartily with the medical profession to promote the progress of rational therapeutics in opposition to what Sir JAMES SAWYER describes as the "gim-crack, hanky-panky humbug" by which so large a portion of the public is deluded and misled. In the advance of this great work of promoting the alleviation and cure of disease there is, however, a part that must necessarily be performed by the public, in recognizing what is due to pharmacists for the exercise of their professional skill and the conscientious performance of their duty to supply pure drugs, a duty which trenches very directly upon the sanctity of human life. The wishes expressed by Sir JAMES SAWYER in regard to one of the practical complications of medicine and pharmacy still prevailing to some extent in this country will, we are sure, be re-echoed by every true pharmacist. But this subject is encompassed by many difficulties, as Sir JAMES admitted, and he therefore discreetly restricted himself to expressing the hope that pharmacists would prescribe less, and that medical practitioners would not so frequently dispense. This is a hope that we believe will be very generally responded to within the ranks of pharmacy, though it may well be feared there is but a remote prospect of that perfect separation of the proper functions of medicine and pharmacy which prevails in some other countries.

At the evening meeting that will be held at the Society's house on the 16th December, Professor H. E. Armstrong, Ph.D., F.R.S., will deliver the first of a course of four lectures on the Phenomena of Fermentation considered with especial reference to the Chemical Problems they raise. The succeeding lectures will be delivered on the second Wednesdays in January, February and March.

* * *

We understand that the name of Mr. Henry Gadd, chemist and druggist, of Exeter, has recently been placed on the Commission of the Peace.

Transactions of the Pharmaceutical Society.

MEETING OF THE EXECUTIVE OF THE NORTH BRITISH BRANCH.

A meeting of the Executive of the North British Branch was held in the Society's House, 36, York Place, Edinburgh, on Thursday, November 19, at 1 p.m. Mr. J. Laidlaw Ewing in the chair.

Present:—Messrs. Ewing, Gibson, and Stephenson, Edinburgh; Fisher, Dunfermline; Hardie and Kerr, Dundee; Kinninmont and McAdam, Glasgow; Maben, Hawick; Nesbit, Portobello; Paterson and Strachan, Aberdeen; and Watt, Haddington.

Apologies for absence were received from Messrs. Boa, Edinburgh; Frazer, Glasgow; Jack, Arbroath; Kermarth, St. Andrews; and Storrar, Kirkcaldy.

The minutes of last meeting were read and approved.

Report of General Purposes Committee.

The General Purposes Committee reported that the Council had given effect to the resolution of the Executive of November 12, 1890, by making Kirkwall a centre for the Preliminary examination to be held once a year in the month of July.

With regard to Evening Meetings the session had been opened on November 11 with an able and interesting address by Professor I. Bayley Balfour, on "Botanical Enterprise in Relation to Pharmacology." The Committee had applied to several of those who had contributed papers in the previous years, and some promises of help had been received. There was, however, considerable difficulty in getting a supply of suitable contributions, and the Committee earnestly invited the co-operation of all who could render assistance, either by contributing papers or sending objects of pharmaceutical interest which could be added to the Museum.

The Committee had considered the remit from last meeting of Executive as to the question of increasing the membership of the Society in Scotland. A letter had been received from Mr. Storrar, Kirkcaldy, who had been unable to attend the meeting of the Committee, suggesting (1) the issuing of a printed circular to every member of the trade in Scotland; (2) organising meetings during winter in the large towns; (3) asking local secretaries to call on every registered chemist in their districts. After full consideration, and in view of certain advantages to be secured by the new bye-laws, the Committee was of opinion that further action should be delayed till these bye-laws had received the sanction of the Privy Council. It was thought that the passing of these bye-laws would furnish a favourable opportunity for taking some active steps. The Committee was also of opinion that in the case of a large city like Glasgow it was desirable that there should be two local secretaries, one for the north side and another for the south side of the Clyde. In the meantime the Committee recommended the Executive to take the present opportunity of urging upon all registered chemists in Scotland, who had not already done so, the desirability of joining the Pharmaceutical Society and thus taking their legitimate share in the work and responsibility of securing and advancing the interests of pharmacy. They were also impressed by the importance of the services to be rendered in this respect by the local secretaries, whose interest and co-operation they felt certain would be readily given in the furtherance of the object the Executive had in view. The remainder of the report was of no public interest.

Mr. Kinninmont said with regard to the suggestion that there should be two local secretaries for Glasgow, that no doubt it was a very wide field, but as local secretary in that city, he might say they did not stand so badly as the Committee seemed to think. They had, he thought, as large a number of members in proportion as in any other town. Out of ninety shops he had on the roll some forty members.

The Chairman said he could assure Mr. Kinninmont that the Committee was in no way making any reflection on him as local secretary. What they had in view was the plan recently adopted in the case of London, which had been considerably subdivided. There the Council had appointed divisional secretaries, and in such a large city as Glasgow it was deemed by the Committee as hardly fair to ask one man to perform all the duties.

Mr. Kinninmont said it no doubt took a great deal of time to go round for the subscriptions, but still it was the duty of the local secretary to see all the members at least once a year. It might perhaps be an advantage to have two men to do the work.

Mr. Maben said he would like to ask who was responsible for the small towns and villages.

Mr. Watt said it would be the local secretary for the district.

Mr. Maben said he was local secretary for Hawick. Around him were the towns of Jedburgh, Kelso and Selkirk, which had no local secretary. There was one at Galashiels, but he thought there was none at Melrose or Coldstream. He was not sure that there was one even at Berwick.

Mr. Nesbit thought they might leave that point and take up the whole question of local secretaries in Scotland. They had hitherto been acting on the principle of having a local secretary in places which returned a member to Parliament or where there were three members of the Society. What was the connection between returning a member of Parliament and having a local secretary he failed to see. What they should have was a district suitable for one man to cover, one which would enable him not only to call upon all the members of the Society in the locality, but also upon all those chemists who were outside the Society, and try to induce them to come within it. The whole country, he thought, should be divided out into manageable districts. The case of Glasgow had been mentioned. London formerly was not divided, but this year it was placed under the superintendence of fifty-two or fifty-three divisional secretaries. That was a fair division, and besides it gave each man some interest in the Society. Moreover, any gentleman would consider it an honour to hold such an appointment. In Inverness, he was told they esteemed the position so highly that they took it in turns. He held, therefore, that the condition of the Society in country districts would be considerably improved if there were more local secretaries. Take Berwickshire, for instance; there was no local secretary in the whole county. There was one in the town of Berwick, but it was in Northumberland, and in the town of Alnwick, which was 30 miles from Berwick, and where there were several chemists, there was no local secretary. Here, in Midlothian, Mr. Hill acted as local secretary; but it was quite evident that Edinburgh, which took in Portobello, Dalkeith, Penicuick, and a lot of little towns was too big to be worked by one man. Leith had a local secretary of its own. Let them appoint local secretaries in various centres, men who would call upon the members of the trade and try to induce them to become members of the Society. Besides, these men whom they appointed might become a terror to evil doers, for it was evident to all that the Society owed some protection to those who had properly qualified themselves as pharmacists by examination. He would suggest that the Committee should take into consideration the whole matter and report to their next meeting.

Mr. MABEN said Mr. Nesbit's proposal apparently was that the country should be divided into divisional areas, for each of which a local secretary should be appointed, rather than, as at present, appointing them for certain towns. If so, he would second the motion. He did not know who was responsible for these neighbours of his; at any rate he had never felt himself responsible for them.

Mr. PATERSON said that was not scriptural.

Mr. MABEN, continuing, said he might add this further remark, that on the previous day the Town Clerk of Hawick had sent him a long letter, which he had received from Mr. G. W. Sargent, asking why he had not taken action against Mr. Maben for acting illegally as local secretary, and insisting that he should take action at once and have him punished. It was a little awkward to have such a communication sent to the Public Prosecutor, who, of course, could not know but what one had been guilty of some serious offence.

Mr. PATERSON thought the General Purposes Committee should ask local secretaries in Scotland what would be the best divisions to make, for it was impossible for the Committee to know the various circumstances of each county. If they looked at Aberdeenshire, for which his friend Mr. Strachan was Local Secretary, they would find that he had an area of about forty miles by forty to cover. That was a large area, and he would require to go on horseback to overtake it. In order to get proper data to work upon they should communicate with the present local secretaries by issuing a circular containing a series of queries. Then they would be able to judge as to the best divisions to make.

Mr. MABEN said of course it would lie with the Council of the Society to settle all that.

Mr. PATERSON said that if they were to make a recommendation to the Council it was right that the General Purposes Committee should have full information. Some parts of Kincardineshire, for instance, were more accessible to Aberdeen than the county in which they were situated, and no doubt other places were in the same position. They would get a much better view of the whole situation by some such action as he had indicated, and thus be able to give a satisfactory report. He thought Mr. Nesbit was on the right lines as to increasing the membership in Scotland, but he would ask him also to consider this suggestion.

The CHAIRMAN asked Mr. Nesbit if he was prepared to adopt Mr. Paterson's recommendation.

Mr. NESBIT said he would move:—

"That in the opinion of this Executive a considerable addition ought to be made to the number of local secretaries in Scotland, and that a Committee be appointed to consider for what districts appointments should be made, and report to the Executive in April."

He thought it also right to consult the local secretaries, and did not see why they should not ask them to meet and discuss the matter.

The CHAIRMAN asked if he would also refer to the Committee the advisability of consulting local secretaries on the subject.

Mr. MABEN said such a procedure would involve expense, and he was afraid the Council would think they were dealing with the whole question. It lay with the Council and not with the Executive in Scotland.

Mr. STEPHENSON said the difficulty in his mind was that anything done in Scotland in this direction must be done in England also. They were looking at a general principle, and why should a general principle be applied to Scotland only.

Mr. PATERSON said they were modest and were only acting for themselves, leaving it to the Council to apply the same system to England if it seemed good to them.

Mr. STEPHENSON said they could never expect them to apply any principle of that kind to Scotland unless it was also applicable to England.

Mr. NESBIT said that, as he had already said, in Alnwick, for instance, there was no local secretary. There were six or seven chemists in it and there were numerous little towns around it. Of course, he did not mean to say they should go to England; that was the duty of the Council. They were honest people in Scotland, and they might say they would not object to see a considerable increase in England by the adoption of the same principle as he suggested. They had seen that in London they had increased the number of their divisions to fifty-three at once.

The CHAIRMAN thought they were rather exceeding their bounds in going into England. They should strictly confine themselves to Scotland and thus be on sure ground.

Mr. STRACHAN said a great deal, to his mind, depended upon the chemists themselves. In Aberdeen there were three members, and therefore they were quite entitled to nominate a local secretary for themselves. In Aberdeenshire they were quite entitled to three; they had two already. In fact, they were entitled to four, as two members of parliament were returned for the city and two for the county. If they looked up the bye-laws they would find that was the state of matters.

The CHAIRMAN here read over Mr. Nesbit's motion as originally proposed.

Mr. MABEN said he had the same feeling as Mr. Stephenson in regard to confining their action to Scotland and specifically stating so. The Council, no doubt, would not take up the one without taking up the other.

Mr. STEPHENSON said the Council would never entertain the question of making special provision for Scotland. What they would do would be to consider the general principle of increasing the number of local secretaries.

Mr. PATERSON said what they (the Executive) were sent there for, was to legislate as far as they could for Scotland, and therefore they ought to confine themselves to that. If Mr. Nesbit's motion were made to read that they should make a recommendation to the Council to increase the number of local secretaries in Scotland that might meet the views of Mr. Maben and Mr. Stephenson, but he thought they ought not to travel to England.

Mr. WATT said the appointment of local secretaries was a subject of great difficulty, but he believed it was very likely the Council would entertain any recommendation they might make.

Mr. NESBIT then altered his motion to read as follows:—

"That in the opinion of this Executive a considerable addition ought to be made to the number of local secretaries in Scotland, and that the country should be divided into areas, for each of which a local secretary could be appointed."

The motion was then put to the meeting by the Chairman and unanimously agreed to, and the report of the General Purposes Committee was adopted.

NOMINATION OF EXAMINERS.

The CHAIRMAN intimated that Mr. William Gilmour, finding that the examination work made too great a call on his energy and time, and Dr. Inglis Clark, on account of pressure of business engagements, had expressed a desire to retire from the Board of Examiners. There were, therefore, two vacancies to be filled, the other members having expressed their willingness to serve again. Proceeding, Mr. Ewing said: I think, gentlemen, I will be interpreting the unanimous feeling of the Executive when I say that we have heard with much regret the intimation from these two gentlemen

that they can no longer serve as members of the examining board. It would not do for me to say anything in regard to Dr. Inglis Clark, except that we entirely agree with the resolution of the Board of Examiners which has already appeared in the Journal. But regarding Mr. Gilmour, considering that he has been a member of the Board of Examiners for twenty years, that he has been a member of Executive, and that he has also filled this chair with great efficiency, I am sure we all part with him with very deep regret indeed, knowing that the Society suffers a great loss in his retirement. I would therefore move that :—

"Dr. Inglis Clark and Mr. William Gilmour having intimated a wish that their names should be withheld from nomination this year, the Executive desire to put on record an expression of thanks to them and high appreciation of the valuable services rendered by them as Examiners and also as members of this Executive."

Mr. STEPHENSON, in seconding the motion, which was unanimously adopted, said Mr. Ewing had well expressed what he was sure was in the minds and hearts of every one present.

The Executive then went into committee, and on resuming the Chairman intimated that the following resolution had been unanimously agreed to :—

"That Messrs. Peter Boa, Edinburgh; David Brown Dott, Edinburgh; Adam Gibson, Edinburgh; James Jack, Arbroath; Alexander Kinninmont, Glasgow; Thomas Maben, Hawick; John Nesbit, Portobello; and John Bertram Stephenson, Edinburgh, be nominated for election by the Council as members of the Board of Examiners for Scotland for the year 1892."

NEW EXAMINATION ARRANGEMENTS.

A resolution of the Council authorizing the Executive to take the necessary steps for carrying out the alterations suggested by the Board of Examiners in Scotland was read.

Mr. STEPHENSON, Chairman of the Board, having explained generally the nature of the proposed alterations, it was remitted to the General Purposes Committee to carry them out in consultation with the Board of Examiners.

The meeting then closed.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of this Association, held on Thursday, November 12, Mr. W. Lloyd Williams, President, in the chair, the following paper was read—

THE IMPORTATION OF FOREIGN CHEMICALS, ETC.

BY JOHN C. UMNEY.

I do not purpose to limit the remarks I have been asked to make in opening this discussion to the cause and effect of the importation of chemicals only, but to extend them to include pharmaceutical products as well as drugs and herbs, whose indigenous character does not render their import into this country a necessity.

As the latter is the smallest class we will make it our first consideration. The principal supply of most of the solanaceous drugs used in medicine is drawn from Germany, notwithstanding the fact that they can be grown in this country most successfully and of undoubtedly superior alkaloidal value to those with which the continent supplies us. In addition to the plants of this natural order there naturally occurs to one's mind aconite root, the imported varieties of which are very often of inferior quality and of a hybrid botanical character, comparing very unfavourably with the *Aconitum Napellus* cultivated in parts of England, especially Huntingdonshire.

Besides these more important drugs, many of less frequent use find their way to this country from the continent, a few examples of which may be cited in black hellebore, valerian, male-fern, chamomiles, etc., etc., all of which may be readily cultivated in this country. It appears strange then that in the depressed state of agriculture in this country, more attention has not been paid to the cultivation of medicinal drugs, the demand for which is necessarily to a certain extent limited, but of a constant character. One is bound to admit that so long as the galenical preparations of these potent remedies remain unstandardized, the demand for the imported drugs will continue, but as soon as a moderately high alkaloidal standard is adopted, a considerable quantity of them will have to be rejected.

Having alluded briefly to crude drugs, we come to the larger portion of our subject, viz., "chemical and allied products," which we may conveniently subdivide into two headings.

First, those which, owing to particular conditions either of favourable production or less restricted legislation, can be more economically produced in other countries.

Secondly, those for the importation of which there appears to exist no other reasons than the sluggishness of the importers and the facilities in the command of cheap labour possessed by the producers.

Under our first subdivision we will consider a few of the American products that reach this country. The enormous herds of swine maintained on the exhausted grain of the American distilleries are an economic source of much of the lard of commerce, but unfortunately its quality is very varying, being frequently sophisticated with cotton seed oil in place of the natural oil, which has been removed. The advantageous preparation of pepsin, from the same source, of the very highest quality, renders it compulsory to include that substance in the first of our categories, and at the present time, the home-produced pepsin, having hardly what can be described in the words of the Pharmacopœia as "a faint, but not disagreeable odour," is being rapidly replaced by a more active and almost inodorous American product. One is almost compelled, too, to classify here the "mint" oils with which America provides us, for the demand for peppermint oil especially is far greater than the crops of this almost sunless country can produce, and the consequent prices of English oil prohibit its use, except in well favoured seasons, for other than strictly pharmaceutical purposes.

France exports to this country enormous and increasing quantities of essential oils and compounded perfumes, in the production of which the exceptional climate of its southern districts places it out of the reach of competition with any other country in the European continent. The petroleum export from the southern ports of Russia shows a marked increase, whilst the chief hitherto necessary import from Italy, sulphur, shows a decided decrease, a change which has not been uninfluenced by the economizing of alkali waste in this country.

I have not referred under either France or Italy to articles economically produced through the great facilities of working with alcohol in bond, as the actual imported value of such is very small compared with the most important exporting country we have left until last to consider, viz., Germany, the manufactured chemical products of which equal those of all other European countries combined. A fair proportion of these are produced more economically in that country, the most important being alkaloids, in the preparation of which either free alcohol or used under excise surveillance places them beyond com-

petition with British manufacturers. It is to be hoped, however, that before many years the drawback recently granted on medicinal spirits for export, an extension of which to perfumed spirits is now being sought, may be made to include all alcohol actually employed in manufacture. The difficulties that seem at first to arise in this direction are surmountable, and the removal of hampering restrictions would greatly benefit British industries. Notwithstanding England boasts her free trade policy, still she has something to learn from Germany, recognizing as she does protective duties. A case in point. There are considerable duties on spices in Germany, cloves among the number, but in spite of this, facility is offered for the distillation of clove oil under the full drawback of the original duty imposed on the crude material, so as to give the manufacturer every opportunity to compete in the world's market. We appreciate one corresponding privilege of the customs authorities in permitting "denaturized" tea to be used without any subsequent restriction for the production of "caffeine" in this country, the effect of which has been to completely dislodge German caffeine from British pharmacy. Should we, therefore, be egotistical in saying that if we had facilities and opportunities afforded as in other cases they would be similarly taken advantage of. By the statistics I have tabulated you will notice that the import of chloral hydrate, acetic and butyric ethers are on the increase, whilst chloroform, possibly from its economic production latterly from acetone and raised protective duty, shows a marked decrease.

Imports from foreign countries, not including British possessions.

Free from duty.

	1889.	1890.
Alkali	£ 20,119	£ 18,923
Brimstone	172,787	129,498
Chemical manufactures and products	1,407,203	1,433,694
Germany	640,000	665,000
Aniline dyes	272,226	264,523
Germany	265,000	246,000
Essential oils	163,843	190,835
Germany	14,268	23,430
Honey	29,713	39,073
Chili	6,863	22,330

Subject to duty (declared value).

1*s.* 3*d.* lb. chloral hydrate.		£ 3,920	£ 4,185
3*s.* 1*d.* lb. chloroform		309	243
£1 5*s.* gall. collodion		413	408
1*s.* 10*d.* lb. ether acetic		41	152
15*s.* 8*d.* gall. ,, butyric		35	119
£1 6*s.* 2*d.* gall. ,, sulphuric		873	750
10*s.* 10*d.* proof gall. spirit (April 18, 1890) (previously 10*s.* 4*d.*)	Germany	113,691	67,781
		142,854	122,433
	Russia	12,181	38,857

The above are not necessarily for home consumption.

In placing a duty of 10*s.* 10*d.* per proof gallon on imported spirit, against 10*s.* 6*d.* per proof gallon on English produced spirit, the government of this country undoubtedly recognizes its inability to compete on equal terms with foreign producers. The reason of this inequality is not difficult to perceive when one considers that whilst in Germany spirit can be produced in almost any quantity from potatoes and in Russia from grain (home-grown products), the English spirit is almost entirely prepared from imported maize and occasionally rice. It will be seen from the figures given that the export of spirit from Russia under a bounty has been considerable, but it is probable that the figures for 1891 will show a great falling off, owing to the recent discontinuance of this bounty, in view of the scarcity of grain this year and the danger of the production of the spirit being at the expense of the food supply. Having touched briefly on a few of the substances for the importation of which valid reason exists, we come to "the thorn in our flesh," viz., products for the importation of which there exists no adequate reason other than possibly greater enterprise of the producers, combined with to a certain extent cheaper labour. The champion and sole formidable opponent to British manufacture in this respect is Germany, although recently France has greatly disturbed both the phosphorus and mercurial home-markets, the competition in the first named branch being excessively keen.

The lead in organic chemistry which Germany possesses over other countries possibly accounts for the fact that almost all the recently introduced synthetic remedies have been the result of the work of the chemists and physiologists of that country; but it cannot account in any way for the marked increase in chemicals, etc., produced in quantity for use in the arts and the encroachments on industries which were originally our freehold.

Acetic, gallic, and tannic acids are imported in enormous quantities from German manufactories, whilst the production of pyrogallic acid in this country is infinitesimal, possibly nil. Although some time has elapsed since the expiration of Kolbe's patent for the preparation of artificial salicylic acid and salicylates, I am not aware that any quantities have been produced in this country, although several German manufacturers have not been slow to take advantage of the opportunity of making chemicals of such very general consumption. The importation of glycerine of excellent quality in enormous quantities is very much to be regretted, for whilst pharmacy uses one part the producers of dynamite and explosives absorb fully one hundred parts, and thus a valuable field for the employment of both capital and labour is here lost altogether to Great Britain. The supplies of reduced iron, amyl nitrite, butyl and chloral hydrates, etc., though chemicals of limited consumption, are very largely German, and commercial hydroquinone, the demand for which, for photographic purposes, is greatly on the increase, appears to be almost entirely the produce of that country. The production of essential oils appears to be becoming quite localized, and English distillers must be appalled at the enormous increase in the importation of these bodies from Germany, the figures for which show an increase of about 30 per cent. in 1890 as compared with 1889. Although of necessity vast quantities of these products must be imported from countries whose climates are different from our own, one cannot easily understand any reason for this vast increase, or even for the actual importation to any great extent of these products from Germany, other than the enterprise and scientific knowledge of foreign and comparative apathy and less perfect acquaintance of British manufacturers; although it may be said to the credit of those of repute of the former, that their products are usually of standard excellence. Permanganate of potash, chloride of ammonium and gas-works bye-products are very largely imported (though the latter at the present time are receiving much more attention in this country), together with a legion of other chemicals, etc., with an influence that can only be harmful on British chemical manufacture and pharmacy generally.

Defeat is an unaccustomed experience for English-

men, and a confession of it can only be wrung from him; but unless effort be made, and at once, to check the growing tendency to allow their products to be supplanted by those of foreign manufacture, that confession will become a necessity. Many of the substances that I have classified as unnecessary importations can undoubtedly be produced in this country, and remuneratively, provided the venture is aided by sufficient enterprise and has the united support and co-operation of British purchasers. And although at the present time we are hampered by a legislation that must sooner or later be modified, at any rate, when these changes lessen our difficulties, let us be ready at once to grasp the opportunities that may be given us, and rely, as Englishmen should, on our own resources.

The President said it might seem pretentious on their part to inaugurate the discussion of this special section of commerce, but he contended their interest ramified throughout all its branches, and consequently they might fairly claim the right to speak. He thought the best mode of bringing the question to the notice of the authorities was in the form of a resolution, to be forwarded to the Chamber of Commerce, and proposed that it should be thus worded:—

"That it is desirable to call attention to the importation of chemicals and allied products, and to consider their influence on British manufacture."

This was all they could do; further steps in that direction were beyond their province. The British manufacturer was too utilitarian in his ideas, as contrasted with the German or Frenchman, who recognized the vital importance of engaging good chemists to conduct investigations. The initial expense was necessarily large, but it brought ample remuneration, and if we did not adopt the same mode of procedure we could not hope to cope with our rivals. Again, the duty on spirit placed us at a disadvantage, and it was necessary that this duty be removed for manufacturers. He thought the British agriculturists might turn their attention to the cultivation of indigenous drugs with some advantage. If they did so we too should reap some considerable benefit, as on the Continent most of the herbs were gathered by rough peasant-folk, and consequently it was small wonder that these supplies were of indifferent quality. With reference to caffeine, Mr. Williams said this alkaloid was formerly chiefly supplied to us by the Germans. Now since the Excise authorities had discontinued destroying or sending inferior tea out of the country, and instead, after it had been denaturalised, or rendered unfit for dietetic purposes, sold it duty free to the British manufacturer, we were able not only to compete with but to oust the German product. He thought this was a fair indication of what could be done if the same facilities were offered in other directions. Of course, no one would think of prohibiting the importation of pepsine from America. The American article was the result of the great natural advantages there were for its production. In conclusion, the speaker said State-aided chemical research was essential, and he thought if the matter were properly placed before the authorities they would be willing to place pecuniary aid at the disposal of the Pharmaceutical Society for this purpose.

Mr. Stark had great pleasure in seconding the President's proposition. He remarked that there were two factors to be considered, viz., cost of material and legislation. With regard to the first, the cultivation of solanaceous plants in England had been mentioned. They had here a product of better alkaloidal value, but dearer than in Germany. Again, aconite was dearer here than in Germany. With reference to legislation, Mr. Stark said that viewed from the manufacturer's standpoint it might seem advisable to remove the duty on spirit and make up the deficit so caused by taxing something else; but he thought this was not practical, drugs were not considered a necessity, and whatever party ventured to introduce such a measure the opposition would strongly oppose it. He thought that there were not more than four firms in the kingdom who employed a chemist of repute, and he contrasted this state of affairs with that in Germany, where a good chemist was considered essential. He considered Mr. Umney took a somewhat gloomy view of the situation; for example, he (the speaker) said in the manufacture of alkali we were the foremost.

Mr. Meyjes thought the resolution just proposed and seconded could produce no satisfactory result; a more definite statement would stand a better chance. Nothing but prohibitive duties would prevent the importation of foreign alkaloids, and no responsible party would be prepared to take up such a measure. The Americans with their new tariff could not keep them out, and if they were unsuccessful England might be expected to be more so. The industries of the importing countries were due to natural causes. If English manufacturers invested more in skilled labour, in course of years they might reduce the import. He did not, however, see any reason why they should. The mass of foreign chemicals was quite satisfactory, and so long as this was so no interference was called for. In the alkali manufacture England was at the top, and exported considerable quantities to Germany, Russia, the United States and elsewhere. There was an interchange of products, and they could not hope but to buy in the cheapest and sell in the dearest market. It had been mentioned that the importation of sulphur had decreased, and this had been partially attributed to the new process in recovering the sulphur at alkali works. It was also true that Italy could produce sulphur still cheaper, and if the cost were reduced to half the present figure the Italians would probably still make a profit. To him it seemed hopeless to compete against a country so favoured by nature. Again, a large quantity of aconite root came from Japan; they had such natural resources that for us to compete with them in that direction was impossible. The drawback on spirit for medicinal tinctures had been in force a few years in this country. In Germany they had had it for some considerably longer time. Had the change in England affected the German manufacturer? He had been assured that it had not. He did not know if the English manufacturer had benefited much by it. It appeared to him to be impossible to adopt an artificial check to the importation of foreign drugs.

Mr. Carteighe (after the hearty applause which greeted him had subsided) said he came to listen, and knowing Mr. Umney would commence the proceedings, had hoped in so doing he would have incited those present to a good discussion. Mr. Umney, however, had spoken as an experienced man and, not wishing to monopolize the whole evening, had not gone into details which would have enlightened those who were not familiar with the subject. He (the speaker) agreed with the observations of the last speaker, and thought Mr. Umney did in part, as in those remarks where he was most emphatic he did not seem so much to lament that a German as a German or a foreigner as a foreigner had the best of it, but that the German or foreigner was not only a cheaper producer but a better animal all round. With fifty research laboratories for about fifty years there might be some chance of our being able to compete with our neighbours. The drawback on spirit would not help us materially; we were half a century at least behind Germany in education. Free trade no doubt was a great blessing. He must confess he was not in a position, not being old enough, to personally compare our condition before and after its

introduction. However, it was a fact that everywhere where more complete education existed they went in for protective duties. He would be a rash man who asserted that free trade was the best thing in all circumstances, for if it were so a large number of intelligent people must be wanting in judgment. A large number of alkaloids could be produced in this country, but were not, because the average Englishman in those particular lines was a slow moving animal. He agreed that the alkali manufacture was due to the natural advantages of the country. The advantage of Germany was due to the high education she gave her children, and her willingness and ability to live under conditions that would not be accepted here. There was still a suspicion in this country that technical education tended to make a man a pure gentleman, whereas with the German it meant making him a better worker. Free education in Germany, to which English free education was a mere bagatelle, was the secret of their success. England held her ground in the alkali trade, but it was regrettable that we could not utilize our coal tar, but had, instead, to send it to Germany for the elaboration of its various constituents.

Mr. Daniels thought they were discussing a most important subject. He remarked with reference to pepsin that he had had considerable experience in the examination of the various makes on the market and had found the German product much inferior to the American. The American pepsin was very good indeed, as might be expected from the facilities they had for its manufacture. He could, however, mention that a London firm produced an article equal to any he had tested. He thought the average Englishman would rather be the middleman than the manufacturer.

Mr. Helbing said he believed Mr. Umney was correct in the statement that very large quantities of German chemicals were imported. The first impulse to the introduction of chemicals into this country was given by the Exhibition of 1852, at which the chemical products, and especially alkaloids, of German firms, attracted much attention. He had also understood that in the first instance these foreign chemicals were only bought by large manufacturers; it was not until some time later that English wholesale houses took them up. The idea largely held in England that the production of the synthetical compounds was necessarily confined to Germany was, in his opinion, entirely unfounded. Salicylic acid, for instance, could be manufactured by anyone, and yet no English firm had taken up its preparation. The case was very much the same with other synthetical compounds. Again, the patent rights in such products were often being sold in Germany, and there was no reason why English firms should not purchase them. It was true, of course, that such work required special skill. German manufacturers employed a large body of chemists who had nothing whatever to do with the manufacturing. One would find at the large colour or dye works in Germany as many as a dozen chemists, some of them men of repute, who were well paid to work from year to year on pure research. If it came to some practical conclusion well and good; if not, they continued their investigations just the same. One reason why chemical manufacturers hesitated in taking up the production of such compounds was the heavy outlay in plant, etc., required initially. Of course they could be bought in this country from Germany with less risk and at a lower price than they could be manufactured. With regard to narcotic herbs it was indubitable that while most excellent qualities would be found and could be bought in Germany, what was imported into this country was rubbish. German pharmacists were required by law to get in fresh stocks of narcotic herbs, and even of such drugs as chamomile and peppermint. Every year this regulation was, of course, most desirable, especially in the case of narcotic herbs, which (*e.g.*, digitalis) rapidly deteriorated with age.

Mr. Morgan thought they had overlooked what Mr. Umney had to say. What he complained of was that they did not take up certain lines which could be profitably worked; that there was a great want of go. Large manufacturers did not think it worth their while to trouble about new preparations, which were somewhat outside their general work. He mentioned with reference to aconite that on the Continent this herb was gathered by very rough and ignorant people, and as a matter of fact they collected aconite when in flower, as then it is more easily distinguished. This, of course, made it very easy for them, but during the flowering the root was comparatively weak in alklaoid and not of much use.

Mr. McEwan thought the views which had been expressed were too pessimistic; that we were not so far behind with chemicals. We manufactured morphine, for instance, and a large amount of this alkaloid goes to Germany and other parts of the Continent. In Edinburgh this manufacture was thoroughly studied and understood forty years ago, and the men now employed were quite *au fait* with the work in every respect. Again, when salicin was introduced, about twelve years ago, Edinburgh manufacturers took it up and now make the major part of the salicin on the market. In Scotland there was a large quantity of yeast produced which is placed on the market as German yeast, which it resembles. With reference to this yeast, he believed its production was the result of work done by Dr. Squire, who had made it a special study. He (the speaker) thought they ought to feel thankful that their neighbours had been at the expense of acquiring the education, and that they reaped the advantage. For instance, in the alkali processes they owed much to Mond. They were essentially cosmopolitan, and if their resident foreigners were not yet English, the next generation or two would see their descendants merged into the nation. He said this question of the importation of chemicals was one of give-and-take. They might engage in making those which were likely to pay, but those which did not pay it would be better to buy. Referring to henbane, he thought it probable, when buying the English product in preference to the German, they sometimes paid for appearance more than anything else.

Mr. Call said the case they were discussing seemed somewhat similar to that of the various playwrights. How frequently they saw German and French plays reproduced, with some modifications, at English theatres. He expressed a hope that the latest development of medical treatment by music would not necessitate the use of German bands. Mr. Carteighe had reasoned that they were not able to compete with the Germans, not being so well educated or intelligent. He was not prepared to admit the last. As an example, English engineers were admitted to be the best in the world, and their work required a marked amount of brain power. From this, he argued, he saw no reason why they should not excel in chemistry. Perhaps the most probable explanation was that the German was more frugal and persevering than his English *confrère*. Of course, the country which had the skilled labour had the pull over the country that supplied the raw material.

Mr. W. R. Griffiths remarked how far behind the times we were in the making of synthetical preparations. He thought it was the best policy to get the best things from the best sources. He did not like the introduction of the foreign chemist into England. He considered English education inadequate, and the mere smudge of everything required for the examinations were not enough. He was at present going in for his last examination, and he felt that what was demanded was not sufficient to make the candidate a competent

chemist. He would like to see the standard raised so that English and German could go hand in hand with brotherly feeling.

Mr. Neville remarked upon the superiority of German chemicals, notably quinine sulphate and potassium iodide.

Messrs. Stark and McEwan protested that his views were hardly correct.

Mr. Umney said with reference to belladonna and aconite he had had some considerable experience, and found that the English-grown herbs were vastly superior to those imported from the Continent. He believed our climate particularly suitable for the cultivation of narcotic herbs. He was of opinion that some samples of German quinine were remarkably pure, but thought English potassium iodide was undoubtedly the best.

Mr. Stead remarked that he had examined numerous samples of iodide of potassium, and had found no English product equal to that produced by certain German firms.

Mr. McEwan proposed that the motion which had been submitted by the President should be brought before the next meeting of the Council of the Association, and then, if the Council approved, forwarded to the Chamber of Commerce.

The President then put the resolution to the meeting, coupled with Mr. McEwan's suggestion.

It was agreed to, only two dissenting.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The third general meeting of the forty-second session was held at the Royal Institution on Thursday evening, November 12, 1891, the President, Mr. C. Symes, Ph.D., in the chair.

The minutes of the previous meeting were read and confirmed and the donations announced.

Messrs. J. T. Hornblower and H. C. Thompson were elected members of the Association.

The President showed a piece of guarana moulded in the form of a bird, and there being no other miscellaneous communications, he called upon Mr. T. Wardleworth to read his paper on:—

Spurious Drugs recently Met with.

BY T. H. WARDLEWORTH.

In submitting the following remarks upon samples of spurious drugs which have come under the notice of the writer during the past few months there is no intention of conveying the idea that they are all new adulterations of well-known and accepted drugs. Some of the samples shown will be recognized by many as old friends, which have appeared on the drug market from time to time, while others will be noticed as new and distinct substitutes for genuine drugs.

In collecting the facts now laid before you it has been necessary to exercise the utmost care and vigilance in order that justice may be given to all, and that injustice may be done to none. In some instances the spurious character of an article is so palpable that no hesitation is experienced in coming to a definite conclusion on the point. In others the resemblance to the true article is so close that it is only by the most exact examination that the fraud can be detected. Again, it sometimes happens that a parcel of produce is by some means prejudiced in its early history, and it is exceedingly difficult in some instances to overcome it.

In proof of this your attention is drawn to a sample of Pareira brava root which has been offered in different centres as the true root, without finding a purchaser. It was supposed by some to be a spurious description, but on careful investigation it proves itself to be the genuine *Chondodendron tomentosum*, although not a very brilliant sample. Of course, when the history of this particular drug is considered, there is some excuse for a difference of opinion as to the genuineness of any particular sample, but at the same time it is rather hard upon the merchant who has brought his produce forward in all good faith.

Notwithstanding the numerous attempts to foist spurious or sophisticated drugs upon consumers it is gratifying to know that in nearly every instance such efforts are unsuccessful, the imposition being generally detected before it has passed the hands of the wholesale dealers. It would be uncharitable, however, to assume that every case of substitution is consciously and willingly performed. There is no doubt that in many instances they are the result of ignorance rather than a desire to deceive.

The specimens exhibited are representatives of parcels of drugs which have been offered on the Liverpool drug market, and the observations concerning them are made in the hope that they may be of service to those who so far have had no opportunity of coming personally into contact with the drugs mentioned.

Jalap.—The first to be noticed is jalap. The sample shown represents a parcel recently brought on this market. Its original source is not known, as it was forwarded by a firm of New York druggists. Upon being brought here it was at once seen that it differed from the true jalap (*Ipomœa purga*). Although somewhat similar in appearance, it is lighter in weight, and the fissures were more strongly marked than in the true drug. It will be observed that in the sample shown one of the tubers has been cut so as to show the structure; and it will be seen that there is an entire absence of the horny and resinous characteristics which mark the *Ipomœa purga*. The interior is distinctly fibrous and starchy, and is lacking the necessary faint, rather coffee-like odour. It is said, however, to possess in a slight degree the properties of the true drug. As no buyer could be found for it, it was shipped back to the United States.

Bearing in mind that such frequent reference is made to the system of inspection which exists in New York and other American ports with the view of detecting and rejecting spurious drugs, it is somewhat interesting to note that this parcel must have passed into America in the first instance without being detected, was exported, and again re-imported without any apparent trouble. This and similar instances where spurious drugs have passed the New York customs has the tendency to shake one's faith in the efficacy of such a system, at least, so far as America is concerned.

Sarsaparilla.—This drug is represented upon the table by a small sample which came from Brazil. It was forwarded as "Brazilian sarsaparilla," but as it lacks almost every qualifying characteristic, it is hardly necessary to deal with it at further length. It is needless to say that this sample was not followed by consignments of the article, and nothing further has, so far, been heard of this Brazilian sarsaparilla.

Calumba Root.—This drug has been represented during the past year by a sample shown upon the table. It was placed upon the market by one of the new African companies, and comes from one of the tributaries of the Niger. At first sight it appears to resemble the true calumba root, but a very brief examination shows that it is not the true drug. It is evidently the stem of a species of *Tinospora*, perhaps *Tinospora Bakis*. Unfortunately, the importers of the drug were unable to give any information as to its source or say whether it possessed any medicinal properties. It is a matter for regret that these new African companies do not devote more care to the

transmission of their samples when they want to introduce some new article. Frequently barks, roots, leaves, fibres, and other botanical products are sent forward, without the slightest intimation as to their origin, properties, or any information as to the purposes to which they may be applied. As many of these articles possess economic and medicinal value it would no doubt be of great service to the commercial world if our Chambers of Commerce would lay some recommendations before the importers of new produce, asking them to state the source, purposes for which it is used by the natives, quantity available, and the properties it is said to contain. Such recommendations as those indicated, if accepted, would no doubt save a great deal of unnecessary trouble to the importers of new produce, and also the disappointment of the producer, who frequently sends his samples forward with brilliant hopes of successful business.

Calabar Beans.—The sample exhibited represents a large parcel, which has been lying here for some years. It was imported at the time when the genuine calabar was fetching from 4*s.* to 5*s.* per pound. When the parcel first arrived, the merchant was under the impression that his goods were of considerable commercial value. He had samples carefully drawn from the bulk and placed in stoppered glass bottles, which were carefully deposited in his own private office. This done, a buying broker was invited to inspect his treasure, and the merchant's feelings may be better imagined than described, when he was told that his so-called calabar beans were not calabar beans at all, and possessed no commercial value. As will be seen, they differ in shape from the *Physostigma Venenosum*, but resemble it somewhat in colour and structure, and are no doubt the beans of a species of *Mucuna*, probably *Mucuna urens*. They are known on the market now as "Sea beans" or "Horse-eye beans," the latter being a good case of analogous naming.

The parcel failed to find a buyer in the Liverpool market, and its ultimate destination it is impossible to predict.

Croton Seeds.—These are old friends. They seem to re-appear with great regularity, in small lots of two or three bags at a time. They have played a more important part in the history of the commerce of Liverpool in the past than they do now. When first introduced under the name of "Croton nuts," much mischief was caused. The men employed in unlading the ship, misled by the term "nut," and finding them sweet to the taste, ate them with distressing results, many having to be taken to the hospitals. The oil used to be expressed in years past for lighting and cloth-dressing purposes, but its highly drastic properties rendered it very unsuitable for the latter purpose, as it is apt to cause trouble among workpeople who are not careful in its use. The seeds shown are those of the *Jatropha Curcas* (nat. ord. Euphorbiaceæ), and are always imported under the name of "croton seeds" now, being intended to represent the true *Croton Tiglium*.

Bals. Copaibæ.—The sample shown represents a variety which has appeared from time to time during the past twelve months as "African Balsam Copaib." In consequence of the paucity of the information as to its origin it is probably rather unwise to say at once that it is spurious. At the same time, although some specimens possess the distinguishing odour of copaiba, upon close examination they do not seem to have any other mark which would indicate they belong to the family *Copaifera*. Mr. Conroy has tested many samples and failed to detect any of the distinguishing features of the genuine bals. capen. copaib. The specimens exhibited give some idea of the wide range of quality, going from thin, pale yellow to a thick dark molasses-like and dirty fluid. Several parcels have been offered on this and the London markets, and sales have been made at about 1*s.* per lb. Judging from all the details we can gather together we may safely conclude that the so-called African balsam copaib. does not belong to the copaifera family, and we must await further particulars before we can assign to it a therapeutic or commercial position.*

Kola Nuts.—While it is necessary to be constantly on the watch for spurious or sophisticated drugs, it is quite possible, as already indicated, to go to the other extreme, and it is very necessary to guard against this, or injustice may be done to genuine articles. This has been clearly demonstrated by the history of the kola nut during the past two or three years. The samples shown represent a parcel of kola nuts imported into this market some time ago. It was accepted by the brokers, by the wholesale dealers, and by the trade generally. One buyer, however, objected to them, saying that they were not the seeds of the *Cola acuminata*, and declined to receive them. On being pressed for his reasons for rejecting the drug he forwarded a sample of the so-called true cola nut, which had been pronounced genuine by a leading London authority. The specimens he forwarded were evidently cotyledons of a nut which had been composed of two cotyledons, whereas the parcel he had rejected was composed of nuts containing three or more cotyledons. A sample of the rejected parcel was forwarded to Kew, and was pronounced to be seeds of the *Cola acuminata*. Meanwhile both samples had been submitted to microscopic examination, and revealed an identity of structure which placed their relationship beyond doubt. Still there was the fact that one sample was a true dicotyledon, while the other was composed of more than two cotyledons. To clear this point up the matter was again referred to Kew, and attention drawn to the correspondence in structural characteristics, and the difference in the number of cotyledons in the two specimens. This elicited the fact, which appears to be overlooked by the compilers of our books on materia medica, that the seeds of *Cola acuminata* divide into from two to five or more cotyledons (*Kew Bulletin*, Nov., 1890, p. 253). This established the genuineness of the discredited kola nut, much to the satisfaction of all concerned. The buyer kept and used the disputed parcel, and nothing further has been heard on the point. This case clearly indicates the necessity for looking most carefully into the doubts which may be cast upon the genuineness of any drug, and should a drug inspector be appointed for the Port of London, as recently suggested, it would be well that his attention should be called to this fact before he reports upon so-called spurious cola nuts.

The President, in opening the discussion, said the paper was one of general interest—one which should elicit a good discussion, as the first step towards putting down sophistication was to know all about its origin, and to accumulate facts and data concerning it. He could support Mr. Wardleworth's statement that when a fresh drug came to this country somewhat like another one in general use it was not always intended to be fraudulently used as an adulterant or even as a substitute. As drugs could be sent to England free of duty there was a great inducement to foreigners to send anything that had a reputation in their own country with a view to finding a market here. He remembered a quantity of Pao-Pareiro being sent over as "quinine bark," being so-called simply because it was bitter, the Brazilian consignor no doubt thinking that the English would be able to get quinine out of it.

* We take the opportunity to mention that we have received a communication upon this product from Mr. J. C. Umney, which we have not yet been able to publish.—Ed. *P. J.*

The drugs dealt with in the paper were handed round, and a somewhat lengthy discussion followed.

A vote of thanks, proposed by Mr. A. C. Abraham, seconded by Mr. Conroy, and supported by Mr. J. S. Ward, was heartily accorded to Mr. Wardleworth for his paper, and the meeting terminated.

NEWCASTLE-ON-TYNE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The third meeting of the session was held in St. Nicholas Café on the evening of Thursday, November 12, at a quarter past eight o'clock. Mr. G. F. Merson occupied the chair.

The minutes of the former meeting having been read and confirmed, the President called upon Mr. A. Russell Bennet to read a paper on "Water Analysis."

After a few introductory remarks, Mr. Bennet entered fully into the chemical composition of water, and illustrated on the blackboard how it was that chemists assigned to that compound the formula H_2O. He then mentioned the best methods of collecting samples of impure water intended for analytical purposes, and attached very special importance to the fact that the apparatus employed must be scrupulously clean, and that vessels containing the smallest quantity of dirt always gave false results. The temporary and permanent hardness of different waters was fully gone into, and it was demonstrated by the soap process how the different degrees of hardness were estimated. Then followed an interesting sketch of how lime was employed for softening water on the large scale, before it reached large towns. Various impurities were described, and the best methods of detecting them were shown experimentally, viz., chlorides, sulphates, ammonia (by Nessler's reagent), nitrates, nitrites, organic matter in peaty water, lead, etc., etc.

Owing to the lateness of the hour the remainder of the paper, dealing with the various methods used for filtering water, and how to detect certain impurities by aid of the microscope, etc., etc., was held over till a future meeting.

On the motion of the Chairman, seconded by Mr. Weddell, a hearty vote of thanks was accorded to Mr. Bennet for his interesting and valuable paper.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

The general monthly meeting of this Society was held on Wednesday, November 18, the President, Mr. C. O. Morrison, in the chair. The minutes of the last meeting having been read and adopted, seven new members and fourteen associates were enrolled.

The President then called upon Mr. G. Ellinor to give his paper on "Synonyms."

Synonyms Proposed to be Inserted in the B.P. and Short Notes on some Contained in Professor Attfield's Report to the Pharmacopœia Committee.

Syn'onym, Synon'yma, Synonyms.

"Synonym" is defined as a compound of two Greek words "same," "name"—a name, noun, or word having the same signification as another is its synonym.

"Synonyma" is its plural—"synonyms" appears to be essentially English.

It is the bearing and application of the word synonyms as applied to the preparations named in Professor Attfield's report to the Pharmacopœia Committee for 1890 on the B.P. 1885, and which occupies the chief portion of that report, I wish to introduce to you this evening.

In order to understand this matter I will read that portion of Professor Attfield's address or letter to the Committee, which immediately sets forth this subject.

We must note carefully these points in that address. Synonyms now found, and which may be found in a future B.P., cannot be sharply defined. Some are useful for professional others for popular purposes. And the keynote for pharmacists, "It is the pharmacist, who has to interpret all pharmaceutical names, official or otherwise, used by medical practitioners, and it is the pharmacist who has to interpret the pharmaceutical or quasi-pharmaceutical names used by the public." It is to the pharmacist the Committee should chiefly look to state in the first instance what synonyms would be useful in the next or any future Pharmacopœia. It is upon you, Mr. President and gentlemen, in common with kindred associations to suggest what synonyms are to be included, what excluded, and to give satisfactory reasons for your suggestions. How shall we proceed? As conscientious men, having a desire to do that which is right to ourselves and the public, and so establish confidence in the Pharmacopœia Committee and the general public, uniformity should be to the front; universal conformity to the definitions set forth officially or by authority, not a hair's breadth behind; greed of gain by wilful contamination, either by reduction or admixture, consigned to oblivion; at the same time avoiding oppression or uncalled for interference; and where confusion may exist, set it at rest by the best definition we can introduce. Can we adopt the whole or part only of the synonyms in this report? The question now arises what is the number and what the names suggested? I have used numbers and names in order to prevent confusion and aid discussion.

	Name.	Suggested Synonyms.
1.	Ac. sulph. arom.	Elixir of vitriol.
2.	Empl. cantharidis	Fly blister.
3.	Empl. plumbi	Diachylon plaster.
4.	Hydr. c cretâ	Grey powder.
5.	Lin. opii	Anodyne liniment.
6.	Lin. saponis	Lin. saponis co.; opodeldoc.
7.	Liq. am. acet.	Mindererus's spirit.
8.	Liq. bismuthi	Solution of bismuth.
9.	Liq. plumbi subacet	Goulard's extract.
10.	Liq. plumbi subacet. dil.	Goulard's lotion. Goulard's water.
11.	Lotio hydr. nigra	Black wash.
12.	Mist. ferri aromat.	Heberden's ink.
13.	Mist. ferri comp.	Griffith's mixture.
14.	Pil. coloc. co.	Gregory's pill.
15.	Pil. coloc. co. et hyos.	Hamilton's pill.
16.	Pil. hydr. subchl. co	Plummer's pill.
17.	Potassii carbonas	Salt of tartar.
18.	Potassii nitras	Nitre, saltpetre.
19.	Pulv. ipecac. co.	Dover's powder.
20.	Sulphur præcipitatum	Lac sulphuris. Milk of sulphur.
21.	Tinctura benzoini co.	Friar's balsam.
22.	Tr. ferri perchlor.	Steel drops.
23.	Ung. hydrargri	Blue ointment.
24.	Ung. hydr. nit.	Citrine ointment.
25.	Ung. hydr. ox. rub	Red precipitate ointment.
26.	Ung. hydr. subchlor.	Calomel ointment.
27.	Ung. resinæ	Basilicon ointment.
28.	Sp. Ætheris nitrosi	Sweet spitit of nitre.
29.	Tinctura opii	An alternative formula.

This is a formidable list, and if we were to discuss the merits and demerits of each, separately, we should require much more time than at our disposal this evening.

Now I enter upon debatable matter, and I trust we shall have a fair hearing and give to each other the same reasonable consideration we would desire for ourselves.

The import of this subject is local and national. Local as pertaining to the synonyms used in this locality and understood by us, yet which may

differ in other localities; and synonyms used and understood by those practising the calling in other localities, but which in some respects may differ from those used in this locality. National in that in the near future some may become imperative or official, and can only then be known by their official name.

I have no desire to be personal in the treatment of this subject, and I trust you, sir, may in this and each succeeding meeting over which you may preside be supported by two bears—not Russian—bear and forbear. As it is my intention to be brief and pointed in my remarks, I do not wish to offend any present, or who may read my remarks should they be published.

1. Acid. sulph. aromat.=elixir vitriol, satisfactory. To distinguish between A.S.D., which is sometimes called spirit of vitriol and elixir of vitriol, and so causes confusion.

2, 3 and 4. Satisfactory; need no comment.

5. Lin. opii=anodyne liniment.

6. Lin saponis=lin. saponis co; opodeldoc.

In all cases where a potent medicine enters into the composition of another compound, it should be defined with great care, in order to prevent confusion and a patient getting that which it was not intended he should get. Therefore the adoption of the synonym Lin. Sap. Co. will be of national benefit, and should be nationally adopted with as little friction as possible in those districts where Lin. Sap. Co. has usually stood for Lin. Opii.

7 and 8. No objection.

9 and 10. This is satisfactory, so far as it applies to the Dil., but in the other the addition of Fort. to the Latin name and Strong to the synonym would serve a useful purpose for definition.

11. Satisfactory shades of colour may induce uniformity of strength, but why should the golden sister be left out, viz., Lotio Hydrargri Flava=Yellow Wash.

12, 13, 14, 15 and 16, satisfactory.

17. This will serve a useful purpose by officially stopping the sale of soda ash, pearl and potash in crude states by drysalters for use in combination with cochineal, etc., for whooping and other coughs and for washes for shampooing.

18. Very salutary to prevent the wilful supplying of the soda salt for domestic and trade purposes.

19. This is very desirable on account of the potency of the preparation, and will prevent the palming off of Dover's Powder sine opio. Such an outrage would be punishable under the Adulteration Act and also the Merchandise Marks Act; and bearing upon this point is that other wise introduction of the synonyms for tinct. camph. co.,—paregoric and paregoric elixir. This is one of the most important synonyms introduced into the Pharmacopœia, in point of fact, law, common sense, and above all public good, public safety and the protection of life. The sale of the so-called paregoric substitute is a deliberate fraud, a violation of common sense, a contempt of authority, a cowardly act for greed or gain, an attempt to evade law and authority duly made and published, and a vile attempt at public safety.

20. This I think will be very acceptable to all pharmacists, and will give the death blow to those substitution views where greed of gain is displaced by the want of understanding or ignorance of the real facts of the history of this preparation. I therefore say these synonyms for Sulphur Præcipitatum are most satisfactory. I may say the greater part by far of Professor Attfield's report is taken up with the literature bearing upon this preparation.

21. Satisfactory.

22. Iron is not steel, steel is iron, etc., yet this synonym is satisfactory for popular purposes.

23. This is somewhat retrogressive and does not appear to be carried out on the same lines of reasoning applied to Sulph. Præcip. For popular purposes Ung. Hydr. Fort. should be stronger mercurial ointment, and a formula added for Ung. Hydr. Mittius =Mild Mercurial Ointment; Blue Ointment.

I do not think it is desirable for infants and young children to be dosed with stronger mercurial ointment, and in some localities blue ointment is in general demand, and there would be much danger in salivating children and possibly adults by supplying as blue ointment the stronger mercurial ointment.

27. Presents a difficulty. Yellow basilicon was the synonym usually given to Ceratum resinæ, at the time when we had cerates and unguents, cerates were prepared with wax and unguents with lard.

Ceratum resinæ was composed of wax, resin, and olive oil; Ung. resinæ, B.P., 1885, of resins, yellow wax, simple ointment and almond oil. For the extra trouble and expense is the ung. better than the cerate? I think not.

28. Why not make this official?

29. Tincture of opium made from a standardized extract of opium. This is equally desirable with the tr. nucis vom.

Whether Dr. Sydenham would agree with it, I do not venture to say. Yet on grounds of definition vinum opii is better expressed by wine of opium than by laudanum.

There are, arising out of this matter of formulæ, several alterations which might be settled officially, but I must leave them for a future occasion.

At the conclusion of the paper a discussion took place, which was carried on to a late hour.

Most of the speakers expressed themselves in favour of the additions of synonyms to the Pharmacopœia; although objections were made to some of the suggestions made, such as "nitre" for potassium nitrate, seeing that name was frequently given to soda nitrate; also to medical terms, as "anodyne," being used, etc., such terms being considered out of place in the Pharmacopœia.

The essayist replied at length to the criticisms, and acknowledged the vote of thanks passed to him.

A resolution was passed approving of the addition of synonyms to the Pharmacopœia, and requesting that a copy be sent to Dr. Attfield.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

A meeting of the above Association was held at the Mason College, Edmund Street, Birmingham, on Tuesday evening, November 24, 1891, when a paper was read by Mr. R. A. Cripps, F.I.C., entitled "Indications of Neutrality used in the Volumetric Analysis of Pharmaceutical Chemicals and Preparations," which will be published in a future number. Mr. A. Southall, President, was in the chair. There was a good attendance, especially of the younger members of the Association.

A discussion followed, in which the President and Messrs. Witherington, Perry, Alcock and others took part.

A vote of thanks was accorded the author, on the proposition of Mr. Witherington, seconded by Mr. Perry.

The secretary announced that Messrs. Evans and Co., Liverpool, had presented the Association with a copy of Lescher's "Recent Materia Medica," and that Sir James Sawyer had presented two of his volumes on "Practical Medicine."

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The third meeting of the fourteenth session was held in the Pharmaceutical Society's House, 36, York Place, Edinburgh, on Wednesday, November 18, at 9.15 p.m., Mr. John Findlay, Vice-President, in the chair.

The minutes of last meeting having been read and approved, the following communications were read:—

A Reliable Test for Oxides or Hydrates.

BY W. B. COWIE.

The object of this note is to show wherein a method at present frequently adopted for the detection of insoluble oxides or hydrates in complex analysis is unsatisfactory, and how, by a slight modification, it may be made reliable and very sensitive. This method does not apply to the detection of soluble hydrates or simple salts in which the hydrates are readily recognized, by giving a brownish-black precipitate (Ag_2O) with argentic nitrate, or a yellow precipitate (HgO) with mercuric chloride. These reactions are reliable in the case of simple salts, but are of no use in complex analysis when there is a chloride, bromide, or iodide present, as the corresponding insoluble salts of silver and mercury are formed.

In the case of insoluble hydrates or oxides or complex salts the usual way to apply the test is to add a solution of ammonium chloride to the substance in a test tube, cover the mouth of the test tube with red litmus paper and apply heat. If hydrate or oxide is present free ammonia will be given off, and the red litmus paper is changed to blue. This seems all right, but I find that here a fallacy is apt to creep in. I find that even when a solution of ammonium chloride alone in water is boiled in a test tube the red litmus paper is changed to blue, as you will see has taken place in this tube I have here. This seems to indicate that decomposition of the ammonium chloride has taken place with liberation of free ammonia, but whether that is so or not I have not clearly determined, and the test I am about to describe makes the reaction all the more difficult to understand.

On heating a solution of ammonium chloride in a test tube covered with phenolphthalein paper you observe that no reaction takes place, apparently indicating that no free ammonia is present. But if a small trace of any oxide or hydrate is added to the solution of ammonium chloride the phenolphthalein paper, as you will see, is instantly coloured purplish-red. In one case I use oxide of lead, in another oxide of magnesium, and in another hydrate of calcium, and you will see that in each instance the reaction is readily obtained, while in the absence of any oxide or hydrate the paper remains quite colourless.

It is evident, therefore, that if one trusts to red litmus paper he may be led into error, while by using phenolphthalein paper instead the test is made quite reliable and very sensitive.

Note on Tartaric Acid.

BY W. B. COWIE.

It is a remarkable fact that the British Pharmacopœia takes special cognizance of sulphuric acid being present as an impurity in citric acid, while it totally omits to give a test for its detection in tartaric acid, in which its presence is at least equally probable.

This was recently brought under my notice accidentally, and on examining several commercial samples I found that all of them readily gave a very distinct reaction with barium chloride, indicating the presence of sulphuric acid.

A further examination showed that it was present in the form of calcium sulphate, its presence being due, no doubt, to the process of manufacture. I have reason to suspect, however, that it is sometimes present also in the free state. I intended making a quantitative estimation of the percentage of impurity, but want of time has prevented. Of course, the official oxalate of ammonium test would indirectly lead one to suspect sulphuric acid, if present, but the object of this note is to suggest that the chloride of barium test should be added to the present official tests for tartaric acid.

Things to Do.

BY PETER MACEWAN, F.C.S.

The author said the tendency in such associations was to confine their attention too exclusively to the practical and scientific aspects of the art and mystery of Pharmacy. He would like to direct their attention to the ethics and practice of pharmacy as a trade, or the acquiring of the knowledge necessary to make pharmacy a success as a business.

The examinational system rendered systematic study of certain subjects obligatory, but the man who held nothing but the Minor certificate was only half qualified to start in business as a chemist and druggist. The average chemist's business was not a big thing, and the wisdom of small pharmacies was open to doubt on grounds of sound economy, but they had simply to face the fact. A chemist and druggist should after gaining his professional qualification set himself to qualify as thoroughly for the business of pharmacy. Few men could start business successfully immediately after passing the Minor, and it was better, as a general rule, to spend from three to seven years in the study of methods of business. Many made the mistake of starting without sufficient capital, and thus put themselves in a position in which they could not do justice to themselves or the public. Taking a typical business doing £20 weekly, he showed that 1000 transactions yielded £22, the average sale being $5\frac{1}{4}d.$, and 52 per cent. of them being for $1d.$ or $2d.$ This was characteristic of a large majority of chemists' businesses in this country. While he deprecated creating or pushing the so-called penny trade, he nevertheless advocated its cultivation for the following reasons.

1. It is economically satisfactory, because it is all ready money.
2. It is generally profitable, because it is made up of self-manufactured articles—ointment, powders, pills, and cheap proprietaries, which cannot be "cut."
3. It provides the pharmacist and his employés with work at times which would otherwise be labourless.

Another department that opened a wide field for skill and ingenuity was the speciality side of the business; the devising of formulæ and putting up of perfumes, pomades, furniture polishes, and the like. In this connection he warned them against palpable imitation, which went hand in hand with substitution. They ought also to qualify themselves for the buying of drugs and chemicals, and to this end he recommended them to acquire knowledge on the following points:—

1. The commercial sources of drugs, the manner in which they are collected and prepared for the market, the season of the year at which they come into the market, and the nature of original packages.
2. The commercial varieties of drugs and their relative medicinal values.
3. The prices of drugs, fluctuations therein, and the causes influencing such fluctuations.

The paper concluded with a detailed description of the way in which to record business transactions, and the best methods to adopt for successfully carrying on a pharmaceutical business.

The reading of the papers was followed by a discus-

sion taken part in by Messrs. Cowie, Duncan, Findlay, Hill, and McEwan, and on the motion of the Chairman cordial votes of thanks were awarded to the authors.

The Chairman reminded members of the Conversazione which takes place on December 11, and for which all arrangements had now been completed. He also intimated that the next meeting would be held on Wednesday, December 2, when papers on "Recent Additions to the Herbarium," by Donald McEwan, and "A Session at a Chemistry Class," by Alexander Murray, will be read.

The meeting then closed.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

A highly successful popular lecture was delivered under the auspices of this Association last Thursday evening, 19th inst., in the Gilfillan Memorial Hall, by Mr. W. L. Howie, F.C.S., of the firm of Messrs. Barron, Harveys and Co., London. The subject—"A Visit to Ober-Ammergau and Back in 1890"—was illustrated with 120 magnificent lime-light views photographed by the lecturer. The audience numbered about 1500, perhaps the largest gathering which has assembled under pharmaceutical auspices in Great Britain. Mr. Charles Kerr, Honorary President of the Association, occupied the chair, and suitably introduced the lecturer.

Mr. Howie having explained that the lecture was the result of a short continental tour undertaken in the summer of 1890, described, in a graphic and highly entertaining style, the various photographs shown, including glimpses of Cologne, Bonn, Munich, etc., charming pictures of the scenery of the Bavarian Highlands, and a splendid selection of views of the different styles of architecture and of the art treasures, museums, and picture galleries. In the Germanic Museum is preserved the "Historical Pharmacy," of which three attractive photographs were presented. The vessels, fittings, and ancient medicines which are there exhibited were collected by the German Pharmaceutical Association, and described by Mr. Peters, who is present owner of the Moor Pharmacy in Nuremburg, a business established over 400 years. The fittings came from Oberinger, and it was found that in the course of hundreds of years nine coats of paint had been applied. These had been removed, and it was found that the first coat on the drawers was bluish-green, and on the pilasters white, and in these colours they have been restored. Some of the drawers are named in crude writing with white paint, others, as well as the jars, bear chemical as well as astrological signs and numbers. The jars, many of them very beautiful, are Italian—chiefly from Majolica—and of the sixteenth century. The balances, hung from the ornamental rococo, stand over the counter, and the objects suspended from the ceiling corresponded with remarkable harmony with that apothecary's shop at Mantua, of which Romeo is made to say, "A tortoise hung, an alligator stuffed and other skins of ill-shaped fishes, and about his shelves a beggarly account of empty boxes, green earthen pots, etc.," although these very earthen pots were at least 100 years old in Shakespeare's day. The other views showed the chemico-pharmaceutical laboratory with curious glass and other apparatus, chiefly for the process of distillation, which seemed to be the favourite process of the early chemists. The Ober-Ammergau and Passion Play pictures presented the spectators with a vivid notion of the Scripture drama and its leading actors.

The lecture was much enjoyed by everyone present, and the enthusiasm which greeted the exhibition of the various slides was evidence of the appreciation of the audience.

The Chairman, in proposing a vote of thanks to the lecturer, paid a high compliment to Mr. Howie, remarking that it had been all the more a pleasure inasmuch as this was a labour of love on the part of Mr. Howie.

The thanks of the meeting having been enthusiastically passed to Mr. Howie, the entertainment concluded about 10 p.m.

Parliamentary and Law Proceedings.

Poisoning by Strychnine through a Mistake in Dispensing.

The Deputy-Coroner (Mr. H. W. Gould) held an adjourned inquest on Saturday, November 21, at Stoke Canon, on the body of Caroline Molland, who met with her death on the 4th instant under circumstances reported in the *Pharmaceutical Journal* for November 14, p. 402. After reading the depositions taken at the last inquiry the Coroner asked Mr. Rowsell, of the firm of Holman and Ham, chemists, Exeter, several questions bearing upon his former evidence.

Superintendent Jesse: Was the solution you were in the habit of making up from a prescription?—Witness: We had it entered on our books as a prescription, but no signature was attached.

I notice that on the label of the bottle there were no directions as to how the drops should be taken?—No. Usually when mixtures are repeated there are no directions.

Is that so with most medical men?—As a rule there are directions.

May I take it that anybody having similar mixture without directions would be liable to make a very great mistake as to the quantity they might take?—I do not think that would apply in the case of the morphia habit.

May I ask you how often you have been in the habit of making up prescriptions for the deceased?—Two or three times a week.

Mr. Friend, who watched the case on behalf of Mr. Rowsell and his apprentice: I understand you to mean that this is by no means an isolated case. The deceased had been a customer of yours for a long time—quite eighteen months or two years—and during the whole of that period had been in the habit of dealing with you?—Yes.

In answer to Mr. Friend, witness said that during the time the deceased had done business with him he had usually made up the mixture himself, and the apprentice Hodges had an opportunity of seeing him. The deceased would, as a rule, have a shillingsworth of the mixture, but on one or two occasions she exceeded the quantity.

Assuming that the bottle was filled up to the blue mark, and that there was more in the bottle than the quantity ordered, that would be strong evidence that the mixture had not come from your shop?—Yes.

In further answer to Mr. Friend, witness stated that Hodges had been in his employ about two years, and, although not qualified under the Act, he should think he was quite competent and capable of attending to prescriptions of the kind in question. Witness believed him to be a well-conducted youth, and had had no occasion to speak to him of carelessness. The shelves above the counter were about three feet from the floor, but were only placed there in a temporary sense. The poisons were kept in a cupboard in the other shop, but owing to the process of changing premises it was found necessary to place some of them on the shelves in question. Between the two bottles containing solution of morphia and solution of strychnine—which were about six inches apart, and both plainly labelled—there were other smaller bottles.

The Coroner: Do I understand you to say that the two bottles were on the same shelf?—That is so.

Would morphia and would strychnine be kept together whether you had a poison cupboard or not?—Yes.

Would you supply solution of morphia without any prescription?—I should make inquiries into the case, and would supply it if the bottle were labelled "Poison."

Do you ever label the bottles containing solution of morphia "Poison?"—Usually, but the labels are sometimes rubbed off.

George Downing, carrier, said, in answer to the Coroner, that when he left the bottle with Mr. Rowsell the latter did not instruct him as to what time to call for it. Witness, however, called for the mixture about 3 o'clock on the 3rd instant and waited until it was made up. He delivered the bottle to the deceased personally the same day. When he received it from the chemist it was wrapped up in paper, but before he reached home the paper came off, and he delivered the bottle to Mrs. Molland naked. The bottle was labelled "Poison" when he received it from the chemist.

Mr. Friend: We are willing to admit that the apprentice put up the mixture and handed it to Downing.

William John Hodges, apprentice to Mr. Rowsell, deposed that he was 19 years of age, and had been with his employer about nineteen months. On Tuesday, November 3, he remembered Downing calling at the shop about 2 o'clock for Mrs. Molland's "drops." Witness, to the best of his belief, measured 1½ ozs. of solution of morphia with an ounce measure and the same quantity of water into the bottle. There was a "Poison" label on the bottle when he took it from the counter, which he did not put on the bottle. Witness had previously dispensed drops under the supervision of Mr. Rowsell.

Dr. Blyth then produced the bottle which he had received, and which witness identified as the one that was brought to the shop.

The Coroner: Whenever you have dispensed it has always been under the supervision of Mr. Rowsell?—Witness: Yes.

How is it you did not do so on this occasion?—We were very much pressed for time just then, and I hardly thought it worth while to call Mr. Rowsell down.

Mr. Rowsell at this time was upstairs?—He was.

From what shelf did you take the morphia bottle?—The top shelf.

Is that the shelf upon which poisons are kept?—Not as a rule; but on this occasion they were.

Was the bottle containing strychnine also on the same shelf?—It was.

How far apart were these two bottles?—I should say about 6 inches.

How did you know what quantity was required?—Because a shilling was paid for it.

Did Downing pay you the shilling?—No, but he told me he had paid a shilling for it.

Did you refer to the prescription book?—No, I did not.

What quantity would be supplied for that sum?—Three ounces—1½ oz. solution of morphia and 1½ oz. of water.

In answer to further questions from the coroner, witness said that the bottle marked "A" was the one which he supplied.

Witness, in reply to Superintendent Jesse, said the two bottles were on the same shelf, and the mixture in both would be of a very transparent character. The shelf was about 40 inches from the counter, and the light fell full upon it. It had been a very busy day. On previous occasions when witness made up the medicines Mr. Rowsell was present. None of the writing on the bottles produced was in witness's hand. Witness had never supplied, or seen supplied from the shop, more than 3 ounces. To put up the solution of morphia he had to use the measure twice, once full and once half full. He also measured the water in the same way.

Witness, in answer to Mr. Friend, said he used every diligence and care in putting up the mixture, and did not supply more than the quantity. The deceased was a constant purchaser, and the bottle was sent for these "drops" about three times a week. Witness had never known the deceased to purchase more than 3 ozs., for which she always sent a shilling. He would not be induced to supply more than the quantity for that sum, as that would be an improper act. The bottles were 6 oz. bottles in which the 3 ozs were put.

Dr. A. W. Blyth deposed to analysing the contents of the bottle and of the stomach. The bottle contained a solution of strychnine, two grains to the ounce. It was an ordinary six ounce bottle divided into one ounce divisions by lines. The exact amount of liquid in the bottle was four ounces and nine-tenths of an ounce. Both the liquids—solution of morphia and solution of strychnine—were transparent. The solution of strychnine contained in the bottle was practically of the same strength as the solution of morphia stated to have been dispensed by the witness Hodges. He could find no traces of morphia in the bottle. Witness also made an analysis of the contents of the stomach, from which he separated a very minute portion of strychnine, not more than two-thirteenths of a grain. That would not be sufficient in an adult to cause death.

Would a great deal of it be absorbed in the intestines?—It would gradually disappear, especially if the person lived a considerable time after taking it.

Would it become absorbed in the course of an hour and a half?—Death usually occurs in two hours, so that the strychnine which causes death is not in the stomach, but in the tissues, so that a great deal of it would disappear in that time.

Have you formed any opinion as to the cause of death?—From the evidence as to the symptoms, it is clearly a case of strychnine poisoning. The difference between the quantity which I analysed and five ounces would not, in my opinion, contain sufficient to cause death.

The Coroner, after again reading the evidence given at the last inquiry, asked Dr. Blyth if he considered the symptoms there stated to correspond with his own idea.

Dr. Blyth said he had no doubt that death resulted from strychnine poisoning, as there was mention of stiffness of the legs and pain in the throat.

Can you tell us whether the contents of the bottle had been measured in dispensing?—I can only say that if there was any idea of putting two grains to the ounce it was very accurately done.

Superintendent Jesse: May I ask if there was any trace of morphia in the stomach or in the bottle?—Witness: No.

Supposing the mixture to have been up to the fifth mark, would the amount of strychnine that was in the bottle be sufficient to cause death?—It would be about one-fifth of a grain; a quarter of a grain is about the smallest dose ever known to destroy life. A fifth of a grain might cause death.

Mr. Friend, in the course of an earnest appeal on behalf of the lad, pointed out that with regard to the mixture there was the evidence of Hodges that he was most careful in making it up, and the evidence of other witnesses indirectly confirmed the apprentice's statement. He also urged that the quantity of mixture supplied by Hodges was not so great as the quantity found in the bottle after her death, and it was, therefore, quite possible that the mixture she took was some other than that which she received from Mr.

Rowsell's establishment, or that it was mixed with something that had been obtained elsewhere, Mr. Rowsell not being the only chemist whom the deceased patronised. To his mind the whole of the evidence pointed to the conclusion that there had been some addition to the morphia mixture after it left Mr. Rowsell's shop. In any case he asked the jury to conclude that the death was due to misadventure.

The Coroner, in summing up, said that it appeared to him that the jury would have to consider three points—whether death was caused by poison, how that poison was obtained, and whether anyone was responsible for death. The deceased had been in the habit of taking morphia for a great many years. Sometimes she got it from one chemist, sometimes from another. And she seemed to have been supplied under circumstances which were not very satisfactory. It appeared that deceased had only to produce money, and she was supplied with any quantities according to the sum which she tendered. He could not speak too strongly on such a system as that, for it was a system which might lead to more serious results. The evidence of Dr. Blyth pointed conclusively to the fact that strychnine was the cause of death. With regard to the question as to how the mixture was obtained, they had the evidence of the carrier who took the bottle to the chemist and received it back again. If the jury considered that Hodges was to blame it would of course be their duty to say so. On the other hand, there was a great deal to be said in his favour. He, in the absence of his master, no doubt anxious to carry out his duties with zeal, unfortunately dispensed the mixture. These were the questions the jury had to consider, and they must say whether Hodges was guilty of culpable negligence or whether he dispensed the medicine by misadventure.

The jury then retired, and after a brief consultation returned a verdict of "Death by misadventure" at the hands of Hodges, and at the same time expressed their censure of the careless way in which the mixture was dispensed by the chemist.

Poisoning by "Weed Killer."

Mr. T. Buss, one of the Coroners for Kent, held an inquest on Monday, at Riverhead, as to the death of Frederick Whale, night watchman at the Montreal Hall, Sevenoaks.

Dr. O. Stedman, of Sevenoaks, said that he was called on Friday to see the deceased, who told him that he had gone into an outhouse near the mansion and found a bottle containing what he thought was beer. He drank about a tablespoonful and immediately after taking it he became sick. The man shortly afterwards died. A *post-mortem* examination revealed symptoms of arsenical poisoning. Witness found that the bottle from which the man had drunk contained "weed killer," a tablespoonful of which was sufficient to kill half a dozen people.

The jury returned a verdict to the effect that the deceased died of arsenical poisoning by accidentally taking a quantity of a compound known as "weed killer," with a rider to the effect that the "weed killer" ought to have been kept in a special vessel, with a proper description on it. They also asked the Coroner to call the attention of the Pharmaceutical Society to the facility with which the weed killer could be procured.

Books Received.

Wattles and Wattle Barks. By J. H. Maiden, F.L.S., F.C.S., etc. Second Edition. Sydney: G. S. Chapman. 1891. From the Author.

The Public Health (London) Act, 1891. With Introduction, Notes, and Index. By Alexander Macmorran, M.A. London: Shaw and Sons. 1891. From the Publishers.

Obituary.

Thomas Hyde Hills.

Another link is broken which bound the present with the past.

Thomas Hyde Hills, whose name has long been familiar as a household word, died on the 19th inst., aged 76.

A lingering malady preceded his decease and caused his retirement from active service; to many therefore of the younger generation the personality of this once prominent and most energetic member of our Society will be unknown.

Time was when no public function connected with pharmaceutical interests would have seemed complete without his presence, and he was in a special manner identified with the rise and progress of British pharmacy.

Mr. Hills was born at Maidstone, May 27, 1815, and was educated at the local Grammar School and subsequently at Goudhurst, Kent.

He was apprenticed for seven years at Brighton to Mr. Thorby, himself a former apprentice of John Bell and Co., of Oxford Street.

Naturally, therefore, when his time expired and he had had a brief experience as an assistant, his thoughts not only turned to London, but to that particular spot with which his name is now inseparably connected. Inseparably in more than one sense, for Hills Place is a standing topographical memento of the distinguished pharmacist who has passed away.

It is one thing to come to the metropolis and another to gain a footing in that great wilderness.

Often has Mr. Hills related how for ten days he wandered up and down in search of a situation and found none, till he eventually obtained an engagement with John Bell, the founder of the firm.

Jacob Bell, being then a young man, and a junior assistant in his father's business, was necessarily thrown into direct companionship with Mr. Hills. An ardent temperament characterized them both; no wonder then that later in life they became closely united, for they found their pleasure *in* their work.

Mr. Hills thus found his opportunity and showed so much ability and such determined assiduity that his position was finally secured.

No small interest attaches to the commencement of the career of a successful man. All beginnings are difficult. Hence it is well to put on record that one who, in due time, became superintendent, and subsequently the head of a great establishment, however favoured by friendship, owed his advancement to untiring industry and indomitable perseverance.

Mr. Hills literally began from the ranks and worked his way right through the various stages of the business. John Bell died in 1849; Frederick John Bell, the younger son, had previously left Oxford Street, and Mr. Hills was admitted as a partner. For ten years the whole conduct of the business devolved on the two friends, Jacob Bell and Thomas Hyde Hills.

At his death in 1859, Mr. Jacob Bell bequeathed his share of the business to the partner and companion of his youth. Mr. Hills has been so long and prominently

connected with pharmacy that it appears strange to us of the present generation to learn that he cannot be reckoned amongst the Founder Members of the Society. He was, in fact, the first Associate, and held that position from 1841 to 1847.

During this time he attended the lectures which were delivered at Bloomsbury Square, and he became a member in 1848. He was elected to the Council in 1860, and consequently his official life began one year after the decease of his gifted partner.

He filled the office of Vice-President from June, 1863, to January, 1868; Mr. George Webb Sandford being President during that period.

In January, 1868, he was elected Treasurer in the room of Daniel Bell Hanbury, who resigned during his term of office. He held this responsible post until in 1873 he was chosen President of the Pharmaceutical Society, an honour which he retained for three years, discharging its multifarious duties with eminent distinction and success.

His official career was a replica of his business life. As a pharmacist he began as a junior assistant, and rose to be the principal of his house; in his public capacity he began as a young associate and ended by attaining the Presidential Chair.

Devoted to the development of the business, no time was left for direct contribution to the literature of pharmacy, but he was ever stimulating his managers and assistants to devote themselves to original pharmaceutical work and to present the results at the evening meetings of the Society.

It is probable that there never has been a more constant attendant at all and sundry gatherings of the Society. The lecture room scarcely ever missed his presence during an evening meeting; and the same remark may be extended to the Council room and the various committees which are necessary for the conduct of affairs.

A distinguishing character of Mr. Hills was liberality combined with unstinted hospitality. Whenever political or other circumstances required a conference with distinguished members of Parliament, the medical profession or eminent men of science, Mr. Hills was ever ready to offer the hospitalities of his house to his colleagues on the Council; and it was at such social gatherings that much of the preliminary work which ultimately led to the passing of the Pharmacy Act of 1868 was considered.

Thus much that proved of the deepest importance to pharmacy was often accomplished in a few hours, and in a quiet, unostentatious way.

The Pereira medallist and the winner of the second and third prizes, termed the "Pharmaceutical Society's Medals," are each the recipient of a gift of books from a fund placed at the disposal of the Council for that purpose by his generous hand. The Jacob Bell Memorial Scholarships are similarly endowed, while the Benevolent Fund was never forgotten.

We believe that a handsome legacy, not yet officially announced, has been left by Mr. Hills to this excellent Fund.

As further showing Mr. Hills' interest in the progress of education, it may be stated that the Bell and Hills' Fund, in connection with the British Pharmaceutical Conference, owes its origin to his generous instincts, though he desired that Bell's name should be associated with his own in the title of the Fund. Fifty guineas were first presented at the Exeter meeting; and a further gift of £200 was made by him at the Brighton meeting, with a view of stimulating the efforts of the Association. Its first object was to form the nucleus of a library, and the second to promote original research.

Pharmacy is as well served now as ever, and its ranks are continuously recruited by fresh and vigorous life; yet one cannot help a feeling of regret when one sees how rapidly the circle narrows of those who bore honoured names and who so disinterestedly promoted the well-being of the Society in its first years. Some, indeed, of Mr. Hills's early associates survive, but alas, how few!

Only a short time ago he was surrounded by a group, which may be said to have become historical, bound together by the ties of friendship and devotion to a common cause.

It would be an injustice to the memory of Mr. Hills not to record how, following the example of Jacob Bell, he watched over and personally guarded the welfare of Sir Edwin Landseer.

The origin of this friendship was so honourable that it will not be considered an intrusion into the privacy of domestic life should the story be related here.

Landseer had been commissioned by Mr. Bell to paint a now well-known subject called "Shoeing." The artist was most dilatory in its execution, but after delays, which were amusingly protracted, the work was finished and was sent home.

The price agreed upon (£200) had been paid. Shortly after the sum of four hundred pounds was offered by a connoisseur. This offer was refused, for Mr. Bell had no wish to sell his picture, but he immediately sent Landseer an additional cheque for £200.

This unexpected generosity amazed the artist as much as delighted him. From that time, and throughout his whole career, Mr. Bell arranged the sale of Landseer's pictures. On Mr. Bell's death the artist was in despair, when Mr. Hills offered his own services, which were gratefully accepted.

What the two partners were to Sir Edwin Landseer would be difficult to describe; both took his financial interests under their immediate care, and Mr. Hills had the satisfaction of brightening the declining years of the great painter.

It will be a source of gratification to the Society to know that during the whole of Mr. Hills' long illness, and up to the day of his death, he was attended with affectionate devotion by his old friend, Sir Richard Quain, Bart.

On Wednesday, November 25, 1891, Thomas Hyde Hills was laid to rest, beside his father and mother, in the family vault at All Saints' Church, Maidstone, in the presence of his relatives and many of his old friends. Amongst them we noticed Mr. George David Pollock, F.R.C.S., Mr. G. D. Leslie, R.A., Mr. T. Woolner, R.A., the President and the officers of the Pharmaceutical Society, and a large company of mourners, who had assembled to pay him the last tribute of respect.

Well may it be said of Thomas Hyde Hills that he was not only the friend of the pharmacist, but the friend of the artist, the man of science, and the doctor.

JOSEPH INCE.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Dispensing Charges.

Sir,—It will be of very great benefit that the position of chemists in regard and in reply to the letter of Mr. Lennox Browne should have been so clearly defined as in your article on dispensing charges in last week's issue.

In a necessarily limited experience I have always found that the chemist who could conscientiously guarantee the absolute quality and correctness of his dispensing had already his customers in hand, should they desire an explanation as to comparative prices.

Defining his position on the basis of your article's contention, if he truthfully knows that he is doing his utmost to assure the patient's safety, the earnest of his position and the complete absence of vacillation in his manner will assuredly carry conviction to his listener.

On the other hand, if he knows that he simply buys at a moderate and, as he thinks, fair price, subjects none of his drugs or chemicals to careful testing or examination, then he may tell his "professional" story without producing the slightest effect. The thing that is not real never deceives.

It would be well that all the pessimistic growlers at stores and cutting prices should assure their status and take the manly stand of real professionalism.

George Lunan.

20, *Queensferry Street, Edinburgh.*

Local Secretaries.

Sir,—Our local secretaries are appointed, and for another year we in ——— must be content to remain "as we were." Albeit, with your permission, I will air a few opinions which I hold respecting the local secretary and his work, and which opinions I have reason to know are shared by others beside myself.

It is in a large town I live ———; you know it, but as I do not wish to unnecessarily hurt anyone's feelings, I will not mention its name. Well, in our town we have the misfortune to be unrepresented by a ———; this is not a clerical error, for though nominally represented we are practically, as I have said, unrepresented by a gentleman who is a gentleman and nothing more. Since the day when he first entered upon the duties of his appointment several years have elapsed, yet during all these years he has never evinced the faintest interest in those duties nor shown in any way that he cares for or has any sympathy with his poorer and less fortunate brethren excepting once, when as a result of grumblings, many and often, and the urgings of one or two more militant spirits, he made one spasmodic effort to waken up, flickered for a short moment and then went out altogether, and not one spark of vitality has been noticeable since.

He has not a small constituency, and it would seriously tax him, as a man of business, to personally visit, even once a year, all his constituents. But would you believe it, sir? that during all these years he has not, so far as I know, visited any of this numerous body, either to collect their subscriptions, to urge the claims of the Benevolent Fund, or to discuss trade matters with them, nor has he once called the trade together to confer with him on matters concerning the Society; and it is a fact that a great many chemists in the district have never seen the local secretary, and many others have only learned who he is by referring to the published list.

This, then, is a true statement of our position—represented, yet unrepresented.

You, Mr. Editor, may probably say it is our own fault, and that the remedy is in our own hands. Well, individually, some of us have, year after year, persistently voted for other men—all to no purpose—until we have been forced to the conclusion that it is no use attempting to alter the present order of things. Organized action is out of the question, for, as I have already said, our present secretary is a gentleman, and, moreover, one who loves the honour attached to the post, and no one has the heart to offend him by openly promoting the nomination of another chemist in his stead, and he lacks the courage to resign an office in the work of which he well knows he does not give satisfaction.

So much for the actual condition of things here, and, I dare say, in many places elsewhere. If the Pharmaceutical Society, in its wisdom (for surely they must know when a secretary is serving only his own interests), would take measures to prevent the perpetuation of this state there might be a gleam of hope for the future.

I would not have you think from the foregoing remarks that I am one of those who hold the opinion that a local secretary should be for ever playing the "private detective"—this is too much to expect of him; nor would I expect him to try and please everybody—only a fool would try. But I think I have sufficiently indicated wherein he might do useful service, both to the Society and the trade, and pointed out to the Society a line of action which, if followed, would materially assist communities like ours, where many persistently complain, but where no one individual has the pluck to take the initiative so long as the secretary is an honourable man. Plebian.

On the Amorphous Bases of Aconite.

Sir,—For some time past I have been engaged in collecting all reliable information on the alkaloids of the aconites,* and at the British Pharmaceutical Conference at Cardiff I read a paper entitled "Suggestions for the Assay of Aconite and its Preparations," which was essentially a chapter of the compilation I had undertaken.

In the paper at Cardiff (*Pharm. Journ.*, [3], xxii., 223; *Chemist and Druggist*, xxxix., 293; *British and Colonial Druggist*, xx., 210) I described a method of assay based on a suggestion of Dr. Alder Wright, and depending on the fact that aconitine was capable of saponification with formation of 19 per cent. of benzoic acid and the unsaponifiable base aconine; and that the other poisonous bases pseudaconitine and japaconitine behaved very similarly.

Mr. J. C. Umney took part in the discussion which ensued, and I find by conversation with a number of those who were present, or have read the reports of the meeting, that Mr. Umney conveyed to them the impression that a process of assay based on the saponification of the active base of *Aconitum Napellus* was "perfectly incorrect," owing to the co-occurrence of an amorphous and substantially inactive base, yielding about 22 per cent. of benzoic acid on saponification, and present in such amount as possibly to double the apparent proportion of aconitine present.

Mr. Umney said this base was first observed by Alder Wright, was referred to by Dunstan and Ince, its presence confirmed by John Williams, and its characters more fully investigated by Jürgens, whose observations Mr. Umney had "had the opportunity of confirming exactly." He made his statements, not on the strength of his own unpublished experiments, but on the authority of Jürgens and other observers.

Since the meeting at Cardiff I have carefully examined the extent to which Mr. J. C. Umney's statements were correct. I have communicated with him, both verbally and by letter, and have pointed out in detail the respects in which his statements appear to have been inaccurate or open to misinterpretation. As Mr. Umney does not see his way to accept my suggestion that he should himself correct these points, I feel bound, in justice to myself, to put right several of his statements which have misled or are apt to mislead others.

1. Mr. Umney stated that the amorphous, inactive, saponifiable base in question was referred to by Messrs. Dunstan and Ince in their paper "On the Crystalline Alkaloid of *Aconitum Napellus*" (*Journ. Chem. Soc.*, lix., 271; *Pharm. Journ.*, [3], xxii., 55, 74); the fact being that in their penultimate paragraph these authors state that in order to throw light on the alkaloids other than aconitine contained in *A. Napellus*, "if other alkaloids there be," an investigation is being made of roots from specially selected plants.

* For the new edition of my 'Commercial Organic Analysis' now going through the Press.

2. Mr. Umney stated that the amorphous, inactive, saponifiable base in question had been found by the late Mr. John Williams; the fact being that Williams simply mentioned a gummy impurity associated with aconitine, and never stated or suggested that it was either saponifiable or inactive. It must be *both* to affect the question at issue. Mr. Umney has simply *assumed* for the gummy impurity observed by Mr. Williams the properties of inactivity and saponifiability, and has ignored the presence of other amorphous bodies not having these characters.

3. Mr. Umney stated, or at any rate his reported observations lead to the inference, that Jürgens had recently fully investigated the subject, and described his results in a paper never published in English; that he found the base in aconite in the proportion of 0·02 to 0·03 out of 0·07 per cent. of total alkaloids; that he had analysed the base in question and determined its combining weight; proved it to be inactive, and to yield about 22 per cent. of benzoic acid on saponification; and that these results had been fully confirmed by Mr. Umney's own experiments. Jürgens' paper was one of the "Inaugural Dissertations" delivered at Dorpat, in Russia, in 1885, and I have consulted the volume in the Library of the Pharmaceutical Society, which is probably the only copy in England. But the paper hardly bears out what I and other hearers of Mr. Umney understood him to say. What Jürgens *actually* did was to isolate a small quantity of an amorphous saponifiable base from the root of *A. Napellus* and submit it to a partial investigation, the *very small quantity of material at his disposal* preventing any complete examination being made. This, too, is the chemist who had access to unlimited supplies of aconite-root, and who had just isolated crystallized aconitine in considerable quantity and examined the characters of the alkaloid and its salts in the fullest possible manner. Jürgens could not obtain the amorphous base wholly free from aconitine, and he found it to contain C. 67·74 and H. 8·40 per cent. On saponification, it yielded a base allied to aconine and an *unstated proportion of benzoic acid.* Such salts as were examined were amorphous. *This is all.* No "22 per cent. of benzoic acid," no statement of the amount present in the root, and no reference to the inactive character of the base, though the taste is described as bitter and not tingling.

4. The figures given by Mr. Umney (0·07 of total alkaloids and 0·02 or 0·03 per cent. of the base in question) are not those of Jürgens at all, but results obtained by Alder Wright and Luff. But Mr. Umney makes the unwarrantable assumption that all that was not crystallizable aconitine was the inactive, saponifiable base in question! Either he confuses this base with aconine and the other unsaponifiable bases of aconite found by Wright, or he deliberately ignores them. Wright and Luff obtained from the mother-liquors from which as much crystalline aconitine as possible had been separated an amorphous base containing C. 66·39, H. 7·74 per cent. (not far from the proportions of Jürgens) which yielded about 14 (not 22) per cent. of benzoic acid on saponification. I have communicated with Dr. Alder Wright, and he states that it is impossible to form any idea of the proportion of the amorphous saponifiable base present. He does not regard his product as having been a single alkaloid, but believes it still retained aconitine, which was prevented from crystallizing by the amorphous bases present, just as cane sugar is retained in molasses.

Mr. Umney seems to have built up his evidence from an impure base described by Wright and Luff existing in perfectly unknown quantity; a similar base obtained in small amount by Jürgens; a wholly imaginary reference to such a base by Dunstan and Ince; and convenient hypothetical characters assumed for the gummy matter of Williams. These materials, with some misinterpretation of figures, are the data which have sufficed Mr. Umney to assert the presence in *Aconitum Napellus* of an *inactive, saponifiable base of such composition and in such proportion* as *materially* to affect the saponification method of assay, and not improbably double the yield of benzoic acid obtained on saponification. It may be true; but there is no foundation for the assertion that any investigations hitherto published prove anything of the kind.

Sheffield. ALFRED H. ALLEN.

THE PHARMACOPŒIA STANDARDS OF PURITY.

Sir,—In a paper having the above title Mr. Ellwood "protests against the lowering of the standard" for bitartrate of potassium, as suggested by me at the Leeds meeting of the Pharmaceutical Conference, he "having found no difficulty whatever in obtaining samples yielding the full requirements of the B.P."

As stated at the meeting referred to, I founded my remarks upon the results obtained from the analysis of a large number of samples of first quality cream of tartar, which formed the subject of a paper published in the *Pharm. Journ.*, [3], xviii., p. 1045. These samples included brokers' samples, samples taken from the cask by myself with a sampling iron, samples of powder bought from first class wholesale and retail houses, and some special samples obtained from abroad. The general results obtained were:—

1. That brokers' samples commonly assay higher than samples from the cask taken with a sampling iron.
2. That the powdered cream of tartar then sold by retail houses was below the B.P. standard.
3. That there was great difficulty in obtaining cream of tartar up to the standard.

Soon after the publication of that paper an improvement took place in the commercial article, whether due to the impetus such a paper might be supposed to give to the production of a good article, or to season, I do not know; for some time past, however, the difficulty of obtaining official cream of tartar has again increased, though not to the same extent as at the time referred to.

I cannot accept Mr. Ellwood's protest as justifiable unless he is prepared to back it up with analyses of a large number of samples, taken with a sampling iron driven right through the original casks in at least two directions.

Mr. Ellwood goes on to condemn the B.P. standard for saccharated carbonate of iron as being too high. I have examined a great many samples and seldom find them below 45 per cent. real $FeCO_3$ when freshly prepared. I have this day tested a sample which is four weeks old, and has been kept without any special precautions; it contains 39 per cent. I protest against the lowering of this standard as unnecessary. R. A. CRIPPS.

NOTICES OF MEETINGS.

Brighton Junior Association of Pharmacy.—Wednesday, Dec. 2.—"An Evening with the Microscope," by Mr. A. E. Colman.

Chemical Society.—Thursday, Dec. 3, at 8.—Papers: "Phosphorus Oxide," Part II., by Professor Thorpe and A. E. Tutton; "On Frangulin," Part II., by Professor Thorpe and Dr. A. K. Miller; "The Structure and Character of Flames," by A. Smithels and H. Tingle; "The Composition of Cooked Vegetables," by Miss K. J. Williams; "On the Occurrence of a Mydriatic Alkaloid in Lettuce," by T. S. Dymond; "On some Metallic Hydrosulphides," by S. E. Linder and H. Picton; "On the Physical Constitution of some Solutions of Insoluble Sulphides," by H. Picton; "Solution and Pseudo-Solution," by H. Picton and S. E. Linder.

School of Pharmacy Students' Association.—Thursday, Dec. 3.—"Hints on the Use of the Microscope," by Mr. H. A. D. Jowett, and a "Report on Physics," by Mr. H. Garnett.

Chemists' Assistants' Association.—Thursday, Dec. 3.—Mr. A. H. Allen having been obliged to defer the reading of the paper announced in his name, the evening will be devoted to impromptu discussions on subjects suggested by members.

Liverpool Pharmaceutical Students' Society.—Thursday, Dec. 3.—"Bacterio-Therapeutics," by Dr. J. R. Logan.

L. Priestley.—It has not been found practicable to make a satisfactory arrangement of the nature referred to.

J. B.—The occurrence is not very uncommon. The mass represents the cotyledon, developed at the expense of the albumen.

S. S. Linnett.—You will find a formula for Tinct. Iodi Decolorata in the B. P. C. Unofficial Formulary.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Turner, Warden, Barker, Humphrey, Johnston, Priestley, Burrell, Umney, Turnbull, Cripps, Druce, Chemist, Globan, Laben, Fair Play, J. H. S.

THE EXISTENCE OF A MYDRIATIC ALKALOID IN LETTUCE.*

BY T. S. DYMOND.

[*From the Research Laboratory of the Pharmaceutical Society of Great Britain*].

The attention of the author was drawn a few months ago to the mydriatic action of an extract prepared at Hitchin from common lettuce, *Lactuca sativa*, when in flower. On examination, the mydriatic action was found to be due to an alkaloid. The extract closely resembled belladonna extract in appearance, smell, and taste ; but a dose of 5 grains had been without injurious effects. Three other commercial extracts of lettuce were examined, viz., an extract of wild lettuce, *Lactuca virosa*, prepared according to the directions of the British Pharmacopœia, the history of which was unknown, and extracts of both the wild and the cultivated lettuce, prepared at Market Deeping, in Lincolnshire. An extract of that variety of the cultivated plant known as Cos lettuce was also examined. They all contained an alkaloid which had a very marked power of dilating the pupil of the eye. Finally, a dried specimen of wild lettuce, collected when in flower, was examined. It contained a mydriatic alkaloid.

The impure alkaloid obtained from the extract was a light brown syrup which possessed powerful mydriatic properties. In order to purify it it was converted into the oxalate. The alkaloid recovered from the pure oxalate, when crystallized from chloroform, closely resembled hyoscyamine, both in appearance and in melting point. The aurochloride was then produced by the usual methods, and this, after recrystallization, was obtained in the shining flat needles characteristic of the aurochloride of hyoscyamine. The estimation of the gold and the base in this compound showed that the alkaloid was one of three isomeric mydriatic alkaloids having the formula $C_{17}H_{23}NO_3$, while its melting point was 159·75° (corr.), and closely corresponded with that ascribed by Ladenburg to the aurochloride of hyoscyamine. The plant does not appear to contain a second mydriatic alkaloid, although it must be remembered that only small quantities of material were operated upon.

The author has thus shown that both wild and cultivated varieties of lettuce, especially when the flowering stage is reached, contain hyoscyamine, the mydriatic alkaloid occurring in *Hyoscyamus niger*, *Atropa Belladonna*, and other plants belonging to the natural order Solanaceæ, and it is probable that to the presence of this alkaloid the sedative and anodyne properties of extract of lettuce are due.

That this important constituent has been until now overlooked, is probably due to the fact that in chemical investigations upon lettuce, the dried milk sap, lactucarium, has alone been examined, although its value as a sedative and anodyne is by no means established. The author found that lactucarium of both English and German manufacture was devoid of mydriatic properties and contained no alkaloid whatever.

The fact that lettuce contains a poisonous alkaloid is not of great importance in connection with its use as a vegetable, since it is only used for this purpose in the early stages of its growth, before the bitter milk has been produced, when the hyoscyamine is only present, if at all, in minute quantities. The amount of mydriatic alkaloid in the extract prepared from garden lettuce when in flower is not more than ·02 per cent. Nevertheless, cases have been recorded in which the immoderate consumption of lettuce has led to unpleasant and even fatal results. Lettuce belongs to the natural order *Compositæ*. This is the first occasion on which hyoscyamine has been found in plants not belonging to the natural order *Solanaceæ*.

The author's thanks are due to Messrs. W. Ransom and Son and to Messrs. Wright, Layman, and Umney for furnishing him with specimens and information.

* The substance of a communication made to the Chemical Society on December 3.

AFRICAN COPAIBA "SO-CALLED."

BY JOHN C. UMNEY,

Pharmaceutical Chemist.

During the present year two consignments at least of a copaiferous (?) oleo-resin have been exported by the Niger Company from West Africa to the port of London, the produce, it is said, of the district of the Niger basin. The substance has been offered on several occasions as Balsam Copaiba without finding a bidder or purchaser at public auction. The appearance of such an import is interesting, inasmuch as several species of *Copaifera* are known to be indigenous to tropical Africa,* but the information as to the production of oleo-resins by these species is very meagre, the only description of a secretion of economic value being given by Bennett, who describes *Copaifera Guibourtiana*, known by the natives as the "Kobo" tree, as yielding a copal.

Of the closely allied genus *Hardwickia*, the oleo-resin of certain species of which resembles that of the *Copaifera*, as far as I can learn only one African variety is known, viz., *Hardwickia Mannii*† and it is doubted whether even this is not a species of *Copaifera*.

With such scanty botanical information available, and the exact district of their production at present unascertained, it appeared desirable to compare these African oleo-resins with the products of the South American species of *Copaifera*, with the object of determining their relationship or otherwise by physical and chemical characteristics.

The two oleo-resins from West Africa, which I will designate as (A) and (B), were dissimilar in appearance, due probably to a difference in the manipulation of the two samples.

(A) was light brown in colour, slightly fluorescent, having an aromatic, somewhat piperaceous odour, a specific gravity of 0·987 at 15° C., and on standing deposited a quantity of small crystals. It yielded by distillation with steam 37·9 per cent. of a pale yellow essential oil, which when dried over chloride of calcium distilled at 264°–270° C., and

* 'Pharmacographia' (1874), p. 200; Bentham and Hooker, vol. i., p. 585; De Candolle's 'Prodromus,' vol. ii., p. 509; Oliver, 'Flora of Tropical Africa,' vol. ii., p. 313.

† Oliver, 'Flora of Tropical Africa,' vol. ii., p. 316.

had a specific gravity of 0·9173 at 15° C. The oil was readily soluble in petroleum ether and ether (·735), less soluble in pure ether (·720), and only slightly soluble in rectified spirit and glacial acetic acid. The crystals deposited by the oleo-resin, were repeatedly crystallized from petroleum ether and when pure had a melting-point of 124° C. (uncorrected), had a faint yellow colour, and were distinctly acid in reaction.

(B) was darker in colour, more markedly fluorescent, possessed an aromatic, piperaceous, but slightly empyreumatic smell, and on standing nearly half its bulk separated as an ill-defined crystalline mass. The specific gravity of the oleo-resin, thoroughly mixed, was 1·002 at 15° C. ; but after removal of the deposited mass, the fluid portion had a specific gravity of 0·992 at 15° C. It yielded by distillation with steam 40·2 per cent. of a pale yellow essential oil, boiling from 264°–270° C. (uncorrected) and having a specific gravity of 0·9188 at 15° C. The oil was readily soluble in petroleum ether and ether (·735), less soluble in pure ether (·720), and only slightly soluble in rectified spirit and glacial acetic acid.

The crystals were purified in the same manner as those from (A) and found to have the same melting point (124° C.), and to be distinctly acid. This melting point is somewhat close to that of a crystalline resin obtained by Flückiger* from gurjun balsam (m. p. 126–130° C.), but that body was indifferent, whilst this from the African oleo-resin is markedly acid, distinctly electrical by friction, and appears to resemble in general characters the oxycopaivic acid (melting point about 120° C.), found by Fehling† in a deposit from a Para copaiba. From neither of the oils—of specimens (A) and (B)—could crystals be obtained by passing dry hydrochloric acid gas through them, either at normal temperature or immersed in a freezing mixture, as has been stated to be the case by Soubeiran and Capitaine‡ with Maracaibo oil under similar treatment, but they gave reddish-brown fuming liquids, agreeing with the behaviour of an oil distilled from Para copaiba by those authors.

I have failed, notwithstanding several attempts, to obtain crystals of a hydrochloride by this method, when operating on the oil obtained from the Maracaibo variety, and in this respect, therefore, my experiments confirm those of Brix,§ and show that the formation of this crystalline body from pure copaiba oil appears somewhat uncertain.

A ready test proposed by Flückiger,‖ for distinguishing between copaiba and gurjun balsams, and which has been made official in the United States Pharmacopœia, consists in adding to a solution of the balsam in carbon bisulphide a drop of nitric and sulphuric acids previously mixed and cooled, when in the case of gurjun balsam an intense violet colour is produced.

On applying this test to samples (A) and (B), in comparison with specimens of Maracaibo and Para copaiba, a brownish-red coloration was produced. A sample of gurjun balsam, however, gave a decided and permanent violet.

Neither of the two oleo-resins (A) and (B) lost their fluidity when heated in a sealed tube to 220° C., whilst gurjun balsam similarly treated became quite solid.

That the two African oleo-resins are identical, therefore, admits of little doubt, and their general characteristics resemble in most particulars the South American copaibas, the only commercial varieties with which we have been previously acquainted.

I hope shortly to publish the results of a chemical examination of the crystals and volatile oils obtained from the two African oleo-resins.

* *Pharm. Journ.*, [3], viii., 725.
† *Ann. Ch. Pharm.*, xl., 110.
‡ *Journ. Pharm.*, xxvi., 70.
§ *Monatshefte*, [2], p. 507.
‖ *Pharm. Journ.*, [3], vii., p. 2.

THE TESTING AND VALUATION OF OIL OF CLOVES.*

BY H. THOMS.

One of the most difficult problems in the testing of medicinal substances is incontestably the valuation of essential oils. In some cases, indeed, a valuation has been hitherto out of the question, since the methods recommended or followed for the purpose are of an extremely imperfect nature. This imperfection is due to the fact that in the case of the greater number of essential oils the chemical constituents upon which their value from a therapeutic or technical point of view depends are not known, or if known present great difficulty in their separation quantitatively in a state of purity from accompanying bodies. The time has passed when the testing of medicinal substances, and consequently also of essential oils, could be based solely on external and physical characters, when appearance, odour and taste gave the first bias in forming a judgment, and the honesty of the seller was trusted for the rest.

According to Wallach, before actually trustworthy methods can be worked out for testing essential oils, and a certain judgment as to their genuineness attained, two preliminary conditions must be fulfilled: (1) The substances which occur in essential oils must undergo exact scientific examination as to their chemical behaviour and characteristics, and easily carried out reactions must be available, so as to be able to recognize with certainty the separate constituents; (2) it must be determined within what limits the quantity of the different constituents in genuine oils can vary according to the year and source. In bringing forward the present communication on the testing of oil of cloves, the author claims that he is moving in the direction indicated by Wallach, in that he describes a process which allows of the separation of the therapeutically active and otherwise valuable constituent of this oil in a way that it can be quantitatively determined.

Oil of cloves has a specific gravity of 1·060 to 1·065 and consists chiefly of eugenol, a phenol having the formula $C_{10}H_{12}O_2$ and the constitution—

$$C_6H_3 \begin{cases} CH_2-CH=CH_2 & (1) \\ OCH_3 & (3) \\ OH & (4) \end{cases}$$

The eugenol is accompanied by varying quantities of a sesquiterpene, $C_{15}H_{24}$, very slightly lævorotatory, boiling at 254° C., sp. gr. 0·910 at 15°, and known also as light or indifferent oil of cloves.

The testing of oil of cloves, like that of other essential oils, has hitherto been carried out in very different

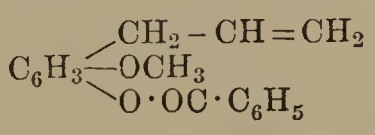
* Abstract of a paper read at the meeting of the Society of Naturalists and Physicians in Halle, and published in the *Pharmaceutische Centralhalle*, October 8.

ways. The good quality of the oil was said to be recognizable by the colour, odour, taste, specific gravity, optical inactivity, and fairly constant boiling-point, as well as by its free solubility in 90 per cent. alcohol. An addition of turpentine oil would lower the specific gravity and the solubility in alcohol. The specific gravity of the oil distilled from clove stalks is given as somewhat lower (1·061 at 15°), but in respect to odour and taste it does not differ from ordinary oil of cloves. In Schmidt's "Lehrbuch der Pharmaceutischen Chemie" it is further stated that if hot water be shaken with oil of cloves it should not after cooling show an acid reaction or be coloured blue or violet with ferric chloride. The determination of the acid and saponification numbers, as recommended by Kremel for essential oils, has been pronounced unsatisfactory by Dieterich, since the limits between the acid and ester numbers are not sufficiently marked and the figures are too low. This is confirmed by the author, who has found that the range of ester numbers, 13·8 to 20·5, given by Dieterich for different sorts of oil of cloves, in no way corresponds to the quantity of eugenol present. The determination of the solubility co-efficient of essential oils in dilute alcohol can scarcely be deemed a decisive test.

The composition of oil of cloves, in the author's opinion, indicates that by far the greatest importance must be attributed to the eugenol as its chief constituent, and therefore that the quantity of eugenol occurring in oil of cloves can be taken as a measure of its value. This assumption is considered to find justification in the fact that recently the action of oil of cloves in tuberculous disease has been attributed solely to the eugenol it contains. In addition the highest priced and best purified sorts of oil of cloves from reliable firms are in most cases the richest in eugenol. The oils of high specific gravity are also reckoned to be the best. For the purposes of perfumery, however, not only the eugenol, but the amount of the peculiar smelling sesquiterpene comes into consideration.

According to this view the determination of the value of oil of cloves will turn upon a simple method for separating the eugenol quantitatively. The known methods are not suitable for the purpose, since relatively large quantities of oil of cloves are required and the isolation of the eugenol is tedious. As is known, the separation is effected by treating the oil of cloves with caustic potash or soda solution, pressing the crystalline paste of eugenol-alkali that forms, taking up the press residue with water, decomposing with hydrochloric acid, washing the liberated eugenol with water, drying it with calcium chloride and then rectifying. It will be evident that a process with all these details will not give quantitatively exact results, especially when only a small quantity of oil is used.

But the author has found that the eugenol can be easily separated quantitatively direct from the oil in the form of the benzoic acid ester, or benzoyleugenol.



This compound, which has recently been recommended for medicinal use, forms in the pure condition colourless and odourless crystals, melting at 70·5° C., neutral in reaction, having a faintly bitter taste, insoluble in water, readily soluble in hot alcohol, chloroform, ether and acetone, and soluble with difficulty in cold alcohol.

The preparation of the benzoyleugenol from eugenol is easily carried out by mixing the eugenol with caustic potash or soda solution, in order to replace the hydroxyl hydrogen by an alkali metal and then adding an equivalent of benzoylchloride. Upon shaking a considerable heating of the mass takes place, which is sufficient to complete the formation of the ester rapidly. A crystalline mass of benzoyleugenol forms upon cooling, which after recrystallization several times from alcohol can be obtained in colourless crystals. The formation of the benzoyleugenol goes on similarly in oil of cloves. But as in this case the result might be affected by the adherence of a small quantity of the sesquiterpene, the crystalline mass, after being washed several times, is heated on a water bath in a definite quantity of 90 per cent. by weight alcohol (25 c.c. where 5 grammes of the oil has been taken). The mixture is stirred until complete solution takes place, then cooled to 17° C. and filtered, sufficient alcohol being added to make up any loss. The filtrate at this temperature contains all the sesquiterpene, together with a small quantity of benzoyleugenol, amounting in 25 c.c. to 0·55 gramme. The crystalline mass is then placed with the still moist filter in a weighing bottle, the weight of which, together with that of the filter, dried at 101° C., has previously been taken and dried at 101° C. until of constant weight. From the weight of this benzoyleugenol, after an addition has been made for the quantity remaining dissolved in the filtrate, the quantity of eugenol present in the oil taken can be calculated in the usual way, the molecular weight of the former compound being 164 and of the latter 268.

A number of samples of commercial oil of cloves from four good sources, indicated by the numerals I., II., III., and IV., have been examined by the author according to this method, and the results, together with the specific gravities, are given in the following table:—

Commercial Description.	Sp. gr. at 17·5°.	Per cent. of Eugenol.
I. Oleum Caryophyllor. nat. . .	1·055	77·04
I. Oleum Caryophyllor. nat. . .	1·058	78·2
II. Clove Oil from stalks . . .	1·059	83·2
II. Clove Oil.	1·057	77·53
II. Clove oil, extra strong . . .	1·0655	90·64
II. Clove Oil, white rectified . .	1·0615	84·1
III. Clove Oil I., yellow	1·0568	76·8
III. Clove Oil II., yellow . . .	1·058	77·35
III. Clove Oil III., yellow . . .	1·059	78·51
III. Clove Oil I., white	1·060	80·88
III. Clove Oil II., white	1·061	81·18
III. Clove Oil III., white . . .	1·0625	81·40
IV. Clove Oil, finest double rectified	1·065	82·70
IV. Clove Oil from stalks . . .	1·062	I. 84·88 II. 84·83
IV. Clove Oil from cloves, extra pale	1·065	82·77
IV. Clove Oil from cloves . . .	1·065	80·89

A glance at this table shows that the percentage of eugenol in oil of cloves generally increases with the specific gravity; but on the other hand must be noted the high proportion of eugenol in the oil from clove stalks, notwithstanding that the specific gravity is low. The lower value usually accorded to the stalk oil finds no justification from this point of view in the above results, and the author thinks that in all cases where a clove oil containing a high proportion of eugenol is desired, the oil distilled from the stalks might be used. It is also thought probable that, besides eugenol and the sesquiterpene, oil of cloves may contain a third body, without which the varying relations between specific gravity and contents in eugenol can hardly be explained.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, DECEMBER 5, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE COUNCIL MEETING.

AT the Council meeting last Wednesday the chair was taken by the VICE-PRESIDENT, who informed the members that since the meeting of the General Purposes Committee on Tuesday evening, the PRESIDENT had found himself too unwell to attend. Mr. BOTTLE'S expression of regret and sympathy was fully responded to, and the business proceedings were then commenced by his moving in reference to the death of THOMAS HYDE HILLS a resolution, acknowledging the great services rendered to the Society in various ways by him. Speaking of the merits of Mr. HILLS in having taken up and so worthily sustained the position of JACOB BELL in regard to the Society, and of the loss that the Society has sustained, he expressed the conviction that the beneficent influence Mr. HILLS had exercised would still remain. He predicted that not only would his memory be perpetuated by MILLAIS' portrait on the walls of the Society's House, but that the good work done by him would be continued by his successor. The motion was seconded by the TREASURER, and cordially adopted by the other members of Council.

The formal appointment of members of the Board of Examiners was then proceeded with, and a vote of thanks was passed to those who have occupied the position of examiner during the past year. The only changes are in the Scotch Board, where the places of Mr. GILMOUR and Dr. INGLIS CLARK have been filled by the appointment of Mr. PETER BOA and Mr. JAMES JACK.

Five persons were elected Associates of the Society. To provide for the conduct of written examinations at provincial centres throughout the country, forty-two persons were appointed Superintendents, and forty-three as Deputy Superintendents.

The report of the Finance Committee presented no unusual feature, save the recommendation that a Committee should be appointed for the purchase of ground rents, as an eligible investment had been missed in consequence of delay in obtaining authority to purchase. In the discussion of this matter the desirability of a general consideration of investment in ground rents was suggested by Mr. EVANS and supported by Messrs. SOUTHALL, ATKINS, ALLEN, GREENISH, and CROSS. The TREASURER, Mr. SCHACHT, and Mr. GOSTLING agreed that this might be done at another time.

A Divisional Secretary for Lewisham was appointed in the person of Mr. W. C. SAYERS, to replace Mr. W. P. WANT, who is unable to continue his services, and the VICE-PRESIDENT expressed the Society's obligation to Mr. WANT for the services he has rendered in that capacity.

On the recommendation of the Benevolent Fund Committee two grants of twenty pounds each, three of ten pounds each, and two of five pounds each, were authorized. A further grant was made of five pounds from the ROBBINS' Fund to an annuitant whose husband had contributed a larger amount to the Benevolent Fund than any other annuitant or annuitant's husband. A letter from Mr. WALTER HILLS was read, together with an extract from the will of his uncle, showing that one thousand pounds had been bequeathed to the Benevolent Fund by Mr. THOMAS HYDE HILLS, free of legacy duty, with directions that this sum shall be applied for securing the election, to orphan schools and asylums, of orphans of persons who have been connected with the Society, and subscribed to the Benevolent Fund for three or more years. Another letter, from Mr. JAMES WILLATS, was read, stating that his uncle, the late Mr. RICHARD WILLATS, of Homerton, had left one hundred pounds to the Benevolent Fund, and also that he desired to continue his uncle's subscription to the Fund. A vote of thanks to these gentlemen for their communications was proposed by the CHAIRMAN and carried unanimously.

PHARMACEUTICAL EDUCATION.

IMPROVEMENT in the position of any section of human society is invariably preceded by an advanced development in the individuals constituting that section. This development, though varying in its direction, is summed up in the word education taken in its widest sense. The general advance in the position of pharmacists during the past half century bears out this statement, being distinctly due to the leavening influence of a few well-educated men upon the mass of their fellows who were stimulated to elevate themselves individually, and so deserve better things as a body.

The tale has been often told and retold, and it is referred to here simply to illustrate the fact, which is too frequently overlooked, that individual self-improvement must precede general advantage in the domain of pharmacy as elsewhere. Every real substantial advantage must be purchased by continual striving and persevering labour. The price, too, must always be paid in advance. We suppose no one nowadays will be found

to deny that the labours of JACOB BELL and his associates were fraught with great and lasting advantage to our body. At the same time it is equally certain that had these leaders not been thoroughly well fitted for their posts their labours would have been in vain. They had specially trained themselves for the vocation they elected to follow, and their commercial prosperity, professional status, and high social position, were essentially due to the fact that they were, in the best sense of the term, men of education. Again, unless those to whom they appealed had decided to follow in their footsteps to the best of their ability, British pharmacists would not to-day occupy their present position. They and their successors must strive to emulate the labours of their predecessors if they would improve or even maintain that position.

All education should be fitted to the requirements of the students and, in the case of the pharmacist, this implies that he should be so taught as to be efficient in all pertaining to the production, preparation, and distribution of medicines. This efficiency depends on the application of methods adapted to the respective natures of the great variety of drugs in the modern materia medica, and the conception of right methods demands an intimate acquaintance with their physical, chemical, and, in some cases, vital properties. An extensive scientific knowledge is required to understand and control the various phenomena exhibited during production; a logical application of principles is necessary to prepare drugs aright; and much skill in technical minutiæ, combined with an intimate acquaintance with men and things, is essential for successful distribution.

Though both physical and biological science are laid under tribute by pharmacists, chemistry is and must be pre-eminent in their curriculum. It is called upon to explain, in some degree, almost every operation in the daily round of the pharmacy. The tyro cannot study it too much or too practically. When he has worked through the syllabus set before him, and seeks advice regarding his after studies, it will certainly repay him best to do more chemistry. It may be feared that the other physical sciences are apt to be regarded as ornamental, the reason being that they are not sufficiently applied by students. It is quite conceivable that improved forms of pharmaceutical apparatus and simplified methods of working might result from the more frequent application of physical data. Botany, which should rank next to chemistry in importance, is likewise often regarded as an unnecessary evil. But it is as impossible to study the vegetable materia medica efficiently without a practical knowledge of plants and their organs, as it is to understand the properties of salts and acids without an acquaintance with the laws of chemistry. The one is as needful as the other in the equipment of the fully educated pharmacist. Doubtless in many instances there have been attempts to study botany without the aid of plants, and perhaps sufficient emphasis has not been laid upon the fact that each vegetable drug represents some particular part of a plant. The new regulations of the examining boards should go far to remedy this state of affairs, by requiring candidates to show a more practical acquaintance with their work, and by allowing sufficient time to test this fully. It is only by a more complete knowledge that students are enabled to estimate properly the respective values of the various subjects in which they are expected to be more or less proficient. A subject may be studied for the sake of the discipline it imparts, rather than to add to one's study of knowledge; but it cannot with reason be said that anything not strictly essential is included in the pharmaceutical curriculum. It is by going beyond this; by continually adding to his store of knowledge; by unceasingly striving to improve his education on every one of its manifold sides, that the pharmacist of to-day may hope to continue the good work begun fifty years ago.

We are requested to announce that the Chemists' Ball will be held on Wednesday, January 20, next at the Portman Rooms, Baker Street, and that the Honorary Secretary, Mr. A. H. Mason, of 46, Jewin Street, will be pleased to receive, as early as possible, the names of those who are willing to act as Stewards.

* * *

The Report just issued by the Local Government Board for 1890, in dealing with the returns of public analysts, refers to the examination of drugs as not having received so much attention "as would be commensurate with the importance of securing the genuineness of medicines." Various instances are mentioned, in which drugs and medicinal preparations were reported to have been adulterated or of inferior quality, but no information is given as to the sources from which the articles were obtained. That circumstance justifies the above-mentioned remark in the Board's report, though probably in a different sense from that in which it was intended to apply. All the drugs and medicinal preparations reported as having been found adulterated were of the kind that are commonly sold by grocers, drysalters and general dealers. It seems desirable, in view of that circumstance, as well for the public interest as in justice to chemists, whose proper business it is to deal in such articles, that the sources from which adulterated articles are obtained should be distinctly indicated in the reports of public analysts. If no such discrimination is furnished, the reports of public analysts upon adulterated drugs, etc., may, and we believe probably do, cast an imputation upon the accredited and proper vendors of such articles which is not justified or in anyway proved to be merited. Probably no better means could be found of securing to the community the supply of genuine medicines than that of showing where they can be obtained with certainty. If chemists, by neglecting the precautions which their special qualifications enable them to apply for ascertaining the purity and quality of the articles

they sell, expose themselves to the risk of being found to supply adulterated articles, they will be themselves to blame for being classed among offenders under the Food and Drugs Act. But if that should be the case the reproach should be made to apply individually, and not in such a way as to throw discredit upon the whole body of chemists. This is an objection to the form in which public analysts' reports upon adulterated drugs are put forward which has already been urged in this Journal, and it is one that is shown to be still requisite by the last report of the Local Government Board.

* * *

The decision of the judges in the recent appeal case relating to the prosecution under the Food and Drugs Act of a vendor of preserved peas coloured by the use of a copper salt does not materially advance the solution of the question whether peas so coloured are injurious to health. Until it is proved that such is really the case, the colouring of peas in that way cannot be regarded either as adulteration, or otherwise an offence under the Food and Drugs Act. The evidence on both sides is evenly balanced, and it is, to a great extent, founded more upon opinion than upon anything less open to dispute. While the matter remains thus open it is of interest to note any facts that have a bearing upon it. In connection with the use of copper salts as a dressing for the foliage of potatoes it has been apprehended that the metal might be introduced into the tubers so as to render them dangerous or unwholesome for use as food. To ascertain how far that may be the case with potatoes to which the copper dressing has been applied, the *Gardeners' Chronicle* reports that Messrs. Veitch, of Exeter, have had analyses made of potatoes so treated and of others undressed. Mr. Bernard Dyer reports that he has found copper to be present, but not in greater amount than one-hundredth of a grain in the pound, and as that was the case with the undressed as well as the dressed potatoes he concludes that this trace of copper must be regarded as normal to the potatoes and not as being due to the dressing.

* * *

The November number of the *American Journal of Pharmacy* quotes a report of the death of a robust woman aged twenty-two, after taking 24 grains of "antikamnia," a nostrum put forward as a remedy for headache, neuralgia, and rheumatism, and said to have for its basis "an amido derivative of benzol." A few minutes after taking the dose the woman became delirious, then unconscious, and death resulted in ten hours. No lesion was discovered after death, but the greater portion of the body was cyanosed and the membranes of the brain were of a sky-blue colour. According to one published analysis of "antikamnia" (*Am. Journ. Pharm.*, April, 1891, p. 182), it would appear to be a mixture of about 47 parts of acetanilide, 50 parts of sodium bicarbonate, and 3 parts of tartaric acid. According to another (*Pharm. Zeit.*, April 22, 1891, p. 255), it is probably a mixture of 70 parts of acetanilide, 10 parts of caffeine and 20 parts of sodium bicarbonate.

* * *

Some time since a Montreal physician, intending to order for a child ten grains of quinine bisulphate in forty powders, wrote "morphia bisulph.," with the result that the pharmacist dispensed morphine sulphate, and the child, after taking a few of the powders, died. The physician admitted his mistake, but attempted to throw the responsibility upon the pharmacist, on the ground that no bisulphate of morphine is known, and that in the number of powders ordered he ought to have recognized a mistake. The pharmacist, on the other hand, argued that he had dispensed the prescription "intelligently," and that the correctness of his conduct was confirmed by the fact that the prescription had been similarly dispensed in New York, Philadelphia, and Boston. To decide the question the father entered an action against both, and at the trial, which took place recently, damages to the amount of 300 dollars were awarded, 50 dollars to be paid by the pharmacist and 250 dollars by the physician. The *Druggists' Circular*, in commenting on the case, expresses the opinion that the decision may serve a good purpose in checking a tendency for the pharmacist to assume responsibilities which should be thrown wholly upon the physician. The disposition to be over-obliging is shown by the fact that in this case several pharmacists had proved willing to dispense a considerable number of morphine powders on a doubtful prescription without ascertaining the use to which they were to be put.

* * *

A case is reported (*Brit. Med. Journ.*, Supp., Nov. 14, p. 157) of a hair-dresser swallowing in a single dose 25 centigrams of pilocarpine and 8 grams of pyrogallic acid, both substances used by him in the preparation of hair washes. Free vomiting took place in a few minutes, followed by profuse sweating, abundant secretion from all the mucous surfaces, contracted pupils, lowered temperature, weak pulse and diminished respiration. The treatment adopted consisted in hot wrappings, hot bottles and hot grog containing $1\frac{1}{2}$ milligram of atropine, under which the patient recovered. The urine, which was suppressed at first, was black, and contained pyrogallol or a derivative and traces of pilocarpine.

* * *

In a letter to the *British Medical Journal*, Mr. Alexander Milne, of Sheffield, suggests that, as a possible means of reducing the number of deaths from chloroform inhalation, a dose of strychnine should be given, either by the mouth or hypodermically before using the anæsthetic.

* * *

At the annual meeting of the Royal Society on Monday last the Royal Medals were presented to Professor Charles Lapworth and Professor A. W. Rücker. The Copley Medal has been awarded to Professor Cannizzaro and the Davy Medal to Professor Victor Meyer.

* * *

Students coming up to the School of Pharmacy during the present session will probably be glad to avail themselves of the recreation provided by the Pharmaceutical Football Club (Association). A private ground has been secured at Harringay Park, North London, and matches have been arranged for Saturday afternoons throughout the season, the results of which may be looked for in the usual papers. Further particulars may be obtained by applying to the Hon. Sec., Pharmaceutical Football Club, 17, Bloomsbury Square, W.C.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, December 2.

Present—

MR. ALEXANDER BOTTLE, VICE-PRESIDENT, IN THE CHAIR,

Messrs. Allen, Atkins, Cross, Evans, Gostling, Greenish, Hampson, Leigh, Martindale, Newsholme, Schacht, Southall, Storrar, and Warren.

The VICE-PRESIDENT said he much regretted that the President was too unwell to be present. He could but express what he knew would be the feeling amongst all his colleagues, one of sympathy with him in what they would all hope was only a slight cold, which would soon leave him free to resume his place amongst them. It would be a very arduous position at any time to have to take the place of Mr. Carteighe, but it was especially so on this occasion, and he hoped, therefore, that any shortcomings would be overlooked, and that he should receive the support of all his colleagues round the table. He regretted also to state that two other gentlemen had written to say they were unable to attend that day. Mr. Watt said there was so much sickness in his neighbourhood that he was not able to leave home, and Mr. Harrison wrote to say that a very important meeting of the Town Council of Sunderland, at which some proposals from the Health Committee, of which he was Vice-Chairman, would be considered, was to be held that day, and he was, of course, expected to be present. He would ask the Treasurer to take the vice-chair.

The minutes of the last meeting were then read and confirmed.

THE LATE THOMAS HYDE HILLS.

The VICE-PRESIDENT said, before proceeding to the ordinary business of the Council, it was his painful duty to make a few observations with regard to an event which had taken place since the last meeting. He referred to the death of their old friend, Mr. Thomas Hyde Hills. On the previous evening the President drew up a resolution which he had intended to move, in doing which the President would have spoken on the merits of their friend much more eloquently than he could do. The resolution was:—

> "That this Council learns with the deepest regret the death of Thomas Hyde Hills, who for more than twenty years was a valued member of the Council, and who, during that time, ably and zealously filled in succession the important offices of Vice-President, Treasurer and President. The members of this Council also desire to record their sense of the services he rendered to the Society, and the generosity which has always marked his active interest in the work of the Benevolent Fund. They offer their warmest sympathy to Mr. Hills' family in the loss which they have sustained."

He did not intend to enlarge very much on this very comprehensive resolution; but it had been his privilege to know Mr. Hills perhaps better than any other member round the table. His recollection went back to the death of Jacob Bell, whose funeral he attended in company with Mr. Hills and very many old friends, most of whom had now passed away. From that time Mr. Hills came amongst them, and no member of the Council took more interest in the Council work or the affairs of the Society, and of those connected with it, than Mr. Hills. It was his privilege to be Vice-President during the time Mr. Hills was President, and then especially, as well as before and since, he had the privilege to live in very close communion with him. He had seen him since his death, and traced in his features what he remembered of him in his better days. They must have all regretted that a man capable of doing so much should for ten or twelve years have been debarred by infirmity and sickness from doing that which he might otherwise have done. In speaking of Thomas Hyde Hills one could not but feel that though he was gone his influence would remain; not only would his features be perpetuated on the walls of the Society's house, but the good which he had done, and especially the interest he took in the rising generation of pharmacists, would be handed on from generation to generation. He could say no more, and would conclude by reading the telegram he had received from the President. "Too hoarse to speak; hope Council will excuse me. Regret keenly not able to pay my tribute to affectionate devotion to Society of friend Hills."

The TREASURER, in seconding the motion, said he could not boast of having had a very close intimacy with the friend they had lost, but he had had the privilege of sitting at that table with him for several years, and he fully accepted the estimate which had been given of Mr. Hills' great services. Mr. Hills was not only exceptionally kind to the Society, but exceptionally kind in bringing forward the younger members who were striving to come to the front. That was a very marked feature in his character; whenever he knew a young man who wanted help and countenance he was always ready, and he gave very remarkable help in the early career of several distinguished members of the trade. They all knew what he did for the Benevolent Fund, and what he would have done for the Society had his health enabled him to continue at the board. Like all good men who strove to make the world better, when he died he left behind him a force which was not spent, and which he ventured to say never would be spent. It was a species of immortality which remained here, and was added to the great force of good which the world carried forward. He was quite sure that Mr. Hills' life had added materially to that force, and could only hope that many others would follow in his footsteps and copy his example.

Mr. GREENISH said it had been his privilege to know Mr. Hills for about forty years, and though he would not take up time by repeating what had been said by the Vice-President and the Treasurer, he could thoroughly endorse everything which they had expressed.

Mr. SCHACHT said he had not had so intimate an acquaintance with Mr. Hills as many present, and his relations with him were rather those of a fellow worker than a personal friend; but that, perhaps, gave him an equal right to speak. What always struck him was the devotion with which Mr. Hills fulfilled his duties, and the kindly nature of the processes which he always adopted. He should also like to say a word as to the catholic spirit which pervaded all of his efforts for the welfare of all those belonging to the craft. He happened to be Treasurer of the Pharmaceutical Conference in its earlier days, at the time when Mr. Hills made his first donation, which he afterwards increased, towards founding his scheme for presenting books to the respective towns which the Conference visited. About that time there was supposed to be a feeling in the Council (which he was quite sure did not exist) that the Conference was in some degree a movement in opposition to the Society. Mr. Hills, with that largeness of view for which he was eminently conspicuous, saw the absurdity of that supposition, and came forward handsomely to show by his practical co-operation that he regarded the Conference as a friend and not as an enemy. Pharmacy and all connected with it had lost a valued friend in Mr. Hills.

Mr. ATKINS desired to add his personal tribute to

the memory of Mr. Hills, as this was the last opportunity practically of doing so. It was about thirty years since he first knew Mr. Hills, and twenty-one years since he began to know him intimately. About that period Mr. Hills called on him in Salisbury, and on taking him for a moonlight walk round the beautiful cathedral, he had said if it was not too far he should like to walk over to the memorial church to George Herbert. That was the first opportunity he had of knowing Mr. Hills at all intimately, and what struck him that night was his intense love of art, his appreciation of the beauty of art, and his great interest in English literature. He had known Mr. Hills for many years at the Council, he knew him in the prime of his life and powers, and he ventured to say that they had never had amongst them a more frank, kindly and loving man. He agreed with what had been said by the Treasurer as to his recognition of young men, and one of the things which most struck him was his utter absence of jealousy with regard to men who succeeded and came to the front in the pharmaceutical or scientific world. He had never heard from him one single disparaging word with regard to such men. It was needless to dwell on his generosity, of which they had had such substantial proofs, and the hospitable reception at his private residence in days gone by would never be forgotten by those who were present. As a country member and an old friend of Mr. Hills he supported the motion with all his heart.

Mr. STORRAR said those who had spoken had all been personal friends of Mr. Hills, but he, who had not known him personally, but yet had known and respected his work, might be permitted to say how much he sympathized with the remarks which had been made and with the resolution submitted. He represented a very large majority of the Society who had not known Mr. Hills personally, but none the less they looked upon his removal as a very great loss to the Society and to themselves. By his death another of the few remaining links connecting them with the founders of the Society had been snapped, but the name of Mr. Hills would be remembered by all British pharmacists. He was glad also to hear Mr. Atkins refer to the fact that he was something more than a pharmacist, that he was also an accomplished scholar, and a gentleman who patronized both art and literature as well as science, and it was a double loss, therefore, when a man of this type was removed from their ranks.

Mr. MARTINDALE desired to add his tribute to those which had already been laid on the tomb of Mr. Hills, and in particular to state how valuable his assistance had been to him at one period of his career, when he helped him in attaining a position which had had a most important influence on all his future life. He had also known him as Chairman of the Board of Examiners, and could speak to the kindly interest which he took in the students, and the sympathetic and encouraging way in which he always spoke to those who unfortunately were rejected.

Mr. GOSTLING felt that if he were to attempt to say much on this occasion he should be multiplying words without wisdom, but he must add his testimony to the kindliness and the deep interest which Mr. Hills always showed in the interests of the Society. His knowledge of him was much more limited than that of several gentlemen present, but he had had the pleasure of sitting on the Council with him for three or four years, and he could not do so without noticing the deep interest which he manifested in everything which related to the Society. They had lost in him one of the best friends the Society had ever had.

Mr. ALLEN said he had not enjoyed the personal friendship of Mr. Hills, as many of his seniors could boast, but he had the privilege some years ago of being in his employment, and he should like to say how much he regretted his loss, and that the privilege of being engaged in the house of which Mr. Hills was then the honoured head had had a great deal to do with any subsequent success he might have met with. Of course, at that time he could not expect to have the personal friendship of Mr. Hills, but he was able to say that Mr. Hills always had the interests and welfare of all his staff thoroughly at heart, and their comfort was always carefully considered, mainly through the personal interest taken by Mr. Hills.

The motion was then put and carried unanimously.

APPOINTMENT OF BOARDS OF EXAMINERS.

The Council went into committee to consider the names of gentlemen to be appointed examiners for the ensuing year.

On resuming the following were appointed the—

Board of Examiners for England and Wales.

Blunt, Thomas Porter, Wyle Cop, Shrewsbury.
Bowen, John William, 13, Curzon Street, Mayfair, W.
Corder, Octavius, 31, London Street, Norwich.
Davies, Robert Higgins, Apothecaries' Hall, E.C.
Druce, George Claridge, 118, High Street, Oxford.
Fletcher, John, 12, Montpellier Avenue, Cheltenham.
Gerrard, Alfred William, University College Hospital, W.C.
Greenish, Thomas Edward, 30, Conduit Street, W.
Holmes, Walter Murton, 7, Belgrave Mansions, Grosvenor Gardens, S.W.
Ransom, Francis, Bedford Road, Hitchin.
Saul, John Edward, 143, New Bond Street, W.
Symons, Wm. Henry, 130, Fellowes Road, South Hampstead, N.W.
Tanner, Alfred Edward, Bruce Grove, Tottenham.
Taylor, George Spratt, 13, Queen's Terrace, St. John's Wood, N.W.

The following were appointed the—

Board of Examiners for Scotland.

Boa, Peter, 119, George Street, Edinburgh.
Dott, David Brown, 104, South Canongate, Edinburgh.
Gibson, Adam, Thistle Street Lane East, Edinburgh.
Jack, James, 102, High Street, Arbroath.
Kinninmont, Alex., 69, South Portland Street, Glasgow.
Maben, Thomas, 5, Oliver Place, Hawick.
Nesbit, John, 162, High Street, Portobello.
Stephenson, John Bertram, 48, Frederick Street, Edinburgh.

It was resolved unanimously:—

"That the cordial thanks of the Council are due and are hereby given to each of the members of the Board of Examiners for England and Wales and in Scotland for his services during the present year."

ELECTIONS.

The following, having passed the Minor examination and previously paid as "Apprentices or Students" their subscriptions for the current year, were elected "Associates" of the Society:—

Dimbleby, James Orlando.....Attercliffe.
Gill, William Sharpe .....Boston Spa.
Parker, John Robert .....York.
Stevenson, Andrew.....Kilmarnock.
Walker, Richard Thomas .....Wigan.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and fine.

RESTORATION TO THE REGISTER.

The name of the following person, who had made the required declarations and paid a fine of one guinea,

was restored to the Register of Chemists and Druggists:—

Leonard Thompson, 351, Berridge Road, Nottingham.

Superintendents of Written Examinations.

The following are the gentlemen who were appointed Superintendents and Deputy-Superintendents of written examinations for the ensuing year:—

Superintendents.

Aberdeen	Strachan, Alexander.
Aberystwith	Wynne, Edward Price.
Birmingham	Thompson, Charles.
Brighton	Gwatkin, James Ross.
Bristol	Stroud, John.
Cambridge	Deck, Arthur.
Canterbury	Bing, Edwin.
Cardiff	Munday, John.
Carlisle	Hallaway, John.
Carmarthen	Lloyd, Walter.
Carnarvon	Jones, John.
Cheltenham	Barron, William.
Darlington	Robinson, James.
Douglas, Isle of Man	Radcliffe, John C.
Dundee	Hardie, James.
Edinburgh	Stephenson, John B.
Exeter	Lake, John Hinton.
Glasgow	Kinninmont, Alexander.
Guernsey	Nickolls, John Bate.
Hull	Bell, Charles Bains.
Inverness	Bethune, William John.
Jersey	Cole, George.
Kirkwall	Stewart, Duncan.
Lancaster	Vince, James.
Leeds	Reynolds, Richard
Lincoln	Maltby, Joseph.
Liverpool	Parkinson, Richard.
London	Taylor, George Spratt.
Manchester	Benger, F. Baden.
Newcastle-on-Tyne	Martin, Nicholas Henry.
Northampton	Bingley, John.
Norwich	Sutton, Francis.
Nottingham	Parker, William Henry.
Oxford	Prior, George Thomas.
Penzance	Shakerley, Benjamin.
Peterborough	Heanley, Marshall.
Plymouth	Hunt, Freeman W.
Sheffield	Ward, William.
Shrewsbury	Cross, William Gowen.
Southampton	Dawson, Oliver Robert.
Worcester	Virgo, Charles.
York	Sowray, Joseph.

Deputy-Superintendents.

Aberdeen	Clark, James.
Aberystwith	Ellis, Robert.
Birmingham	Perry, George Edward.
Brighton	Savage, William Wallace.
Bristol	Pitman, John.
Cambridge	King, George.
Canterbury	Amos, Daniel.
Cardiff	Coleman, Alfred.
Carlisle	Pattinson, Michael Herd.
Carmarthen	Williams, Joshua Edward.
Carnarvon	Jones, David.
Cheltenham	Fletcher, John.
Darlington	Hutchinson, Rev. E.
Douglas, Isle of Man	Young, John.
Dundee	Hardie, James Miller.
Edinburgh	Ewing, James Laidlaw.
Exeter	Harris, Henry William.
Glasgow	Davison, Thomas.
Guernsey	Carré, James Hilary.
Hull	Stoakes, Benjamin M.
Inverness	Bethune, William John.
Jersey	Baker, John Thomas.
Kirkwall	Webster, Rev. D.
Lancaster	Arkle, William.
Leeds	Branson, Fredk. Woodward.
Lincoln	Battle, John Scoley.
Liverpool	Hocken, Joshua.
London	Allen, Charles Bowen. Moon, Harry.
Manchester	Midgley, Charles.
Newcastle-on-Tyne	Stuart, Charles Edward.
Northampton	Mayger, William D.
Norwich	Corder, Octavius.
Nottingham	Patchitt, Edwin Cheshire.
Oxford	Thurland, Henry.
Penzance	Symons, Netherton H.
Peterborough	Saunders, James Edwin.
Plymouth	Woods, William Herbert.
Sheffield	Morrison, Charles Orr.
Shrewsbury	Blunt, Thomas Porter.
Southampton	Spearing, James.
Worcester	George, Henry.
York	Kendall, Edward Basnipp.

Report of the Finance Committee.

The report of this Committee was of the usual character, and included a recommendation that sundry accounts should be paid. Also that the President, Vice-President, Treasurer, and Messrs. Hills and Martindale be appointed a Special Committee to purchase suitable ground rents out of the Consols now standing to the credit of the Benevolent Fund donation account.

The Vice-President, in moving the adoption of the report and recommendations of the Committee, said the only portion of it which required comment was that referring to the appointment of a Committee to purchase ground rents. It was found the other day that an eligible investment had slipped through in consequence of the delay required to obtain authority to purchase, and for that reason this Committee had been suggested.

Mr. Evans thought it would be well if the whole question of investment in ground rents were reconsidered, in view of probable legislation in the future. He should like to know the particulars of the most recent purchases made.

The Secretary said he could not give full particulars at the moment, but the Benevolent Fund investments paid about 4 per cent.

Mr. Evans said he thought the President had recently stated that it was difficult to find ground rents which would yield 4 per cent.

The Vice-President said that was the reason why the President suggested the appointment of this Committee, so that any opportunity which offered might be taken advantage of.

Mr. Evans suggested that the field of operations might be extended. Ground rents in Manchester or Liverpool would be as remunerative as in London. Personally he did not approve this class of security at all.

Mr. Southall thought it was a doubtful policy to invest all the Benevolent Fund in ground rents. It was much better to have a variety of investments. He did not think there was any immediate fear of legislation affecting ground rents, but they could not tell what might happen in the future.

The Treasurer said it was very desirable, if Mr. Evans or any other member held strong views on this question, that they should take the usual steps to have the matter discussed, but it could not very well be gone into then. In the meantime there was a certain sum requiring to be invested, and though legislation might interfere with ground rents, other investments also were liable to fluctuations.

Mr. Evans said he thought it was his duty to call attention to the subject when the resolution was

brought forward. He should be prepared to give a notice and have the whole question discussed.

Mr. ATKINS thought Mr. Evans was quite right to raise the question, and he had no objection to its being thoroughly discussed on a proper occasion, though personally he believed ground rents were the best investments for such funds. He supposed this Committee would present a report.

The VICE-PRESIDENT said no; the object of the resolution was to enable the Committee to conclude a purchase at once.

Mr. ALLEN thought the whole question of investments in ground rents might be brought up at a future time, but the object of the present recommendation was to enable the Committee to purchase forthwith. The amount it could dispose of was comparatively small, and suitable investments being well within the reach of individual purchasers, it was found they were snapped up before the Council could act. The interests of the Society would be quite safe in the hands of the gentlemen named.

Mr. SCHACHT pointed out that the resolution only referred to the investment of the Consols now in hand. When the funds again accumulated the question could be again raised.

The TREASURER said Mr. Evans must not suppose that he objected to his raising the question.

Mr. GOSTLING supported the motion, especially as the Council had just lost a good investment in ground rents. Negotiations had been carried on, and the Secretary was instructed to draft a letter directing the Surveyor to view certain premises which had already been inspected by some of the Committee, when a telegram was received saying the property was sold.

Mr. GREENISH thought it would be well if a committee were appointed to consider the whole question of investment in ground rents.

Mr. CROSS, while agreeing in the propriety of Mr. Evans raising the question, hoped that the Committee would not only be appointed, but would find an investment for the money in hand before the next meeting of the Council.

Mr. EVANS asked whether the Committee was confined to London ground rents or had it a free hand to investment on ground rents anywhere.

The VICE-PRESIDENT said the Committee would have a perfectly free hand, but, at the same time, it was desirable, other things being equal, to make purchases within the London district, because the property would be more under the supervision of the Council and office, and would be less expensive in dealing with in every way.

The motion was then put and carried unanimously.

DIVISIONAL SECRETARY.

It was resolved that Mr. W. C. Sayers be appointed Divisional Secretary for Lewisham, in the place of Mr. W. P. Want, who is unable to continue his services in that capacity.

The VICE-PRESIDENT said the Society was indebted to Mr. Want for his valuable services during the time he had held the post of Divisional Secretary.

REPORT OF THE BENEVOLENT FUND COMMITTEE.

The report of this Committee included a recommendation of the following grants:—

£10 to the widow of an associate and subscriber to the Fund. Applicant was left in April last with no means of supporting herself and three children of her deceased husband by his first wife. The grant is made for the benefit of the two younger children. (Chester.)

£10 to a registered chemist and druggist (age 49), who has been in business in several places, but had to give up in August last, and is suffering from the effects of paralysis. (London.)

£5 to the widow (age 60) of a registered chemist and druggist who had a similar grant in December, 1883. Earns very little, and is in precarious health. (Sheffield.)

£10 to the widow (age 61) of a member and subscriber. Applicant had a similar grant last year. (Doncaster.)

£20 to the widow (age 65) of a former member and annuitant, who died in 1887. Applicant has five children, but only one is able to render her any assistance. (London.)

£5 to the widow (age 65) of a registered chemist and druggist, who has had three previous grants, the last in January, 1887. (Brighton.)

£20 to a registered chemist and druggist (age 77) who was fifty years in business in a country town, but it gradually declined and had to be given up four years ago, since when his resources have been gradually exhausted. Is in ill health. (London.)

Two other cases the Committee had declined to entertain.

Robbins' Fund.

The Committee recommended that £5 from the Benevolent Fund be given to Mrs. Caroline C. Davies, her late husband having contributed a larger sum to the Benevolent Fund (£13 13*s.*) than any annuitant or the husband of any annuitant now on the list.

The VICE-PRESIDENT moved the adoption of the report and recommendations, which was carried unanimously.

LEGACY FROM MR. THOMAS HYDE HILLS.

The VICE-PRESIDENT also read the following letter which had been received from Mr. Walter Hills:—

"Michael Carteighe, Esq.
"*President of the Pharmaceutical Society of Great Britain.*"

"225, Oxford Street, W.,
"*November* 30, 1891.

"Dear Mr. President,—I enclose an extract from the last will of my uncle, the late Thomas Hyde Hills, showing the bequests he has made to the Pharmaceutical Society.

"The will has not yet been proved, but it will be proved so soon as the necessary arrangements can be made. The executors are the Rev. W. H. Grove, myself, and Sir Arnold White.

"Yours faithfully,
"WALTER HILLS.

[*Extract.*]

By his will, dated February 20, 1883, Mr. Thomas Hyde Hills, who died on November 19, 1891, makes the following bequests:—

"I give the portrait of my late kind friend Jacob Bell, painted in two hours by Sir Edwin Landseer, and presented to me by the said Sir Edwin Landseer, and also the portrait of myself, painted in three hours by John Everitt Millais, R.A., and presented to me by the said John Everitt Millais, to the Pharmaceutical Society of Great Britain free from legacy duty. And I declare that the receipt of the President of the said Society shall be a sufficient discharge for the same.

"I give to the Benevolent Fund of the said Pharmaceutical Society the sum of one thousand pounds, to be paid with the legacy duty thereon out of such part of my personal estate as may by law be given to charitable purposes, and preferably to all other payments thereout, and the receipt of the President of the said Society shall be a sufficient discharge for the same. And I direct that the said legacy shall be invested and the income be applied in the discretion of the President and Council of the said Society for the purpose of assisting or purchasing the election of orphans of members and associates of the Society (who have been sub-

scribing members to the said Benevolent Fund for three years and upwards), to orphan schools or asylums."

LEGACY TO THE BENEVOLENT FUND.

The VICE-PRESIDENT also read a letter which had been received from Mr. James Willats, stating that his uncle, Mr. Richard Willats, of Homerton, had left £100 to the Benevolent Fund, which he should be pleased to hand over in a few days, and also desired to continue his uncle's subscription to the Fund.

The VICE-PRESIDENT said he would propose that a vote of thanks be recorded to the gentlemen who had made these communications. It was very gratifying to find that Mr. Willats was disposed to continue the good work which his uncle had commenced in his lifetime. With regard to Mr. Hills, he could only say that it was just what he should have expected of him. Knowing the interest he took in the Benevolent Fund he was not at all surprised at the gift.

The motion was then put and carried unanimously.

REPORT OF THE LIBRARY, MUSEUM, LABORATORY AND HOUSE COMMITTEE.

Library.

The report of the Librarian had been received, including the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
October	Day . .	644	37	14	24
	Evening .	219	16	3	10

Circulation of books.	Total.	Town.	Country.	Carriage paid
October . . .	213	123	90	£1 6 6

Donations to the Library had been reported (see p. 389), and the Committee had directed that the usual letter of thanks be sent to the respective donors.

The Committee recommended that the undermentioned books be purchased :—

For the Library in London—

See (A. B.), The Microtomist's Vade-Mecum, 2nd ed., 1891.

Binz (C.), Vorlesungen der Pharmakologie, 2. Aufl., 1891.

Museum.

The Curator's report had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
October	Day . .	640	41	3	23
	Evening	121	11	1	4

Donations to the Museum had been reported (see p. 389), and the Committee had directed that the usual letter of thanks should be sent to the respective donors.

The members of the School staff had attended and reported on their respective classes.

International Congress.

The Committee had further considered M. Bocquillon-Limousin's letter, and no communication having been received from the Secretary of the International Congress in Brussels, to whom a letter of inquiry had been sent, it was recommended that M. Limousin be informed that having regard to the possibility of a congress being held in Chicago in 1893, it was not thought desirable to hold one in Europe in that year.

Meetings in Provincial Centres.

The question of holding meetings of the Society annually at provincial centres had been again considered. The Committee recommended that the Executive of the British Pharmaceutical Conference be invited to a friendly conference on the subject with the President, Vice-President, Treasurer, Mr. Atkins and Mr. Schacht.

Research Laboratory Certificate.

The Committee had considered the question of the desirability of granting certificates to those who had done good work in the Research Laboratory at the end of their term, and recommended that such certificates be granted by the Council on the recommendation of the Research Committee. A form of certificate had been approved.

The Committee recommended that, in accordance with Mr. Thomas Hanbury's desire, a copy of the 'Science Papers' be in future presented to each of the silver medallists in the sessional examination in materia medica and pharmacy.

The VICE-PRESIDENT moved the adoption of the report and recommendations of the Committee, which was at once agreed to.

EVENING MEETINGS.

The VICE-PRESIDENT said he was happy to be able to announce that arrangements had been made with Professor Armstrong to deliver four lectures on "Fermentation," the first of which would take place on Wednesday, the 16th inst. The members of the Society were much indebted to Professor Armstrong for his courtesy in undertaking to deliver the lectures.

REPORT OF THE GENERAL PURPOSES COMMITTEE.

This report included the usual letter from the Solicitor as to cases placed in his hands. Several cases are standing for trial, and one defendant had paid a penalty and costs into Court.

A number of cases of alleged infringement of the Pharmacy Acts had been reported to the Committee, and in certain cases proceedings were recommended.

Two letters had been received from coroners in Kent and Sussex, containing particulars of deaths through weed-killers.

The Committee recommended that in future the Journal be wired with one staple.

An estimate for printing the Register and Calendar had been considered and it was recommended that 900 Calendars and 1700 Registers for 1892 be printed.

The Committee having considered a letter from the Society's Local Secretary in Birmingham, recommended that Mr. F. H. Prosser be appointed Assistant Local Secretary for the northern portion of Birmingham.

The Council went into Committee to read and consider the above report. On resuming, the report and recommendations were unanimously adopted.

LOCAL SECRETARIES IN SCOTLAND.

The VICE-PRESIDENT read a letter from the Executive of the North British Branch, enclosing the following resolution :—

"That in the opinion of this Executive a considerable addition ought to be made to the number of local secretaries in Scotland, and that the country should be divided into areas, for each of which a local secretary could be appointed."

He would suggest that this resolution be referred to the Library, Museum, etc., Committee, for consideration.

This was agreed to.

DONATION TO THE SOCIETY.

The VICE-PRESIDENT moved that the best thanks of the Council be given to Mr. Alexander Kinninmont for his handsome donation of a binocular microscope and a micro-spectroscope to the Society. These instruments were very valuable and would be of great use to the Society. He believed they would be kept in the Society's premises in Edinburgh.

The motion was carried unanimously.

LEEDS CHEMISTS' ASSOCIATION.

The VICE-PRESIDENT read a letter of thanks for the grant recently made to this Association from the Secretary.

BENEVOLENT FUND GENERAL MEETING.

ELECTION OF ANNUITANTS.

A General Meeting of the Members and Associates of the Pharmaceutical Society and of the Subscribers and Donors to the Benevolent Fund, was held at the house of the Society, 17, Bloomsbury Square, on Thursday, December 3, at 12 o'clock, for the election of SIX ANNUITANTS.

Mr. ALEXANDER BOTTLE, Vice-President, in the chair.

The notice convening the meeting was read by the Secretary.

Scrutineers were appointed, who examined the voting papers.

On bringing up the report the Chairman said :—The Scrutineers who were duly appointed at "the meeting for the election of six annuitants on the Benevolent Fund of the Pharmaceutical Society" have examined all the voting papers which have been placed before them, and have unanimously agreed to submit the following report :—

Scrutineers' Report.

We, the undersigned Scrutineers, appointed at the twenty-seventh election of Annuitants on the Benevolent Fund of the Pharmaceutical Society of Great Britain, do hereby certify that we have examined the voting papers committed to us, and report the following result :—

Barker, Joseph	999
Bensley, Harriett M.	3649
Cheetham, George	1183
Harvey, Charles G.	3114
Kent, Alfred	1279
Machon, Henry	4338
Mumbray, Rebecca	1561
Pearce, James	1345
Rowan, Mary B.	4651

* 3954 voting papers were received, of which number 95 were informal (59 unsigned and 36 incorrectly filled up), representing a total of 296 invalid votes, and were disallowed.

EDWARD N. BUTT, *Chairman.*

W. PRIOR ROBINSON.	H. BATE.
JOHN C. UMNEY.	GEO. WYLDE.
W. MURTON HOLMES.	F. G. CURTIS.
J. ORD SMITH.	JOHN T. WALLIS.
EDWARD B. STAMP.	J. C. HYSLOP.
W. J. PINCHEN.	JOHN GOODWIN.
HENRY C. BIRCH.	W. THACKER.
H. A. THOMAS.	MAURICE HOWELL.
G. J. R. PARKES.	G. GOLDFINCH.
A. E. TANNER.	B. H. PAUL.
SIDNEY E. TENCH.	

December 3, 1891.

The VICE-PRESIDENT then declared the following six duly elected Annuitants :—

Rowan, Mary B.
Machon, Henry.
Bensley, Harriett M.
Harvey, Charles G.
Mumbray, Rebecca.
Pearce, James.

On the motion of the Vice-President a vote of thanks was recorded to the Scrutineers, which was acknowledged by the Chairman.

* 6088 voting papers issued.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting held on Thursday, November 26, Mr. W. Lloyd Williams, President, in the chair, the following paper was read on—

DRUGS AND PREPARATIONS IN USE IN DENTAL SURGERY.

BY W. RUSHTON, L.D.S., ENG.

Some time ago I was requested by one of your energetic Secretaries to read a paper before this Association. He suggested at the same time that the subject of "Drugs and Preparations used in Dental Surgery" might prove interesting. I accordingly ask your kind attention for a very brief period, while I touch upon this subject.

And first of all it may not be uninstructive to glance for a moment at the medicaments and appliances of a former age, used in dental surgery.

In an interesting volume lately edited by Mr. Weddell, entitled 'Arcana Fairfaxiana'* (a review of which, with special reference to dental surgery by myself, will be found in the *Dental Record* of July and August last), will be found many quaint and curious recipes. Some of these, for the teeth, are still used to this day, others have mercifully fallen into disuse.

Among the useful remedies in vogue three centuries ago was "Pellitory of Spaine," infused in strong vinegar, used to "draw the rewme from the gummes." The root after being infused was made up in pellets and chewed.

Another useful preparation was "white arsenic." This is used still in our everyday work, mixed with morphia or other drugs under proper precautions for devitalizing tooth pulps. The original recipe written, I should imagine, about 1640 or so, is as follows :—"For the toothache. Take white arsenicke and bole arminiack, of each a little quantity ; make these up into a small pellet with a drop of aqua vitæ, a drop of sallet oyle and a little lint ; stop therewith the hollow of the grieved tooth two or three houres ; swallow not, but spit out the rheum that shall flow into the mouth, and let not the party sleep while it is in the mouth." I have no doubt this remedy, though useful when its action is understood, used ignorantly and in the aforesaid fashion, did much more harm than good in most cases of toothache.

Another sensible recipe was "Crude opium and camphire of each a grain, putt y^m into a bag and hold to y^e teeth."

But what shall we say to the following :—"To pull out a tooth—Take worms when they be a-gendering together, dry them upon a hott tyle-stone, make powder of them, and what tooth y^u touch w^{th} it it will fall out." Or, "Take wheat-flour and mixe it w^{th} y^e milk of spurge and thereof make a paste or dowe with y^t, w^{ch} fill y^e hollow of y^e tooth and leave it in a certain time and y^e tooth will fall out." I should think it would require to be left in a very *un*certain time. I could give you some more extraordinary "cures," such as dropping plantain juice into the ear on the opposite side to the aching tooth, etc., but I will not tax your patience.

I think I may say that dental surgery from the time of which we have just been speaking down to thirty years ago was in an utterly non-progressive state. Men like Hunter and Bell took up the subject of the teeth with more or less enthusiasm and success, but it

* 'Arcana Fairfaxiana Manuscripta,' a M.S. volume of apothecaries lore, nearly three centuries old, used and partly written by the Fairfax family, edited by Mr. George Weddell. Messrs. Mawson, Swan and Morgan, Newcastle-on-Tyne ; and Elliot Stock, Paternoster Row.

was reserved for the veteran dentist, Sir John Tomes, to reduce dental surgery in this country to an exact science, and to place it in that respect on a plane with any other branch of special surgery. We have still much to learn, but the main causes of dental caries, of toothache, of alveolar abcess or gumboil, and of dental neuralgia are now fully understood and made subservient to treatment.

For sensitive dentine the drugs chiefly used are escharotics, and include carbolic acid, chromic acid (which must be used with great caution), nitrate of silver (which has the disadvantage of staining the dentine black), and chloride of zinc.

When the pulp of a tooth is exposed by caries it may have to be destroyed by an application of arsenious acid. The acid may or may not be used mixed with morphine or cocaine. I have not found either of these drugs much good in allaying the pain caused by the arsenious acid. Strong nitric acid has also been used, but this has many disadvantages, the chief being the dangers in application and the disintegrating action of acid upon tooth tissues. The well known action of pepsin has also been taken advantage of, but this digests the pulp so slowly that it is of little use, besides being uncertain.

The drugs chiefly in use for allaying pain in exposed pulps, are chloroform, chloral hydrate crystal wrapped in wool, spirit of camphor, cocaine, oil of cloves, carbolic acid, and boracic acid.

A very difficult branch of our art consists in dealing with the tooth pulp after it has been destroyed by drugs or by a natural process of inflammation. It is difficult to withdraw it from the root, and when decomposition has set in the difficulty of treating the root so as to render it perfectly sweet and aseptic is increased tenfold. Every antiseptic, new and old, has been used with varying success, and any new preparation is eagerly tried. The chief drugs used are as follows:—creosote, solution (aqueous or spirituous) of perchloride of mercury (this darkens the teeth), iodoform (the unpleasant taste and odour are drawbacks to the use of this drug), oils of cloves and eucalyptus, alcohol, permanganate of potash, thymol, myrtol, carbolic acid, creolin, beta-naphthol, etc.

It may be interesting in this communication to give the results arrived at by the eminent bacteriologist, Dr. Miller, of Berlin, as regards the comparative efficacy of various antiseptics. His conclusions are very interesting, and in some cases surprising; but it must be borne in mind that his experiments on the tooth pulp were viewed not only from the purely antiseptic standpoint, but also from the view of penetration; as naturally an antiseptic cannot be spread over a surface, but has to be applied at one end of the pulp, and has to work its way down.

The result of Dr. Miller's experiments* are summed up as follows:—

"(1) Antiseptics pre-eminently active in preventing decomposition of pulp tissue. Bichloride of mercury powder, cyanide of mercury (?), trichlorphenol, sulphate of copper, carbolic acid, oil of cinnamon, chloride of zinc, campho-phenique (?), hydro-naphthol (?).

"(2) Those of doubtful value:—Thymol, salicylic acid, eugenol, α- and β-naphthol, acetico tartrate of aluminium, 5 per cent. solution of bichloride of mercury, and possibly some essential oils.

"(3) Those nearly or quite worthless:—Iodoform, basic aniline colouring matters, borax, boracic acid, chloride of lime, peroxide of hydrogen, sozoiodol salts, iodol, tincture of iodine, spirit of camphor, naphthalin, the double cyanide of mercury and zinc and many essential oils.

"Resorcin, thallin, sulphocarbolate of zinc, oil of birch, iodide of sodium, nitrite of sodium and some other substances, have not yet been sufficiently tested to permit of forming an estimate of their value though some of them seem to promise well."

These experiments cannot, I think, be taken to determine the respective action of those drugs otherwise than in the presence of an infected pulp.

Roughly speaking, Dr. Miller's plan was to infect a fresh pulp of a tooth of the calf, dog, etc., at one end, apply the antiseptic at the other end, place in a tube of nutritive agar-agar, and let them fight it out for a longer or shorter time, then remove, withdraw the pulp and place it on the surface of a plate of nutritive agar-agar. If the antiseptic won the day no bacteria developed around the pulp and *vice versâ*.

In this way crystals of iodoform were seen simply covered with bacteria; borax and boracic acid were very weak; while powdered $HgCl_2$ was far and away the best, the 5 per cent. solution, however, only penetrating half way.

The drugs used during the process of teething are the hypophosphites, phosphates and lime water, and as the calcification of some parts of the teeth takes place before birth it is the duty of the future mother to partake of a bone and tooth forming diet, instead of the weak tea and slops which form the staple food of so many of them, with disastrous results to the children they bear. Mercury has a strong action on the teeth, and "mercurial teeth," the result of mercurial teething powders, are a very common sight to the dentist.

The agents used for anæsthesia, local and general, are chloroform, ether, nitrous oxide gas, bromide and chloride of ethyl, cocaine, carbolic acid and electricity.

Chloroform for purely dental purposes is seldom used on this side the border, but in Scotland it is used much more frequently. It is never free from danger. Ether by itself or as an adjunct to gas is more used than chloroform and is safer.

Gas N_2O is the most frequently used of all general anæsthetics for dental purposes. It is very important that it be pure and free from admixture with the higher oxides of nitrogen. Chloride and bromide of ethyl, as well as ether, have all been used as local anæsthetics in the form of spray, but the cold they produce is almost if not quite as unpleasant as the pain they are intended to null. Cocaine has been used extensively with some very good results, and also some serious ones. Further investigation is required as regards dose and alleged impurities. At present it is used very little; the time it requires in injection, and the dense tissues of the jaws, detract from its usefulness in dental surgery. Strong carbolic acid is useful as a local anæsthetic in making a puncture, etc. Electricity has been used and the results obtained have been widely different. The mass of evidence goes to prove that in a few cases it deadens pain, in a few cases it makes the pain far worse, and in the majority of cases it seems to exert no influence one way or the other. Nothing as yet has been found to equal N_2O.

The foundation of most tooth-powders has always been and I expect always will be chalk (precip. for choice), and I know of none better, as it is alkaline and non-gritty. To this basis have been added powders by the score, of more or less use. Powdered areca, useful in flabby gums; bol. armeniæ for colouring purposes; camphor, a general favourite and refreshing in its taste, but otherwise of little use. It has been said to injure the enamel, but this requires proof. Yellow cinchona, myrrh, quinine, orris root, carbolic acid and many essential oils are used, but I do not think they are much, if any, good, except as flavouring agents. Powdered soap and powdered pumice are both useful ingredients. Os sepiæ has been charged with scratching the enamel. Carbo ligni and soot I believe to be deleterious, the black particles not only getting up under the gum and causing a blue margin, but also by their absorbent action causing the gum to recede.

* 'Dental Cosmos,' Aug., 1890.

Any tooth-powder or wash that contains cream of tartar or other acid ingredient ought to be unconditionally condemned.

The chief drugs used in mouth-washes are astringents and antiseptics. As astringents we may mention tinct. krameriæ, tinct. myrrh, tannin, catechu, etc.; as antiseptics carbolic acid, solution of phenate of soda, permanganate of potash (continued use may discolour the teeth), sanitas, thymol, borax, and boric acid. As a stimulant tinct. pyrethri; as a wash for an ulcerated mouth trisnitrate of bismuth, and as a pleasant froth producer tinct. quillaiæ. Alum should be used with caution, except in edentulous mouths, as it is said to have free acid very often, and acid is the great enemy of the teeth. Other lotions used in ulcerated conditions of the mouth are solutions of chlorinated lime, and chlorinated soda, and chlorate of potash, while nitrate of silver, sulphate of copper, and caustic potash are used in the solid state for touching ulcers, etc. Chlorinated lime has been used as a bleaching agent in discoloured teeth; the success has not been very great.

The names of the drugs in use for neuralgia are legion:—Chloride of ammonium, belladonna, sulphate of beberia, butylchloral hydrate, *Cannabis Indica*, chloral hydrate, citrate of iron and quinine, gelsemium, hyoscyamus, menthol, morphine acetate and hydrochlorate, opium, phosphorus, bromides of potassium, sodium, and ammonium, iodide of potassium, sulphate of quinine, mustard and cantharides locally; sodæ bicarb., tonga, veratria ointment, etc. These, of course, have to be selected with a knowledge of what the neuralgia springs from, and it very frequently happens that, as in digestion, pepsin and bismuth, etc., fail simply because the patient cannot masticate, so in neuralgia all the drugs in creation may have no effect, simply because the cause, some carious tooth or other, is not attended to.

In alveolar abcess or gumboil the old-fashioned remedy of poppy heads and chamomiles is still used, but still more often abused, as people will persist in fomenting their mouth from the outside instead of from within, and so doing their best to make the abcess burst on their face with permanent disfigurement. If the abcess is pointing on the cheek, sometimes painting the cheek with collodion will save the disfigurement and the abcess will break or be lanced inside.

In hæmorrhage after tooth extraction tannic acid, gallic acid and acetate of lead and ergot, are used internally, and plugs of lint saturated with tannic acid, perchloride of iron, hamamelis or phenate of soda are used locally. Matico leaf, the rough side outermost, after being soaked in warm water, makes a good styptic.

In inflammation round the roots of teeth, iodine, aconite and capsicum are used as absorbents and counter irritants. The iodine should be a strong preparation, and the liniment and this and the Fleming's tincture of aconite must be used with great care.

For temporary fittings collodion and solutions of sandarach, mastic and benzoin and gutta percha are used. Glycerine is useful as a vehicle for tannin, borax, iodine, etc. Litmus is used to detect acidity in the saliva and buccal mucus, and in this connection I may say that when patients are taking acid medicines it is not sufficient to use a medicine tube. The mouth should always be rinsed with water, or better still, with water made alkaline with bicarbonate of soda or potash.

Bromide of potassium is given or sprayed to lower the sensibility of the mucous membrane of the mouth when slight operations are performed.

Sulphate of calcium is invaluable for taking and casting models; yellow wax and gutta percha have many uses in the dentist's laboratory. Mercury is a necessary ingredient in amalgam fillings. Borax is the best flux for gold and silver soldering.

I have now in a necessarily sketchy way touched upon the most important drugs and preparations used in dentistry. It is to you we look for new remedies and preparations, especially in the field of antiseptics, and any addition to our armoury in that or any other way is gratefully accepted.

I thank you for your kind and patient attention, and beg leave to hope that our subject has not been wholly uninteresting or uninstructive.

———

The President said that, judging from the old recipes Mr. Rushton had quoted, toothache had been with us a very long time, but he was afraid that our teeth were not in so good a condition generally as those of our ancestors had been. Although such practices as the destroying of the nerve by means of actual cautery had gone out of fashion, still old time ideas survived in some parts of the country; for instance, charms were yet in common use in Devon. Again, henbane seeds had many advocates, who gave force to their advocacy by asserting that the worm-like expansion of the cotyledons of the heated seeds in reality consisted of worms expelled from the aching tooth. He thought that wisdom teeth were gradually disappearing from the human jaw. His attention had recently been drawn to the prickly ash (*Xanthoxylon fraxineum*) which resembled pellitory, both in flavour and properties, and he thought it could be well used as a substitute for the latter if any substitute was wanted. The accidents with cocaine which had occurred on the first introduction of the alkaloid were very probably due to impurities, and it was possible that the memory of these accidents gave rise to imaginary bad effects now. The alkaloid now on the market was of remarkable purity, and any untoward effects from its use must be put down to the idiosyncrasy of the patient. Areca nut (both nut and leaves of the plant) was much used in the East as a masticatory, evidently with good results. The Japanese were reputed to be the most skilful dentists in the world, despite of the only instrument for extractors being their fingers. The use of dentifrices containing sodium bicarbonate as a principal ingredient was generally attended with excellent results, the bicarbonate neutralizing the harmful acid fluids that might be generated in the mouth under abnormal circumstances. He thought the decoction of camomiles and poppy heads was very useful if used in time, as it tended to abort incipient inflammation.

Mr. McFall remarked that good teeth were essential to enable people to speak well. An acquaintance of his was in the habit of rinsing the mouth with lime water; he would like to know if this was likely to be beneficial to the teeth.

Mr. Walton differed from Mr. Rushton as to the effects following the application of cocaine and arsenic. He thought cocaine very useful for deadening the pain of extractions. Personally, he had had teeth extracted with and without cocaine, and had noticed a marked diminution of pain when cocaine was employed. In several cases that had come under his notice, the application of cocaine solution to the gums had given instant relief. Had Mr. Rushton had any experience with methyl chloride in cases of neuralgia? It was much used in France, but had not made much progress in England. He had always thought iodoform to be a powerful antiseptic, and suggested that if, when applying it to a hollow tooth, the cavity were well closed with stopping, the objectionable diffusion of the taste and smell of the chemical would be prevented.

Mr. Taylor said he had recently made up a dentifrice which consisted of camphorated chalk 2 ozs. and iodoform 20 grs. Although its antiseptic properties

were doubtless remarkable, he thought that for various reasons the formula would not recommend itself to the majority. He asked was not benzoic acid considered a good dental antiseptic? Camphorated chalk had been mentioned by Mr. Rushton. He knew that it was much used by the Americans, and had wondered if there were any truth in the assertion that it made the teeth brittle. Had Mr. Rushton had any experience with ginger poultices for use in cases of abscess in place of mustard and other counter irritants?

Mr. Evans said the injudicious feeding of the mothers produced not only bad teeth but cleft palate in the children. He had lately seen an extraordinary case in which the child at birth had two well developed teeth (lower bicuspids). He used for extraction a 20 per cent. solution of cocaine and found 4 to 5 minims sufficient to nullify the pain. Painting with ether was also useful. In the case of a "bleeder" he had found that nothing short of actual cautery would stop the hæmorrhage consequent on the extraction of a tooth. Of a complete set of teeth the wisdoms generally decayed first.

Mr. Cooper referred to the use of air as an anæsthetic. It was advocated more especially by American dentists. He found that air alone in his case was not sufficient, but with smoking a cigarette as an adjunct he got marked results. The loss of teeth had a conspicuous effect upon the voice and the introduction of false ones did not fully remedy the defect.

Mr. Wright said he had had the pulp of a tooth destroyed with arsenical paste, and had not suffered that pain Mr. Rushton said it frequently caused. He remarked upon the properties of cocaine in deadening pain, especially in operations on the eye.

Mr. Seccombe had always been under the impression that iodoform was a good antiseptic, as it was so frequently used in surgical operations. He thought that chloroform was useful in prolonged operations on the jaw, as the horizontal position could be assumed. He understood that the injurious effect consequent on the administration of cocaine, was due to the presence of hygrine in the preparation. Did Mr. Rushton prefer beeswax or Stent's composition in taking impressions?

Mr. Wilson asked if there were the same danger with ether as with chloroform, and was gas in any way dangerous. He thought a dentifrice of soap solution with benzoic acid better than a powder containing soap. Some provincial dentists consider iodoform a most efficient dentifrice.

Mr. Stead had found iodoform considerably inferior in antiseptic properties as compared with other antiseptics in common use.

Mr. Griffiths asked what effect iodine had upon the teeth. He thought charcoal was an excellent cleansing agent. Could Mr. Rushton account for the dark ring that appeared round the teeth after its use? He found that turpentine removed the odour of iodoform from the hands. Were benzoates disinfectants? He had tried morphia for deadening pain during extractions with good results, and had found painting with solution of cocaine useful. What was the action of phenol—did he recommend it in mouth washes?

Mr. Tingle found that the application of arsenic with morphine and cocaine was painless. Actual cautery was still much employed. He did not think iodoform had any antiseptic properties, but its value was due to its desiccating effect. Iodoform when used on the Continent was first sterilized. What was Mr. Rushton's opinion of salicylic acid as an antiseptic?

Mr. Rushton, in reply, said it was an acknowledged fact that teeth were deteriorating, for the causes of which he must refer them to his previous paper (*Pharm. Journ.*, vol. xxi., [3], 1031). A red hot iron for cautery had been improved upon. Charms were still in use, and he must refer them to 'Arcana Fairfaxiana' for some interesting examples. It was true that wisdom teeth were slowly disappearing on account of the length of the jaw diminishing. He thought prickly ash might be very well used in the place of pellitory. The Japanese were considered skilful dentists, but they took considerable time over their extractions, and were not above humbugging their clients as to the cause of their teeth decaying. He recommended a solution of sodium bicarbonate as a mouth wash for children, but the salt was too soft an article for general use as a dentifrice. Hot fomentations, he repeated, were best applied inside the mouth. Rinsing the mouth with lime water, although somewhat unpleasant, was a good practice. Mr. Walton had found the use of cocaine and arsenic painless, but he could not judge by isolated cases, as the results depended upon the conditions of exposure of the tooth pulp. He had not used methyl chloride, but ethyl chloride was largely used as a spray. There was nothing used so much as iodoform as an antiseptic, but although well sealed down when applied to a tooth, it invariably came through. There were many preparations more pleasant to use, which were quite as efficacious. It had not been proved that camphorated chalk caused brittle teeth. He would suggest capsicum plasters in the place of ginger poultices. He thought the two teeth mentioned by Mr. Evans must have been molars, not bicuspids. It was a most remarkable case. Imagination played a conspicuous part in the extraction of teeth by electricity. In extreme cases of hæmorrhage actual cautery might be advisable. He had seen some experiments made with air as an anæsthetic by an American dentist, which were an utter failure.

Mr. Seccombe suggested that the anæsthesia produced by deep inspirations of air was an intoxicating effect due to the rapid oxidation of the hæmaglobin into oxyhæmaglobin.

Mr. Rushton said he had not previously heard this explanation. Gas was perfectly harmless as an anæsthetic if properly administered. Any preference given to Stent's composition or wax depended on the manipulation. Iodine had no action on tooth tissue, but was very useful in inflammation of the gums. Carbon was a good antiseptic. The black ring round the base of the tooth was caused by particles of carbon getting between the tooth and the gum. Phenol was one of Dr. Miller's favourite antiseptics, but he (Dr. Miller) found it necessary to renew the application every twenty-four hours, as by that time the phenol became inert. He thought the action of iodoform was stimulating and drying.

Provincial Transactions.

GLASGOW CHEMISTS AND DRUGGISTS' ASSISTANTS' ASSOCIATION.

This Association held its usual fortnightly meeting in the Waterloo Rooms on the evening of Wednesday, November 25, Mr. Jas. Robb, President, in the chair. The following address on "Shop Life" was delivered by Mr. W. L. Currie.

Few of us, I dare say, but look back with a grim smile upon the artless simplicity which induced us to become knights of the pestle. I have no doubt that the coloured carboys in the windows, taken in conjunction with the great display of gold labelled bottles on the shelves, on which were written wonderful characters, and the idea that the man who was able to decipher all the different names must be above the common run, helped to the decision. Examinations were not thought about. The work was understood to be pleasant, and from what we had heard from others concerning the various

pranks which could be perpetrated, it was considered to be a good thing.

If I may be allowed an expression of opinion, I do not think I am far wrong when I say that the majority, if they had the chance of beginning life over again, would not select the drug trade to pass their days at. And why should this be so? Why is it that youths do not feel inclined to go to the trade now as they have done in the past? Several things have combined, I daresay, to this result.

1. The idea seems to have spread among those who are at the business that the drug trade is done, and this is propagated abroad. Well, I do not think the drug trade is done, not by a long way; and even although you do not succeed in making your fortune, it must be a very poor calling indeed if it does not afford a subsistence, and something over, if you constantly and faithfully follow it out.

I suppose you have heard of the druggist who put above his door the advertisement that he could cure every ill, prevent every disaster, and soothe every disappointment. And when customers applied for the remedies he said—

"Patience is the pill
That cures every ill;
Take care is the plaster
That prevents disaster;
Good temper is the ointment
Soothing disappointment."

It wants perseverance, like every other thing you try. You must,—

"To catch Dame Fortune's golden smile,
Assiduous wait upon her,
And gather yearly every wile
That's justified by honour.
Not for to hide it in a hedge,
Or for a train attendant,
But for the glorious privilege
Of being independent."

2. The long hours.
3. Small wages.
4. The examinations. Now I do not mean to enlarge upon those points, but will content myself with saying that shop hours are very much better than they once were. That wages are also much improved. While as to examinations, well, no matter what trade or profession you may now take up there are examinations to pass, and some of them pretty stiff, too; and while I am of opinion that the examinations of the Society, as they were up till July, were quite sufficient guarantee as to the capability of a man to take charge of a drug shop, still, if it is to be the means of improving the status of the trade, by all means advance. But I have diverged a little from the continuity of my paper. The first day behind the scenes will be a long remembered one. The view presented is not too reassuring, and the kind of work which you get to do is not such as you had expected. The usual routine of label trimming, bottle washing, floor sweeping, and dusting, in conjunction with the usual request to smell this fine perfume, or to taste this new fruit syrup, all tend to open the eyes of the embryo pharmacist to a world of which he knew nothing, and as day after day new experiences are added, his ideas of pharmacy and pharmacists, with their mysteries, are not particularly enhanced. The older hands in the shop, if chance should place him where there are a few, are sure to remember what they have learnt, and usually try to improve upon it. Now, to this method of initiation I have great objections. Sometimes it has been carried too far, and more than once have I seen the services of the medical man in request; and not only does it involve risks, but it seriously damages the assistant in the eyes of his subordinate. The youth who has been tricked once does not fall so easily a second time, and occasionally it happens that the tables may be turned, and thus begins an endless course of tit for tat, which is bad for all parties concerned. The impressions made on an apprentice during the first few months of his career will either make or mar, and I am quite sure that if a moment's consideration were bestowed on the results of example life would be much pleasanter.

I quite admit that a good deal has to be borne because of apprentices, but they are necessary evils and cannot be done without. After a time of hunting up I came across a few verses that appeared in the *Chemist and Druggist* a few years ago, and which illustrate exactly what I have said. The verses were entitled "The Druggist's Boy," and are as follows:—

Who came to me with smiling face,
Who wormed himself on my good grace,
With "Mother's sure I'll suit the place,"
The boy.

Who celebrated his advent
By sampling all the best of scent,
And seemed quite hurt when I resent,
The boy.

Who never touches glass or pot,
But I from top to toe feel hot,
Who makes me say things I ought not,
The boy.

Who leaves with Mrs. Smith the pills
That were prescribed for Jones' ills,
Who with jujubes his stomach fills,
The boy.

Who, if I do not start the knave,
Will make me like a madman rave,
And bring me to an early grave,
The boy.

Shop life is to us practically our social life. In the shop we find our work as well as a good deal of our pleasure, and the individual who accommodates himself to his surroundings is the man who enjoys his work and simply revels in his leisure. One often hears it said, that the long hours (of which I have no doubt we have all had some experience) leaves very little time for study, leisure or amusement. As regards the study, I have an observation to make further on, and I am sorry that it is only too true that we have not more time for leisure; and yet, gentlemen, who is it nowadays that has much leisure, and as for the amusement, I think you will agree with me when I say that of all classes of shopkeepers, we may derive more amusement in a week than the majority could in a month. The curious requests that are made of us; the extraordinary caligraphy which we come into contact with, taken in conjunction with the still more extraordinary spelling; the stage whisper which is intended to be quite private, the wonderful descriptions of various complaints: all these supply a source of amusement not to be met with elsewhere. To be asked for the first time for McGregor's Gathering, or operatic pills, or to be handed a note, with a request to give the bearer a soothing draught for a woman who was confined a few days ago of twins and a box of Tidman's Sea Salt, is quite sufficient to bring a smile from the prosiest of mortals. While to be told with an expression of perfect innocence and an air of superiority by a high falutin' individual, that he is very much troubled with the boil, or the still more absurd request, to give something for an ulster in the throat, is sufficient to cause a ticklish shopman to go into a fit of laughter which very much offends the customer.

There is not much difference in the routine of work which falls to be done in chemists' shops, but where there are two or three employed, it is always best, for the sake of good feeling, to have a perfect understanding as to the division of the work. It is the first step towards establishing that regularity and neatness which generally exists where system is in force, and besides, when each one knows what has to be done, there is not the same tendency towards confusion that is almost bound to exist if the work is performed at

hazard. For the probability is, that where there is a continual worrying going on, as to who has to do this or that work, the shop becomes irksome, and what should be the most pleasant part of one's career, becomes the most unhappy. The whole pleasure of our existence, is to live on good terms with those with whom we daily associate, and friendships are formed during those years which have lasted through life.

The kind of business done by us differs very much from that of almost every other class of shopkeeper; consequently, there is not the same continual stream of customers, nor the usual end of season cheap sales of surplus stock; although since the introduction (during the past few years) of so many new remedies and appliances of all kinds, it might be a good thing even for the chemist to have an occasional surplus stock sale. If there is no epidemic, or something akin to it going around, business is not so continuous as in any other class of shop, and it is on this very point that I would venture to make an observation. It is only when there is such a quiet time that an assistant has an opportunity for putting up the usual stock articles belonging to the retail branch of the business. We hear a very great deal about the want of time for study, and that when the ordinary day's work is done the mind is unfit for any great effort; hence the great cry for shorter hours. Well, I say by all means let us give shorter hours. But has it ever occurred to you, gentlemen, how much memory work might be overtaken during the time you may be occupied in putting up a gross of seidlitz powders or in rolling out a few gross of pills. I venture to say that the greater part of the memory work of the Minor examination might be overtaken at such times. While you are folding powders or weighing out and rolling a pill mass, the mind is practically roaming wild, with the result that the best part of the day for real work is thrown away. I speak from experience, and I have no hesitation in recommending the plan to anyone who has not tried it, and they will be astonished at what can be done.

There is also a great deal said regarding the drudgery and slavery which belongs to the drug trade. Well, I cannot say that it is all that it might be, nor that it cannot be improved. I think there is room for great improvement, and particularly as regards Sunday labour. I have always been of the opinion that the public are too well attended to on Sunday, especially when someone comes to your house during church hours and actually goes the length of saying, and impudently too, what right have you to go to church without leaving someone behind you to attend to business. I think it a pity that Sunday labour cannot be curtailed to not more than one or two hours. But is it the case that it is the only trade in which drudgery exists? I think not. Anything can be a drudgery if the mind does not lie to the work, and I say to you now, put your whole soul into your work and it will become to you a pleasure. You may often find it difficult and hard to put up with, and you may often think when you are lighting up behind the coloured carboys,—if I had only been something else! A banker or a school teacher, for example. Well, gentlemen, if such thoughts should crop up, banish them, and comfort yourself with the fact that even they have their difficulties to overcome, and that it is a good thing for the world in general, and ourselves in particular, that everybody is not of our mind. Somebody must of necessity dispense drugs, and why not you as well as the next man. Life can be made as pleasant and interesting to us as to any one else. It is often said that the best education one can have is to rub against all the corners of human life. Well, in my opinion and experience, no business has such an opportunity for so doing as that in which you are engaged. High and low, rich and poor, at some time or other require the service of the medicine man, and the various phases of life presented to us by the individuals themselves are interesting in the highest degree. Mark the differences in temperament of those with whom you come in contact; make it a point to study every face you meet, and you will soon be able to decipher who are approachable and who are not. It should be part of an assistant's duty to ascertain the character of his customer. He ought to be able to read a face like a book, and it is astonishing what a large fund of information can be obtained if you are successful in the bent of mind of your customer. You may often be tempted to wish your customer at Jericho, for causing stock to be turned out, or for taking up what may be precious time; but with it all no opportunity should be lost to leave a favourable impression on the mind, offering to send their parcel, or in making one out of two or three, whilst the value of a nod or a pleasant recognition on entering or leaving a shop is incalculable, as we all like to be thought something of, and sometimes feel slighted when treated as if it was a matter of indifference whether we came or not. Common sense is not possessed by everybody, and it is only gained by close observation, which stores the mind with a stock of useful knowledge and the tact of using the same as opportunities arise. Have a method in your work, so that when a demand is made upon you you can fall back upon past experience and answer the demand made upon you promptly. Utilize every moment, it gives a decision of character, which commands the respect of all you meet, and remember these are especially the days when a man must be qualified for what he undertakes to do. To be something he must be quite equal to his competitors, but to be somebody he must be superior to the majority. These things, trivial as they may appear, are in reality but the training necessary for the time when the successful carrying of them out will be of the highest importance. You do not expect to be always assistants. The time will come, and I hope in the not far distant future, when you will assume the reins of an employer, and it is then that your training will be put to the test. I might go on enlarging on many points, but one more point and I have done. The assistant of the present day has very much more trouble and annoyance in the execution of his work than his predecessor of say even ten years ago, on account of the extraordinary number of new remedies and combinations foisted upon the physician. Time was and I hope will soon return, when a good prescription could be dispensed with B.P. preparation, and the life of the assistant was comparatively a happy one; but now it is almost the exception to dispense a prescription without having to make some inquiry regarding somebody's new "mistura," or some other body's new pill. Well, to this I would say to the assistants, throw as much cold water as possible on such preparations. If a physician asks if you have so and so's pill, containing such and such an ingredient, and you have not it, do not say you will be delighted to procure them (unless it is very specially insisted on), but just say you will be delighted to make any pill of whatever combination he may want. It may be more labour, but you will be able to guarantee your work, and by putting yourself to a little extra trouble may bring round a physician to think that after all it will be much better to write out a prescription for exactly what he wants instead of ordering something which is nearly what he wants. The assistants of to-day will be the employers of the future, and by combating the fast growing tendency of ordering ready made combinations, they will be bettering the trade generally and improving their own position.

And in conclusion I would say: If you wish to have pleasant recollections of the various resting places where you have passed a short time, act when an assistant as you would have an assistant act to you.

And when you do become an employer, do not treat your employees as if they were mere machines there for the purpose of doing the work. Take some interest in their welfare, and give them the benefit of whatever advice you can. You will command more respect and have much greater pleasure in your life. And if it should ever be your luck to be able to enjoy the leisure of old age, you will thoroughly appreciate the words of the poet, when he sings of—

"Toiling, rejoicing, sorrowing,
Onward through life we go;
Each morning sees some task begun,
Each evening sees it close;
Something attempted, something done
Has earned a night's repose."

The lecture was received with much enthusiasm, and an interesting discussion followed, taken part in by Messrs. Cartwright, McKellar, Laing and Robertson.

The Chairman, in proposing a vote of thanks to the lecturer, remarked on Mr. Currie's abilities to put the experience of shop life in such an interesting manner, then gave several reminiscences of his own experience, especially in his first days, when everything was held out to him as a mystery, which he thought should be avoided. The vote of thanks having been awarded, Mr. Currie in reply stated that inside of two and a half years he was in from 100 to 150 shops, being relief assistant in a wholesale house, and to gain experience he knew of no better way than spending a few years in such a manner.

LEEDS CHEMISTS' ASSOCIATION.

The twenty-third annual meeting of the above Association was held at the Church Institute, on October 29, Mr. Geo. Ward, F.I.C., President, in the chair.

The annual report and financial statement were adopted on the proposal of Mr. Yewdall, seconded by Mr. Worfolk.

Votes of thanks to the Pharmaceutical Society for the gift of the *Pharmaceutical Journal*, to the British Pharmaceutical Conference for the 'Year-Book,' were passed.

The Hon. Librarian, Mr. W. D. Pollitt, was also thanked for compiling a new catalogue of the books in the Library.

The annual report stated that during the past session a meeting of the chemists of the West Riding had been convened to consider the Pharmacy Bill, and that the President of the Pharmaceutical Society and about eighty pharmacists had attended this meeting.

The expenditure for the year amounted to £24 2*s.* 2*d.*

With the assistance of the Yorkshire College, a complete course of instruction in botany, chemistry, physics, materia medica and pharmacy had been arranged for pharmaceutical students at moderate fees.

The following elections took place:—President, Geo. Ward, F.I.C.; Vice-President, E. Yewdall; Hon. Treasurer, S. Taylor; Hon. Librarian and Curator, W. D. Pollitt; Hon. Secretary, F. W. Branson. Council: Richard Reynolds, Geo. Briggs, C. G. Catterall, P. Jefferson, G. W. Worfolk, R. J. Maudson. Auditor: Ed. Brown.

LIVERPOOL PHARMACEUTICAL STUDENTS' SOCIETY.

At the meeting of the above Society, Mr. H. Wyatt, junr., President, in the chair, held on the 19th ult., Mr. J. S. Ward was elected an honorary member, and Mr. Tabor an ordinary member.

Mr. D. Hetherington, in the course of a paper on "Suppositories," showed a large and varied assortment of suppositories, including the glycerine suppository of the B.P., which he said could not (according to the directions given) be made satisfactorily; part of the gelatine, however good the quality, being left undissolved. Gelatine not being soluble in cold water, but merely sucking up a quantity of it, it was necessary to warm the soaked gelatine in a water-bath previous to adding the glycerine. Also, a minute or two was far too short a time, it requiring at least five to ten minutes to soak. The manufacture of suppositories with a basis of glyco-gelatine should cause little difficulty to anyone, providing that no tannic acid or spirit were contained in the formula. Even then, in the case of extracts, there was usually a sufficient quantity of glycerine to redissolve any extract which might be thrown out of solution. Ext. hamamelis, for instance, caused some trouble. Even after they are made they become quite wet—sweating.

Cacao Butter.—When this is heated and allowed to cool without stirring and the melting points taken, one from the top and another from the bottom layer, they would be found to vary from two to four degrees. It followed that suppositories made with ol. theobromæ must be very gently heated or a uniform result would not be arrived at. Vegetable butter, although having a melting point of only 82° F., did not set so readily as cacao butter, and could not with advantage be substituted in the manufacture.

The mode of making uterine pencils, both with a basis of cacao butter and glyco-gelatine was explained, as was also that of hollow pessaries, which are coming into so general use among medical practitioners.

An interesting discussion followed, in which the President and Messrs. Wokes, Woodruff, Woolliscroft, Mitchell and others took part.

Mr. F. S. Wokes, Ph.C., then read a paper on "The Manufacture of Aerated Waters." Mr. Wokes commenced his paper by saying that he had recently gone into this subject because he considered that the preparation of aerated waters ought to be more generally in the hands of the chemists. The term "aerated water" might be applied to any water containing gas or air, but the kind of aeration he had to consider was that produced by CO_2. This gas was soluble in water to a considerable extent. At ordinary temperature and pressure water dissolved its own volume, but in making artificial aerated waters its solubility was increased by means of pressure. The author then proceeded to describe the apparatus generally used for this purpose, including a generator for liberating the CO_2; a gasometer for storing and washing the gas; and a machine containing one or more pumps, and a cylinder for receiving the gas and water, from which the filling machines for syphons or bottles are supplied. Each form of apparatus was illustrated by a diagram, by means of which the description of the methods of working were made additionally intelligible to the audience.

Parliamentary and Law Proceedings.

Poisoning by Liquor Strychninæ.

An inquest was held at Mortlake, on Wednesday, by Mr. A. Braxton-Hicks, touching the death of Jane Ellis, age 19, a domestic servant, lately in the employ of Dr. Adams. It appeared from the evidence that the deceased, who had written two letters announcing her intention of committing suicide, was found early on Monday morning lying dead on the ground, near her master's surgery. Dr. J. Adams stated that deceased had taken an ounce and a half of solution of strychnine. Death must have been instantaneous. Witness said he did not keep the door of his surgery locked, it being the duty of deceased to clean it. The jury returned a verdict that deceased committed suicide whilst in a state of unsound mind.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Pharmacists, Physicians and the Public.

Sir,—Pray permit me to offer to you my cordial thanks for your very appreciative notices of my address to the Midland Counties Chemists' Association, and especially for the able and admirable leaders you have founded upon my speech, namely, your editorial articles entitled respectively "Dispensing Charges" and "The Relations of Pharmacy with Medicine." The subjects treated in my address have engaged my anxious attention for a long time, and I am glad to think I have succeeded in attracting influential notice to questions which are of great public importance, and which concern very closely the progress of the remedial art, the development of pharmacy, and the advantage of persons who suffer from illness; and I rejoice to expect that our work cannot fail to bear good and early fruit, and lead to further advancements in the future. The propositions I have sought to maintain are these:—That pharmacy is an integral part of medicine. That pharmacists have shared with great public advantage in the past in the progress of the science and art of therapeutics, and that they must continue so to share, and in increasing measure, in the future. That the scientific and technical education of pharmacists must be continued and extended. That "dispensing charges" should yield a fair trade profit to the pharmacist upon the drugs or other materials he supplies to his customer upon a physician's prescription, and also carry with them, beyond a merely commercial profit, a just remuneration to the pharmacist for his professional service in each particular case. That the pharmacist should only use the very best drugs in dispensing, and that he cannot, with the barest justice either to himself or to his customer, or to the writer of a magistral formula, allow any considerations whatsoever to qualify the highest excellence in the dispensing of a prescription; that he should refuse to allow trade competition to compel deviation in practice from this principle; and that, if such deteriorative deviation be insisted upon and yielded to, the same should be clearly stated to his customer, so that his customer have full knowledge of it, and take upon himself the responsibility of treating his sufferings by means of inferior qualities of the remedies his physician wished to employ. Physicians have an indefeasible right, which pharmacists have always admitted, to insist that the best drugs only shall be used for their prescriptions; and I recognize that this right carries with it the duty of supporting pharmacists in the conditions of such perfection. Pray allow me to invite the attention of my pharmaceutical brethren to the propositions I have ventured to submit to their consideration. I think we should keep the whole subject of the advancement of pharmacy before our minds. I hope to recur to it again upon an early occasion. James Sawyer.

31, *Temple Row, Birmingham.*

The Benevolent Fund and Local Secretaries.

Sir,—Few of my duties are more painful than voting for annuitants. Consider the selected as carefully as possible, weigh each *pro* and *con*, and vote as conscientiously as possible, still one feels that almost a wrong has been done to the others, and it is with a feeling almost of desperation, and certainly of relief, that the voting paper is hurried off. Take the nine cases that have been selected this year; there is not one that ought not to be elected, and yet three must be disappointed, and have to struggle on for at least another year. Why is this? Simply because 10,000 chemists do not contribute. I will not say they will not contribute, because, of the majority, I believe, this would not be true. Now, who is to blame for this? I say, unhesitatingly, the Council of the Pharmaceutical Society to a large extent. And why? Simply because it will go on in the same humdrum style. Year after year, in spite of the protests of the trade, it sticks to the old-fashioned plans, with a tenacity that would cheer the heart of the most enthusiastic Tory that ever lived, firmly believing in the eternal fitness of all things as by law now established. Before the Benevolent Fund was made available for the whole trade a local secretary was appointed for all towns sending a member to Parliament or containing three pharmaceutical chemists. Now it is still the same. I yield to no one in my esteem for Mr. Carteighe and his colleagues, but in this particular they seem to be terribly behind the times. For years they have been urged over and over again to remedy this lapsus. My friend, Mr. Swinn, showed them years ago a possible and workable plan. I have written letter after letter, both public and private, until I feel certain that the widow appealing to the unjust judge had a considerable advantage over us all; the judge, we are told, did get weary, but the Council shows not the slightest signs of weariness. Look at the correspondence the last few weeks. You, sir, accuse us of supineness. We reply the supineness is not confined to us; the Council is supine. It has infected us and we are its victims. One correspondent says appoint "men of energetic, genial, frank and honourable character." Well, sir, the Council has appointed here a gentleman who possesses all these traits in a marked degree, but "what is he amongst so many of us." A very large proportion of his constituents do not even know his name, and a still larger number never saw him; it is utterly impossible for him, unless he devoted the whole of his time to his office, to become acquainted with his constituents. A few years ago, through the exertions of a well known and deservedly respected representative of a local house, a considerable addition was made to the list of subscribers, but this was due to personal influence and argument. No one local secretary could cover this district. I am aware that the whole of my arguments are directed to the Benevolent Fund, but other matters must follow. Suppose they did not, still good would be done. Just imagine 10,000 men to appeal to; take a very low estimate; suppose 5000 contribute and average only 2*s.* 6*d.*, here is £625; more than enough to elect all the annuitants this year, and to give a very good help to the orphans. Circulars are no use; those who are officially connected with even the most energetic societies know what broken reeds circulars are when any special effort is to be made. Personal application must be made. This can never be done under the present system. Let us have more men, with less responsibility; a responsibility that although it may become tedious will not become irksome, then, if the officer fails, "away with him." Put someone more worthy in his place. I know it is open to any one to canvass for subscribers, and perhaps if there were no local secretary and no other interests this argument would apply. As it is many never lose an opportunity of urging the claims of the Benevolent Fund, but they all feel the same thing, that the Pharmaceutical Council is indissolubly connected with the Fund, and its representatives must appeal, must show the trade that the Council is a real living organism, something more than a name. Then better things must ensue. No earthly power can stop them, and then we shall go far to realize what we so much talk about and desire, but which each year seems further off than ever, viz., a united front. Perhaps I have written warmly. I feel warmly. I see £500 or £600 yearly lost to one of the best conducted charities in the world, and I feel compelled to add my quota to the perennial appeals made to the Council, and if we can only induce it even to show some signs of weariness (a yawn would give us hope) we shall be well rewarded. J. Hart.

131, *Embden Street, Manchester.*

P.S.—Since writing this I am credited with the authorship of a letter in last week's Journal. Allow me, therefore, to parody an extremely *classical* quotation—my signature occurs at the foot of all my letters, and without it none are genuine.

Re Divisional and Local Secretaries.

Sir,—This is the first letter I have ever sent to the Journal, as I am one of those who do not wish to court notoriety by such means.

I have been waiting to see if other hands would write to vindicate the secretaries (in answer to one or two letters that have appeared of late respecting the non-attention of the same). Finding no one has done so, duty calls upon me.

Some two years since, our respected Secretary called upon me, and asked if I would take a division? Feeling if I could be of any service to the Society it was only a duty, I reluctantly bowed to his wish and accepted office.

I made my first visit to those in my division, expecting, at least, to find gentlemen (but blessed are those who expect nothing). Entering the shop of almost the first I called upon, making my bow, and endeavouring to explain my business, the individual cut me short, saying, that he had no time to waste upon me or the Society, asking, "What has it ever done for me?" and rudely going into his room, left me standing in the shop.

Now I ask, can chemists expect gentlemen to call upon them if this is the treatment they are to receive? although I should hope that this case is an exception, and not the rule.

Henry Wiggins, D.S.

Collodium Belladonnæ.

Sir,—I have read much correspondence on this subject lately, and beg to draw the attention of your correspondents to a substance introduced by Dr. Morgan Dockrell at St. John's Hospital, which I think would form a good basis or vehicle for diluting watery extract of belladonnæ, etc. The substance comes to me with the fancy name of bassorine, and is a combination of tragacanth, glycerine and water. It is of the consistence of vaseline and rather paler in colour, but it differs in being a watery instead of greasy base. It dissolves such substances as resorcin, ichthyol, etc., and mixes readily with small quantities of alcoholic solutions of salicylic acid, hydronaphthol, etc.; without precipitation such mixtures act with more vigour than powders, ointments or collodion.

It has the advantage over collodion that it does not give a feeling of uncomfortable stiffness; it is also easily removed by washing with water, and it does not modify the action of the drug like a tenacious coating of collodion; it dries in a few minutes, and, unlike collodion, is almost invisible.

Of course there are many cases where it cannot be used, but I think where ext. belladonnæ or glycerinum belladonnæ is applicable it is worthy of a trial.

Some of your readers may say, but we have already glycerinum amyli and starch poultice, why not use these? All I can say is the new substance seems to answer differently.

Geo. Barker.

Importation of Foreign Chemicals.

Sir,—Referring to the excellent paper by Mr. J. C. Umney on "The Importation of Foreign Chemicals, etc.," recently read before the Chemists' Assistants' Association, as one interested in the subject I would call attention to the incorrectness of the view taken by the author of the paper on the use that English oil of peppermint is put to in this country.

Mr. Umney is reported to have said that the "consequent prices of English oil prohibit its use, except in well-favoured seasons, for other than strictly pharmaceutical purposes."

As a matter of fact, the great portion of the mint oil produced here is not used in pharmacy at all, but is sold to the large confectionery houses, who use it for the manufacture of their confections.

It is a cause for surprise that, considering the undoubted superiority of the English mint over the American, there is not more demand for it by chemists in general, the bulk of the trade using a certain well-known brand of American oil.

A prominent member of the Conference, after making various experiments gave his results in a paper already published.

By the iodine test he found that all the samples of American mint absorbed a much larger portion of the chemical than English oil, thus proving that terpenes exist in far greater quantities in the former than in the latter, and without this is a natural character of American oil, which is highly improbable, it shows that all American oils one comes across in this country to be highly adulterated with turpentine.

The home products used in medicine are certainly very few, and I think it a pity that they receive so little attention at the hands of pharmacists in general, and truly in this case it may be said as of old that a prophet is not appreciated in his own country.

Conversing recently with an agent here for a large firm of wholesale druggists established in India, he told me that the demand is for cheap extracts, and cheap extracts the druggists will have, consequently the supplies that used to be got from a manufacturer of English extracts are now obtained from German firms, who can make them to any price, there being, of course, no standardization of the alkaloid necessary, consequently many are very inferior.

Perhaps a little more prominence might with advantage be given occasionally by examiners to these articles, a case coming under my notice recently where two Minor students were shown a bottle of English chamomile oil and they utterly failed to recognize it.

W. H. Hobbs.

A Dispensing Query.

Sir,—In reply to a correspondent's inquiry *re* Sirop de Morphine and Inf. d'Ipéca, I beg to inform him that the formulæ are as follows; viz. Firstly—

Sirop de Morphine (*French Codex*).

℞ Morphia hydrochlorate . . . . 1 part.
Distilled water . . . . . 40 parts.
Simple syrup . . . . . 1960 „

Dissolve the Morph. Hydrochl. in the water, and mix the solution with the syrup; and secondly—

"*Infusion d'Ipéca*" (vide *Officine by Dorvault and other Authors*).

℞ Ipecacuanha in coarse powder . . . 2 parts.
Boiling distilled water . . . . . 100 „

Infuse 20 minutes.

I hope the above may prove to be the information desired.

G. Le Seelleur.

Sir,—In answer to your correspondent *re* Inf. Rad. Ipecac., we had a prescription in which 20 grains to 6 ozs were ordered.

I should like the opinion of some of your readers as to which soap should be used in the following prescription. I noticed that it had previously been dispensed by two other chemists, and our customer said it was different from what she had had before.

℞ Potassii iodidi . . . . . ℥iij.
Tinct. belladonnæ . . . . . ℥j.
Saponis . . . . . ℥ij.
Ft. ungt. nocte maneque utend.

Hull.

L. Priestley.

NOTICES OF MEETINGS.

Society of Chemical Industry—London Section.—Monday, Dec. 7.—Papers: "Contribution to our Knowledge of the Soluble and Resinoid Constituents of Bituminous Coals," by Mr. Watson Smith; "The Salt Industry of India," by Dr. Murray Thompson.

Midland Counties Chemists' Association.—Tuesday, Dec. 8, at 8.30.—Paper: "Photography—Chemicals and Processes," by Mr. W. H. Jones.

Manchester Pharmaceutical Association.—Wednesday, Dec. 9, at 7.45.—Lecture: "The Microscopical Characters of the more Important Official Drugs," by Mr. W. Kirkby.

Brighton Junior Association of Pharmacy.—Wednesday, Dec. 9, at 8.45—Musical and Social Evening.

Glasgow Chemists and Druggists' Assistants' Association.—Wednesday, Dec. 9, at 9.15—Paper: "Heat, Sensible and Latent," by Mr. G. Robertson.

Chemists' Assistants' Association.—Thursday, Dec. 10, at 9.—Paper: "Floral Formulæ and Floral Diagrams," by Mr. E. B. Sherlock.

Sheffield Microscopical Society.—Friday, Dec. 11.—Lecture: "Vegetable Parasites and their Work," by Mr. J. D. Siddall.

Communications, Letters, etc., have been received from Messrs. Hooper, Cripps, Petrie, Hill, Mason, Observer, J. R. P.

THE SOLVENT ACTION OF ALCOHOL OF DIFFERENT DEGREES OF STRENGTH ON SOME OF THE DRUGS USED IN MAKING PHARMACOPŒIAL TINCTURES.

BY E. H. FARR AND R. WRIGHT.

NOTE VI.—ON TINCTURE OF BELLADONNA.

Before proceeding to give a detailed account of the results of our work upon the pharmacy of belladonna leaves, it will perhaps be worth while to devote a portion of the space at our disposal to an analysis of the present state of our knowledge of the chemistry of the solanaceous alkaloids, and the order of their distribution among the members of the class of plants from which they are, in the main, derived.

For some time after their discovery atropine, hyoscyamine and daturine were supposed to be perfectly distinct alkaloids, marked off sharply and distinctively by their chemical characters from each other. More recent researches have proved, however, that the relationship existing between them is in reality very close, so close indeed as to give rise to the opinion that as in chemical constitution, so in physiological effect, any difference which may exist between them is one of degree rather than one of kind.

The first step towards the attainment of exactitude of knowledge on the subject of the chemical constitution of the mydriatic alkaloids was taken in 1879 by Ladenburg, who, starting upon the basis of the fact previously established by Kraut and Lossen (Liebig's *Annalen*, cxxxviii.), that atropine, when treated with barium hydrate at a high temperature, splits up into tropine ($C_8H_{15}NO$) and tropic acid ($C_9H_{10}O_3$), succeeded in reproducing the alkaloid by acting upon tropine tropate with dilute hydrochloric acid, and showed that the resulting substance was in all respects identical with the original alkaloid.

By applying the same treatment to other salts of tropine he obtained a series of compounds similar to atropine, upon which he bestowed the generic name of tropeines. Suspecting that the other mydriatic alkaloids belonged to this class of bodies, he prepared and examined pure hyoscyamine, and proved that it was isomeric with atropine, both having the formula $C_{17}H_{23}NO_3$. He further showed that under the influence of barium hydrate, hyoscyamine, like atropine, splits up into a secondary alkaloid which he then named hyoscine, and an acid that he termed hyoscinic ; the melting points and other properties of which corresponded exactly with those of the decomposition products of atropine. Both daturine and duboisine were also proved to be identical with hyoscyamine, as the result of a study of their gold salts, and also of the alkaloids regenerated from the same.

Ladenburg therefore concluded that there existed but two mydriatic alkaloids ; atropine and hyoscyamine, similar to each other in properties, and differing principally in gravity, melting-point, etc. Continuing his research, he established the identity of the secondary alkaloids and the acids yielded by the two, and ultimately succeeded in converting hyoscyamine into atropine. He showed the possibility of producing atropine artificially, not only from tropine tropate, but also from the decomposition products of either hyoscyamine or daturine. Thus (1) tropine from atropine and hyoscyinic acid from daturine = atropine ; (2) hyoscine from hyoscyamine and tropic acid from atropine = atropine ; (3) hyoscine from daturine and hyoscinic acid from hyoscyamine = atropine.

Schmidt also (*Ber. der Deutsch. Chem. Ges.*, xiii., 370) confirmed the observations of Ladenburg so far as the alkaloids daturine and atropine were concerned. This chemist also found (*Archiv der Pharmacie*, xxii., 329) that so-called daturine contained from 50 to 70 per cent. of atropine : and confirmed the truth of the fact previously observed, that duboisine was identical with hyoscyamine.

Ladenburg subsequently discovered the existence of a second alkaloid in henbane, having similar reactions to hyoscyamine, and as the secondary alkaloid of that name produced by the decomposition of hyoscyamine had been proved to be identical with tropine, he bestowed the name of hyoscine upon this second henbane alkaloid.

In 1858 Hübschmann claimed to have isolated a second alkaloid from belladonna, to which he gave the name of belladonnine. The existence of this alkaloid has since been definitely established, and it has been obtained in a pure condition by several workers. In 1884 Ladenburg showed that the true formula for belladonnine was $C_{17}H_{23}NO_4$, and that its constitution was probably that of a tropate of oxytropine.

The interest excited by Ladenburg's classical researches was maintained when Will discovered (*Ber. der Deutsch. Chem. Ges.*, xxi., 1717) that hyoscyamine may be converted into atropine by heating for several hours at a temperature just above its melting point, or even at ordinary temperatures by the action of an alkali upon the alkaloid in solution. Will's results were called in question by Ladenburg, but subsequent work by Will and Bredig served to confirm the accuracy of the observations previously made.

The number of mydriatic alkaloids is therefore reduced to four ; viz., hyoscyamine, atropine, hyoscine and belladonnine. The first three are isomers, having the common formula $C_{17}H_{23}NO_3$, and the first is convertible into the second. With regard to the distribution of these alkaloids in the vegetable kingdom, the evidence of different workers is somewhat conflicting. Ladenburg (*Chemiker Zeitung*, 1881, No. 9) states that atropine exists in belladonna and stramonium plants ; hyoscyamine in belladonna, stramonium, henbane and duboisia ; hyoscine only in henbane ; and belladonnine only in belladonna. Schmidt has stated that the young roots of belladonna contain hyoscyamine only, but that old roots also contain a little atropine. The same chemist found both hyoscyamine and hyoscine in the roots of two species of Scopola, viz., *S. atropoides* and *S. japonica*. The former, according to Liebert, also contains atropine. Dunstan and Chaston, in an investigation into the chemistry of the root of *Scopola carniolica*, found the alkaloid present to consist of hyoscyamine, with a possible trace of hyoscine.

The statements of different workers as to the alkaloidal content of belladonna leaves vary very considerably. Lefort (*Journ. Pharm. Chim.*, series 4, xv., 365) gives the average yield from eight specimens of the leaves as ·436 per cent. Dragendorff (*Jahresb. f. Pharm.*, 1874, p. 96) obtained ·66 per cent. alkaloid from the dried leaves. Lyons

('Proc. Amer. Pharm. Soc.,' 1886) reports having examined a number of samples of the leaves, the yield of alkaloid varying between the limits of ·23 and ·87 per cent. and the average being ·44 per cent. He states that the pressed leaves may be kept for a period of six years without suffering any deterioration in alkaloidal strength. The most thorough and reliable work upon this subject has been done by Gerrard ('Year-Book of Pharmacy,' 1881, 1882 and 1884). He first gives the results of the analysis of the different parts of specimens of wild and cultivated plants of the third years' growth, which show that the leaf and root yield much more alkaloid than the stem and fruit, and that the wild plant is more powerful than the cultivated plant. The latter result contravenes the statement of Lefort, that when collected at the same time the leaves of wild and cultivated plants yield practically the same amount of alkaloid.

The percentage amount obtained by Gerrard from the wild plant was as follows :—Root ·45, leaf ·58 ; and from the cultivated plant, root ·35, and leaf ·40 per cent. Three commercial specimens of the leaf gave ·07, ·11, and ·22 per cent. alkaloid respectively.

Mr. Gerrard subsequently published the results of further work upon the alkaloidal value of wild and cultivated plants of the first and second years' growth. He found the dried leaves of plants of the first year to give ·22 per cent. alkaloid, and the average yield from two specimens of the leaves of two year old cultivated plants, taken in May, June, and July to be ·32 per cent. He also showed that the plant attained its maximum strength in June or July, and confirmed his previous observation that the leaves contain a larger percentage of alkaloid than the root ; the average yield by the latter being ·28 per cent.

In his most recent communication Mr. Gerrard gives the results of the examination of the leaves and roots of two, three, and four year old plants, the average yield of alkaloid being as follows :—(1) wild : feaf ·449, root ·350 per cent. ; (2) cultivated : leaf ·422, root ·296 per cent. Although the potency of the wild plant was thus proved to be greater than that of the cultivated plant, the difference in strength was not very great, and Gerrard recommended, for the sake of uniformity, that the leaves of the cultivated plant should alone be employed in pharmacy, the wild plant being utilized for the production of the alkaloid.

Dunstan and Ransom ('Year-Book of Pharmacy,' 1885, p. 393) report having obtained from dried foreign leaves, ·22 per cent. alkaloid, and from a specimen of English leaves which had been overheated in the process of drying ·15 per cent.

From the above published results it appears that in commercial samples of belladonna leaves the percentage of alkaloid occasionally falls as low as ·07 per cent., but that good specimens should yield not less than ·30 per cent., and in some cases as high a yield as ·60 and even ·80 per cent. has been recorded.

In our experiments upon tincture of belladonna, twelve samples of the leaves obtained from various sources were operated upon. Of these eight were the produce of English, and the remaining four that of German plants. In addition to these, we obtained, for the sake of comparison, one specimen each of English and German belladonna root. All the samples were reduced to No. 20 powder, and from each a series of tinctures was prepared, with alcohol of 80, 70, 60, 50 and 40 per cent. strength (by volume). The proportion of drug to menstruum, and also the process followed were those of the B.P., but the final stage in the process was varied, percolation until the required volume of tincture was obtained being substituted for the final expression of the marc and subsequent addition of menstruum in order to make up the volume to the quantity required.

Some of the tinctures deposited slightly at first, but after standing for a day or two, they were filtered, and subsequently remained clear.

Before deciding upon the process to be followed in estimating the tinctures, a few preliminary experiments were tried, the following processes being followed, and 50 c.c. of a standard tincture being used for each estimation.

Experiment 1.—The tincture was evaporated until all spirit was driven off, and the residual liquor allowed to cool. It was then filtered into a separating funnel, and acidified with dilute sulphuric acid. The residue in the dish was treated with chloroform, the solution added to the contents of the separating funnel, and the whole well shaken. After separation the chloroformic layer was drawn off, and the process repeated with successive small quantities of chloroform until the latter came away colourless. The mixed chloroformic washings were then freed from traces of alkaloid by shaking with a little acidulated water, and the latter separated and added to the contents of the funnel. An excess of ammonia was then added, and the liberated alkaloid taken out by three agitations with chloroform. The chloroform solutions were in turn drawn off, mixed, shaken with a little ammoniated water, and after separation removed and evaporated over a water bath, the residue being heated at 100° until it ceased to lose weight.

Experiment 2.—The tincture was evaporated to low bulk, water being added, until all spirit was removed. The residual liquor was allowed to cool, an excess of dilute sulphuric acid added, the alkaloidal solution filtered, the dish rinsed with acidulated water, and the rinsings added to the original solution. A slight excess of ammonia was then added, and the alkaloid removed by shaking with three portions of chloroform. From the mixed chloroformic solutions the alkaloid was extracted by agitation with three successive quantities of acidulated water. The alkaloidal solutions were mixed, a slight excess of ammonia added, the alkaloid shaken out with chloroform, the chloroformic solution evaporated and the residue dried at 100° and weighed.

Experiment 3.—The tincture was evaporated with addition of water until all spirit was driven off, the extract allowed to cool and then filtered into a separating funnel. The dish was rinsed with water acidulated with 1 c.c. semi-normal sulphuric acid, and then with 10 c.c. ether ·720, and the whole transferred to the separating funnel and the mixed liquids shaken. After separation the ethereal layer was removed, and the process repeated with successive small quantities of ether until the latter came away colourless. The mixed ethereal washings were twice shaken with acidulated water to remove traces of alkaloid and the

acid washings transferred to the funnel. The alkaloidal liquor was then made alkaline with ammonia, and the alkaloid shaken out with successive doses of ether. The mixed ethereal solutions were afterwards evaporated, and the residue dried at 100° till constant, and weighed.

Experiment 4.—This was conducted exactly as No. 3, benzole being substituted for ether.

The results were as follows :—

Experiment 1	50 c.c.	Tincture	= ·0145	gram alkaloid.
Experiment 2	50 c.c.	„	= ·013	„ „
Experiment 3	50 c.c.	„	= ·011	„ „
Experiment 4	50 c.c.	„	= ·010	„ „

These results showed that chloroform removed more alkaloid from solution than either ether or benzole. In order to determine whether ether was capable of taking out all the alkaloid from an alkaline solution, and if not, to settle the question as to whether the extra amount of alkaloid removed by chloroform possessed the same characters and properties as that removed by ether, the following experiment was tried :—

Fifty c.c. of the tincture was evaporated and the alkaloid extracted with chloroform, as in experiment I. The alkaloid was removed from the chloroformic solution by agitation with acidulated water, the latter solution rendered alkaline with ammonia, and shaken with three successive 15 c.c. ether ·720. From the mixed ethereal solutions ·012 gram alkaloid was obtained. The mother liquor was then evaporated over a water bath to drive off retained ether, and after cooling was again made alkaline, and shaken up with two successive small quantities of chloroform. The mixed chloroformic solutions yielded on evaporation ·003 gram alkaloid, the properties of which, so far as they could be ascertained by the action of various reagents, were precisely the same as those of the alkaloid removed by ether.

A second experiment with another sample of tincture gave the following results :—

Alkaloid removed by ether . . .	·015	gram.
„ „ chloroform .	·002	„

In another experiment the alkaline alkaloidal solution was shaken with six successive quantities of ether, but even then traces of alkaloid were still retained by the mother liquor, the result being as follows :—

Alkaloid removed by ether . . .	= ·0195	gram.
„ „ chloroform .	= ·002	„

In every instance the residue was tested with appropriate reagents and with the same results. It is evident, therefore, that ether alone does not remove all the belladonna alkaloid from solution, or if so, that this can only be effected by the use of a very large volume of the solvent.

It was ultimately decided to employ process No. 1 for the estimation of all the tinctures, the exact details being as follows :—

Fifty c.c. of the sample was evaporated in the usual way till free from spirit. The residual liquor was allowed to cool, and was then filtered through cotton wool into a separating funnel, the dish rinsed with a little water, to which 1 c.c. seminormal sulphuric acid had been added, the residue carefully dissolved in 10 c.c. chloroform and the whole transferred to the separating funnel and the mixture well shaken. After separation the chloroform was drawn off and the process repeated with successive 5 c.c. chloroform until the latter came away colourless. The mixed chloroformic solutions were shaken with a little acidulated water, to remove mechanically adherent alkaloid, and the acid washings added to the contents of the separating funnel. The latter was then made alkaline by the addition of 2 c.c. liquor ammoniæ, B.P., and the alkaloid extracted by shaking with two successive 10 c.c. and then with 5 c.c. chloroform. To obtain the alkaloid in a pure condition the mixed chloroformic solutions were shaken with acidulated water, 20 c.c. distilled water being acidulated with 2 c.c. seminormal sulphuric acid, and used in three successive portions. The acid alkaloidal solutions were separated in turn and then mixed, the mixed liquids made alkaline with ammonia, and the alkaloid removed by agitation with 2 successive 10 c.c., and then with 5 c.c. chloroform. The mixed chloroformic alkaloidal solutions were drawn off into a platinum dish and evaporated, and the residue dried over a water-wath. The dish was then transferred to a desiccator and allowed to cool, and was then weighed.

It was anticipated that the resinous and fatty matter present would render difficult the removal of alkaloid from the chloroform used in washing out the colouring matter. Such, however, was not found to be the case, agitation with acidulated water being found to remove the last traces of alkaloid. This was proved in many of the estimations by evaporating the washed chloroform containing the colouring matter to dryness, treating the residue with a little dilute sulphuric acid, filtering and testing with Thresh's reagent.

In several of the 40 and 50 per cent. tinctures the mucilage present was found to interfere seriously with the estimation of the alkaloid by hindering, and in some cases altogether preventing the separation of the chloroform. This difficulty may frequently be overcome by keeping down the volume of the aqueous fluid, and doubling the amount of chloroform used for shaking out the alkaloid, but the most satisfactory plan to adopt is to precipitate the mucilaginous matter by treatment with 90 per cent. alcohol, as described in our note on tincture of jaborandi (*Pharm. Journ.*, July 4, 1891). The alkaloid, as obtained in the process of estimation is a perfectly transparent fused mass. It is soluble in water, and the aqueous solution gives an orange precipitate with Thresh's reagent; a white, more or less curdy precipitate with Mayer's solution; a lemon-yellow precipitate with phosphomolybdic acid; and a kermes-brown precipitate with solution of iodine in potassium iodide. It gives a faint white precipitate with mercuric chloride, and a copious white precipitate with tannic acid cautiously added. The latter precipitate is very readily soluble in a slight excess of the test solution, a trace, however, invariably remaining undissolved. The solution is not precipitated by platinum chloride.

The results are given in Table I.

On reference to this table it will be seen that the average yield of alkaloid by the tinctures made with menstrua of different strengths is very uniform, the balance being very slightly in favour of a menstruum of low alcoholic strength. We have little hesitation, however, in saying that, as in the case of henbane leaves, perfect exhaustion of

Table I.—Showing Quantitative Results of Estimation of Samples of Tincture of Belladonna.

No. of sample.	Amount of alkaloid in grams from 100 c.c. tincture.					Amount of extractive in grams from 100 c.c. tincture.				
	80 p. c. tincture.	70 p. c. tincture.	60 p. c. tincture.	50 p. c. tincture.	40 p. c. tincture.	80 p. c. tincture.	70 p. c. tincture.	60 p. c. tincture.	50 p. c. tincture.	40 p. c. tincture.
1	·024	·025	·026	·028	·028	·925	·900	·950	·975	·925
2	·024	·024	·024	·026	·023	1·36	1·24	1·30	1·20	1·28
3	·026	·025	·026	·025	·025	1·32	1·45	1·45	1·47	1·42
4	·026	·024	·026	·025	·026	1·06	1·16	1·14	1·18	1·14
5	·042	·045	·044	·043	·045	1·42	1·52	1·54	1·50	1·58
6	·0205	·020	·021	·020	·021	1·44	1·52	1·52	1·34	1·32
7	·020	·020	·021	·021	·020	1·14	1·40	1·44	1·38	1·42
8	·0395	·041	·0385	·0395	·039	1·44	1·50	1·48	1·54	1·54
9	·017	·016	·016	·018	·017	·725	·850	·925	1·01	1·00
10	·014	·014	·015	·015	·013	0·70	·82	·90	·94	·88
11	·020	·020	·021	·021	·022	0·90	1·00	1·10	1·20	1·22
12	·015	·016	·017	·016	·016	0·92	1·04	1·14	1·14	1·08
Average . .	·024	·024	·0246	·0248	·0246	1·112	1·20	1·24	1·24	1·23
Root Tinctures.										
German. .	·020	·020	·021	·020	·019	·725	·775	·802	·851	·854
English. .	·0305	·032	·0305	·030	·0265	1·40	1·46	1·48	1·46	1·54

Series 9 *to* 12 *were prepared from German leaves.—Each result represents the mean of Two Estimations.*

Table II.—Showing Results obtained on Mixing the Tinctures (1) *with Water, and* (2) *with* 90 *per cent. Alcohol.*

No	Result when 1 vol. of tincture is mixed with 2 vols. water.					Result when 1 vol. of tincture is mixed with 3 vols. alcohol.				
	80 per cent. tincture.	70 per cent. tincture.	60 per cent. tincture.	50 per cent. tincture.	40 per cent. tincture.	80 per cent. tincture.	70 per cent. tincture.	60 per cent. tincture.	50 per cent. tincture.	40 per cent. tincture.
1	Opal., then opal., faint trace dep.	Opal., then opal., very sl. deposit.	Slight opal., then opalescent.	Clear, then opalescent.	Clear.	Clear, then clear with faint trace ppt.	Clear, then clear with slight ppt.	Faint opal., then clear with slight gel. ppt.	Opal., then clear, with sl. gel. ppt.	Clo. opal., then clear, with slight gelat. ppt.
2	Opal., then cloudy with floc. dep.	Opal., then cloudy with floc. dep.	Opal., then cloudy with floc. dep.	Clo. opal., then cloudy with slight floc. dep.	Cloudy, then cldy. traces floc. ppt.	Clear, no ppt.	Clear, then clear with slight ppt.	Very faint opal, then clear, slight gel. ppt.	Opal., then clear, with slight ppt.	Cloudy, then cloudy, with slight gelat. ppt.
3	Opal., then opal. with floc. ppt.	Opal., then opalescent, floc. ppt.	Opal., then opal. with floc. ppt.	Opal., then opalescent, no ppt.	Clear, no ppt.	Clear, no ppt.	Clear, no ppt.	Faint opal., then clear with slight gel. ppt.	Opal., then clear, with sl. gel. ppt.	Clo. opal., then clear, with sl. gel. ppt.
4	Opal., then opal. with floc. ppt.	Opal., then opal. with floc. ppt.	Opal., then opal. with floc. ppt.	Cldy. opal., then cloudy opalescent, no ppt.	Clear, no ppt.	Clear, no ppt.	Clear, then clear with sli. gel. ppt.	Faint opal., then clear with sl. ppt.	Opal., then clear, with slight ppt.	Clo. opal., then clear, with slight gelat. ppt.
5	Turbid, and remains so.	Turbid, then turbid with slight dep.	Turbid, then cloudy with floc. dep.	Cloudy, then turbid, no dep.	Opal., then clear and sl. floc. dep.	Clear, very slight ppt.	Opalescent, then clear, sli. gel. ppt.	Opalescent, then clear sli. gel. ppt.	Opal., then clear, gelat. ppt.	Opal., then clear, with gelat. ppt.
6	Cloudy, then turbid with separation.	Opal., then turbid with sep. of resin.	Opal., then cloudy with slight sep.	Sl. opal., then opal, no dep.	Clear, then slight opalescence.	Clear, no ppt.	Faint opal., then clear with slight floc. ppt.	Faint opal., then clear with slight floc. ppt.	Faint opal., then clear with fl. ppt.	Faint opal., then clear, with fl. ppt.
7	Faint opal., then cloudy with floc. sep.	Ft. opal., then opal. with floc. sep.	Clear, then turbid with slight sep.	Clear, then opalescent,	Clear, then opalescent.	Clear, no ppt.	Faint opal, then clear with slight gel. ppt.	Opalescent, then clear with mucil. dep.	Opal., then clear with mucil. dep.	Opal., then clear, with mucil. dep.
8	Turbid, then opal. with greenish dep.	Cloudy, then turbid, no deposit.	Opal., then cldy. opal., no dep.	Opalescent and remains so.	Ft. opal., then clear and sl. ppt.	Clear, then clear with slight ppt.	Faint opal., then clear with slight floc. ppt.	Faint opal., then clear with slight floc. ppt.	Opal., then clear, with mucil. dep.	Opal., then clear, with mucil. dep.
9	Opal., then opal. with b'lky green. dep.	Opal., then opal. with b'lky green. dep.	Opal., then cloudy and faint trace ppt.	Opal., then cloudy, no ppt.	Opalescent, then cloudy.	Clear, no ppt.	Clear, then clear with trace ppt.	Faint opal., then clear with slight gel. ppt.	Clo. opal., then clear, with slight gelat. ppt.	Clo. opal., then clear, with gelat. ppt.
10	Clear, then cloudy with floc. ppt.	Clear, then cloudy floc. ppt.	Clear, then cloudy with trace ppt.	Clear, then cloudy, traces ppt.	Clear, then cloudy, no ppt	Clear, no ppt.	Clear, then clear with sli. flo. ppt.	Slight opal., then clear with fl. ppt.	Faint opal., then clear, with fl. ppt.	Faint opal., then clear, with fl. ppt.
11	Opal., then cloudy with sep. of resin.	Opal., then cloudy with sep. of resin.	Opal., then cloudy, no sep.	Very faint opal., no change.	Very faint opalescence.	Clear, no ppt.	Clear, then very sl. ppt.	Opalescent, then clear, with sl. dep.	Opal., then clear, with mucil. dep.	Opal., then clear, with mucil. dep.
12	Opal., then cloudy with floc. ppt.	Opal., then cloudy with floc. ppt.	Opal., then cloudy, no ppt.	Sl. opal., then opalescent.	Slight opal., then opalescent.	Clear, no ppt.	Clear, then clear, slight floc. ppt.	Faint opal., then clear with fl. ppt.	Slight opal., then clear, with mucil. dep.	Clo. opal., then clear, with mucil. dep.
13	Clear, no ppt.	Clear, no ppt.	Clear, no ppt.	Clear.	Clear.	Clear, faint trace ppt.	Clear, then slight ppt.	Opalescent, then clear, with sl. ppt.	Clo. opal., then clear, with slight floc. ppt.	Clo. opal., then clear, with slight floc. ppt.
14	Clear, then opal.	Clear, then opalescent.	Clear, then opalescent.	Clear, then faint opal.	Clear.	Clear, no ppt.	Clear, then sli. floc. ppt.	Faint opal., then clear, with sl. ppt.	Faint opal, then clear, with slight ppt.	Opal., then clear, with slight ppt.

Table III.—Showing Results of Experiments on Process.

	Alkaloid per cent.				Extractive per cent.			
	By maceration.	By double maceration.	By B.P. process.	Continuous percolation.	By maceration.	By double maceration.	By B.P. process.	By continuous percolation.
No. 1. .	·022	·024	·025	·026	1·38	1·40	1·44	1·46
No. 2. .	·024	·028	·028	·028	·86	·91	·90	·96

the drug may be effected by the use of any of the menstrua employed, if the process be carefully conducted. The menstruum at present official contains about 60 per cent. alcohol by volume (proof spirit=57 per cent.), and although for leaf tinctures generally a 50 per cent. menstruum appears to be the most suitable, there does not appear in the present case to be any urgent reason why the strength of the official menstruum should be altered.

The series of tinctures marked Nos. 9, 10, 11 and 12 were prepared from the German leaves. They show a lower yield of alkaloid than those prepared from the leaves of English grown plants, and also a very serious deficiency in extractive strength. It is to be feared that in some pharmacies in this country the leaves of English or German plants are used indiscriminately for the preparation of the tincture, and it may not be inadvisable to note the fact that for the preparation of tincture of belladonna the leaves of "plants grown in Britain" are specially directed to be employed.

The results we have obtained are not without interest, from the evidence they afford of the fact that the belladonna leaves sent out by wholesale houses in this country give an alkaloidal yield somewhat higher than the average generally obtained by those who have worked upon the subject.

The strength of the B.P. tincture of belladonna is 1 in 20, so that by multiplying our results by 20, the percentage amount of alkaloid in the leaves employed in making the tinctures may approximately be ascertained.

As stated above the alkaloidal content of good specimens of the drug may be fixed at from ·30 to ·87 per cent., and on calculating out the percentage on the basis of the results recorded in the table, it will be found to vary between the limits of ·30 and ·90, with an average yield of ·49 per cent.

Another fact which is clearly evident from a study of the table is, that no fixed ratio exists between the yield of alkaloid and extractive, the proportions showing a very great variation. This has been pointed out in relation to other drugs, and will be understood when the variability in the amount of chlorophyll, and also of mucilaginous matter present in the leaves is taken into account.

With regard to the root tinctures, both show a very fair average content of alkaloid, and it is quite possible that by carefully selecting small roots, in which the proportion of cortical to woody matter is fairly large, a tincture of considerable potency and tolerably constant strength might be obtained. This tincture is one which readily admits of standardization, and in view of the results we have recorded, which show a variation in alkaloidal strength between a maximum of ·045 and a minimum of ·015 per cent., we are strongly of opinion that the time has come when such standardization should be carried into effect. The standard should be fixed not lower than ·025 per cent., and it is evident from the results given in Table I., excluding those obtained from the tinctures prepared from the German leaves, that no difficulty need be experienced in preparing a tincture of belladonna of that strength, using the proportions of drug and menstruum ordered in the B.P.

The effect produced on mixing the tinctures (1) with water, and (2) with 90 per cent. alcohol, as indicating the presence or absence of resinous, fatty, waxy and mucilaginous bodies, was noted, and the results are stated in Table II. Those results show the appearance presented on mixing the liquids, and also after standing for 12 hours. In order to ascertain the comparative value of alternative processes for the preparation of tincture of belladonna, two good samples of the drug were selected, and tinctures made from each with a 50 per cent. menstruum, by the following processes.

1. *Simple Maceration.*—Half an ounce of the drug in No. 20 powder was macerated for seven days in 10 fluid ounces of menstruum, with occasional agitation; the liquid portion was then poured away and the marc pressed, and a sufficiency of menstruum added to make the volume of the mixed liquids up to 10 fluid ounces, and the tincture filtered.

2. *Double maceration.*—Half an ounce of the powdered drug was macerated for forty-eight hours in five fluid ounces of menstruum, with occasional agitation. The liquid portion was then strained off, and the marc pressed, the pressings being added to the strained liquid. The marc was then macerated with the remainder of the spirit for twenty-four hours, the tincture strained off and the marc pressed, the liquids mixed and made up with menstruum to ten fluid ounces, and the tincture filtered.

3. The B.P. process—maceration and percolation—the last portion of the tincture being displaced.

4. *Continuous percolation.*—Half an ounce of the drug in No. 20 powder was moistened with menstruum, and packed in a conical percolator; more menstruum was then added, and percolation allowed to proceed, slowly but continuously, until ten fluid ounces of tincture had been obtained.

The tinctures were then estimated by the process already described, with the results stated in Table III.

From these results it is evident that there is little to choose between the process of double maceration, and one of macero-percolation or continuous percolation, the probability being that with the proportions of drug and menstruum ordered in the B.P. perfect exhaustion may be effected by the use of either of these processes.

CHEMISTRY OF PHOTOGRAPHY.*

BY F. PARK.

How few people who dabble in photography know anything about the chemical changes which take place in the processes that a photograph goes through before it is complete. Both amateurs and professionals are alike in this, and few ever try to understand the chemical changes, and consequently the why and wherefore. But it is an advantage to know the nature of these reactions, so as to find out the causes and to overcome the difficulties which attend some of the processes. A person ignorant of the use of each ingredient, if he find his negative or print a failure, is often totally at a loss for a remedy, and must either find out by repeated trials or ask the advice of someone who knows the reactions and can trace the source of the failure. Anyone with a little knowledge of chemistry can easily understand the reactions, and it is important that we as chemists should understand them, for now that photography is so prevalent a great many of the chemicals are supplied by us and we should be able to explain any difficulties that may be met with.

It would be impossible on this occasion to describe all the processes of photography. I will, therefore, simply deal with some of the more important changes which take place in developing and fixing an ordinary negative and print as far as is known, and merely mention the theories which have been brought forward to explain the constitution of the invisible image on an exposed plate.

In connection with photography, one of the first changes that was observed to be due to light was the darkening of silver chloride upon exposure, and subsequently that there was a liberation of chlorine. The same change is found to take place with silver bromide and iodide, but the visible darkening is not so decided. The visible darkening, however, is not a measure of the relative sensibility of the compounds to light, as silver bromide, for instance, is more sensitive to light than silver chloride when followed by development.

In the old wet plate process, silver iodide was spread on a glass plate, with the assistance of collodion, which latter acted simply as a vehicle to hold it on the surface of the glass. But silver iodide *alone* is found to be very insensitive to light.

If pure silver chloride be exposed to light in a tube which has been exhausted of air and moisture, it does not darken, but remains perfectly white; but if moisture or moist air, or anything that will absorb or combine with chlorine, be admitted into the tube and it be again exposed to light, the silver chloride rapidly darkens, and loses chlorine, which of course unites with the absorbent. The same is true of silver iodide and bromide, but the visible discoloration is not so plainly seen. When the light acts upon it the tendency is for the light to split up the silver iodide, and liberate iodine, but there must also be something present which will combine with the liberated iodine. So that to make a plate, covered with silver iodide in collodion (which itself is not an absorbent of iodine) perfect there must also be some substance present in the film, which will combine with the iodine before the plate is sensitive to light. Such a substance is called a sensitizer, and when this is present, the plate is capable of taking an impression of light and shade, which can afterwards be developed.

The collodion plate is prepared by flowing over it a solution of collodion, containing iodide of potassium or other iodide, and when set dipping into a solution of nitrate of silver. Iodide of silver is formed imbedded in the collodion, and a little free nitrate of silver, which is in excess, is left on the film, and this latter acts as the sensitizer. The plate must be exposed while still wet with nitrate of silver solution, for if this were washed off or allowed to dry, the plate would be again almost insensitive. An improvement upon this, so that the plate could be preserved and used when dry, instead of having to use it when wet, was made by washing off the free nitrate of silver and adding some other absorbent to the film instead. This could be done by soaking the plate in some organic sensitizer, like tannin or albumen, etc., which took the place of the nitrate of silver and acted when dry. A great improvement was made upon this when gelatine took the place of collodion as the vehicle for holding the silver salt, and gelatine is now the vehicle employed in the most modern photographic plates.

In the case of gelatine, it not only acts as the vehicle for holding the silver salt, which is nearly always silver bromide, as this is found to be the most sensitive when gelatine is used, but it also acts as a sensitizer, so that there is nothing more required than silver bromide imbedded in gelatine for the most rapid plates. Another great advantage is it can be used when dry, and retains its sensitiveness for a long time.

The plates are not coated in the same way as described for wet collodion plates, but the gelatine and bromide of potassium are dissolved in hot water, and the silver nitrate in solution added to this and mixed, the bromide being in excess. Bromide of silver is formed and emulsified in the gelatine. The other product, nitrate of potassium, together with the excess of bromide of potassium, are washed out when the emulsion is set and cold, as they are injurious to sensitiveness. The plates are then coated with the hot emulsion, allowed to set and dried. Of course all this is done in a dark room.

I mentioned before, when light acts on such a prepared plate, that bromine is liberated and absorbed by the gelatine, which is a rapid absorber of bromine. There are other substances, as nitrite of potassium, which are very greedy for bromine, and which not only absorb the bromine, but have a great attraction for it, and consequently act very strongly as sensitizers, but nitrite of potassium is too deliquescent for use in the gelatine film.

It is also found that by boiling the emulsion it becomes more sensitive to light. It would appear that the heat brings the bromide of silver almost to the verge of decomposition, and that the slightest impact of light is then sufficient to liberate the bromine. If the boiling is carried too far, the bromide of silver is decomposed and the emulsion spoiled. The same sensitiveness is also produced by adding ammonia to the emulsion instead of boiling. So that the aim in making a sensitive plate is to produce a compound like bromide of silver in such an unstable state that the slightest impact of light is sufficient to complete the disassociation of the compound, but not to overstep the mark, so that the compound will remain until the requisite impact is given.

The actual change which occurs in the film when exposed to light has not yet been definitely solved. It is known that bromine is liberated, but the composition of the product, that is the compound which is formed after the liberation of the bromine, and which constitutes the latent image before development, is still unsolved. It is usually spoken of as the reduction product, and is invisible on an ordinary exposed plate.

The reduction product has been defined by some as sub-bromide of silver (Ag_2Br), by others as an oxy-bromide of silver, the oxygen being supplied by the air, and by others, as being simply due to a further oscillation produced in the molecules of the silver bromide, by the light, and which consequently behave differently in the developer. It is most likely a chemical change, but the investigation is

* Paper read before the Newcastle-on-Tyne Chemists' Assistants' and Apprentices' Association.

surrounded with difficulties, as the amount of reduction product is so small that it is impossible to collect it. Even if sufficient of it could be formed, it would be at present impossible to isolate it by any known means, as all solvents seem to act by dissolving away the whole of the film, without making any difference between the reduction product and the unexposed portions.

There is a difference in action between the development of a collodion wet plate and a gelatine plate with their respective developers. The essential ingredients in the developer for a wet collodion plate are a solution containing ferrous sulphate and a little acetic acid, together with a small quantity of alcohol to make the developer flow easily over the plate. The collodion plate, it will be remembered, has a film of nitrate of silver solution, and when ferrous sulphate is added to silver nitrate, a precipitate of free silver is formed.

$$6FeSO_4 + 6AgNO_3 = 2Fe_2(SO_4)_3 + Fe_2(NO_3)_6 + 3Ag_2.$$

If simple ferrous sulphate solution were added to the exposed plate, a precipitate of metallic silver would be formed and deposited over the whole plate, but acetic acid checks the precipitation of the silver, with the result that the silver is gradually formed and deposited over the reduction product, that is, on those parts only which have been acted upon by light. It is not known why the depositing silver chooses the reduction product, perhaps the reduction product has a reducing effect upon the silver nitrate, and consequently causes the silver to deposit upon itself, but the effect is only produced when the acetic acid is added to the ferrous sulphate solution, and the acetic acid is called a restrainer. Its virtue consists in forming an organic compound with the silver, which is a little more stable than the silver itself. It is possible to have restrainers of almost any degree, so that the precipitation of the silver is wholly prevented.

The silver first deposited on the image attracts more silver from the developing solution, which comes from the nitrate of silver and goes on doing so as long as there is any silver to feed it, so that the density is greater as the development is continued, and is proportional to the amount of reduction product first formed by light.

Silver is not the only developer that can be used; the plate can be developed with mercury in a similar manner. All that is required is a "potential deposit" of mercury, just as there is a "potential deposit" of silver in the ferrous sulphate developer; that is, a solution containing mercury in such a condition that the slightest chemical attraction will disturb the balance and cause the metallic mercury to separate from the solution. Such a developer can be made with pyrogallol and mercurous nitrate, where the mercury is deposited and forms the image, the plate being washed to free it from the nitrate of silver, after being exposed.

Ferrous sulphate is able to reduce silver nitrate to metallic silver, but is incapable of reducing iodide or other haloid of silver; but in the development of a gelatine plate, a much stronger developer is used, viz., one that can reduce the haloids of silver. As they all act in much the same way, pyrogallol and ammonia may be taken as an example.

Pyrogallol in alkaline solution is a rapid absorber of oxygen, and if allowed to act on an exposed gelatine plate, the bromide of silver would be reduced to metallic silver all over the plate, so that it also requires a restrainer.* The tendency would be to reduce the exposed parts first, and then immediately to attack the unexposed bromide. Bromide of potassium acts as a restrainer, which is supposed to form a more stable compound with bromide of silver and consequently prevent its too easy reduction. The developer with such an addition first begins to reduce the reduction product, which is more easily done, to metallic silver. The bromide of silver in immediate contact, with the newly formed, or "nascent" silver, becomes reduced, and this product is now reduced by the developer to metallic silver and so on, the silver being deposited and forming the image, being fed as it were from the bromide of silver below the parts originally acted upon by light, the picture being fed from silver derived from the unchanged silver bromide, not from all the bromide, but only from that in contact with the silver image resulting from the first action of the developer, such image at first being the equivalent in silver of the reduction product formed by light. In the wet collodion development the image is built up by silver being deposited from above, but in the alkaline development the image is formed from below, and the silver is supplied from the bromide in the emulsion itself, so that the image is sunk into the gelatine film.

The reducing action of the "nascent" silver upon the bromide, is in all probability the result of micro-electrolytic decomposition.

Another reason why the boiling of the emulsion, or the addition of ammonia, which was mentioned, causes greater sensitiveness, is because the molecules of bromide of silver aggregate together and give a coarser-grained emulsion, the particles formed being larger, the effect of light on a definite area will be communicated to a greater number of the molecules when they are clustered together.

Such are the theories advanced for the explanation of development, and the next process, after the image has been brought out, is to remove the unaltered bromide, so as to have simply the image upon the plate, and enable it to be used for printing, and to prevent it being further acted upon when exposed to light.

This is usually done, in the case of a gelatine plate, at any rate, by immersing it in a solution of hyposulphite of soda, which dissolves alway the unaltered bromide of silver, but does not affect the silver image. It does so by forming a compound with the bromide, which is soluble in the solution of hyposulphite of soda, so that the "hypo" solution must be tolerably strong.

$$AgBr + Na_2S_2O_3 = AgNaS_2O_3 + NaBr.$$

If the solution of hypo is too weak, a different compound is formed, which is insoluble, and cannot be washed away subsequently. If used too strong it is apt to form blisters on the film, or bring the film partly off, when placed in water to be washed, owing to osmotic action taking place too rapidly, the water entering the film much more quickly than the strong hypo solution can leave it.

In making prints from negatives there are numerous processes. Only one of the most frequently used, that with albumenized paper, will be here described. Paper is coated with albumen which has been previously salted with a soluble chloride, and is then floated on a solution of nitrate of silver and dried. The excess of nitrate of silver acts as a sensitizer, and the albumen acts both as a sensitizer and a vehicle for holding the silver salts. Chloride and "albuminate" (for want of better knowledge) of silver are formed, and these, when placed behind a negative and exposed to light, darken and form a positive, that is a print with correct light and shade. The picture is composed of the reduction products of silver chloride and silver albuminate, the former resembling in composition the reduction products composing the invisible image on an exposed plate.

The colour of the print is of a rusty brown colour, and to overcome this it is subject to a process of "toning" before being fixed in the ordinary way. The toning solution in which the print is immersed is composed

* Sulphite of soda is generally added to the developer, which is a more rapid absorber of oxygen than pyrogallol, and thus keeps the "pyro" free to do its work of reducing the bromide of silver for a long period.

of a dilute solution of chloride of gold or chloride of gold and soda, to which is added a little acetate, or bicarbonate of soda, or borax, etc. A neutral solution of chloride of gold is easily reduced by almost any reducing agent and the gold precipitated, so that the reduction product of the image reduces the chloride of gold and metallic gold is precipitated upon it, the unaltered chloride has no reducing action. The toning solution has a "potential deposit" of gold.

The object of adding carbonate or acetate of soda, etc., to the solution is because hydrochloric acid is set free, when the auric chloride is reduced, and the accumulation of this would act as a restrainer and prevent the precipitation of the gold, but the carbonate or acetate prevents this, as the HCl acts upon them and liberates a milder acid, as carbonic or acetic acids.

There are many other printing processes, as gelatino-chloride, gelatino-bromide, platinotype, carbon-printing, etc., etc., some of which are developed instead of being "printed out." Those who care to study them can consult such works as those by Abney, Meldola, and others, to which the writer is much indebted for his information.

STYLES OF COMPOSITÆ.

So great is the uniformity of structure throughout this vast natural order, that any new tribal characters are of great value. Mr. J. S. Chamberlain attempts, in the *Bulletin* of the Torrey Botanical Club, to obtain such from the structure of the style, paying special attention to the papillæ and to the collecting or brush-hairs. He finds that, like other characters in the Compositæ, those derived from the style cannot be used in all cases singly, but only in conjunction with others. These characters are more constant and uniform in some tribes of the order than in others. Thus, in the Vernonieæ, Eupatorieæ and Asteroideæ, the structure of the style is very uniform and constant for each tribe, and can be used with great advantage for purposes of classification. In the Helianthoideæ and Cynaroideæ the characters are still sufficiently uniform and constant to be of great aid; while in the Helinoideæ, Anthenideæ and Senecionideæ there is less uniformity and constancy. Another difficulty is that where, as in some genera of Inuloideæ and Helianthoideæ, the flowers are diœcous, the brush-hairs are wanting on the style of the female flower.

INTOXICATING RYE.

At a village in the department of the Dordogne in France, the bread made from a sample of rye produced remarkable effects, not only on men, women, and children, but on animals of all kinds which partook of it. These effects were not the same as those produced by ergot, but more resembled alcoholic intoxication. Grains of the rye were subjected to a careful examination by M. Prillieux, who found them infested by fungi and bacteria of various kinds. The pathogenic effects he believed to be produced by an undescribed species of fungus, the representative of a new genus, characterized by the production of spores within the cells. He names it *Endoconidium temulentum*.

NITRIFYING SCHIZOMYCETES.

Dr. O. Loew suggests that the oxidation of the ammonia in the soil caused by the nitrifying schizomycete *Nitromonas* is partly complete, as expressed by the equation $2NH_3 + 3O_2 = 2NO_2H + 2H_2O$, partly incomplete, according to the formula $2NH_3 + 2O_2 = 2NO_2H + H_4$, and that the hydrogen thus set free immediately combines with carbon dioxide to produce formic aldehyde, according to the equation $CO_2 + H_4 = CH_2O + H_2O$.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, DECEMBER 12, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE NEW BYE-LAWS.

A REVISION and amendment of the Society's bye-laws has long been requisite, and though this subject has been under consideration by the Council for several years, it has been deferred from time to time in the hope of obtaining further powers by amended legislation, which would afford occasion for a thorough reconstruction of the bye-laws. The failure of the attempts made with that object having done away with that reason for leaving the matter longer in abeyance, the Council decided last March to proceed with the necessary steps for altering the bye-laws in several points relating to the constitution of the Society and to the examinations, so far as the existing powers conferred by the Pharmacy Acts of 1852 and 1868 would permit. It may here be stated that the bye-laws drawn up after the passing of the Pharmacy Act, 1868, and the alterations finally approved between that time and 1879, were drafted on the basis of the bye-laws existing when that Act was passed and having relation to the Pharmacy Act, 1852, by which membership of the Society was restricted to pharmaceutical chemists. Although that restriction was then removed, some of the provisions having reference to the older order of affairs were retained in the bye-laws, and they have with the lapse of time become obsolete. A draft of the proposed new bye-laws adopted by the Council, was submitted to a special general meeting held on the 27th of May last, and they were then approved and confirmed. The new bye-laws have now been finally confirmed by the Privy Council in accordance with the requirements of the statute, and they consequently come into operation forthwith. Some of the alterations made are merely of such a nature as is requisite for bringing the bye-laws into full conformity with the Society's Charter and the Pharmacy Acts. Of those which have a further application and are more important, some relate to the internal constitution of the Society and to its position as a representative of the pharmaceutical body, while others relate to the examinations. In explaining the nature of the changes which will result from the new bye-laws those above men-

tioned are the most important to consider, and in the first place we shall refer to the bye-laws affecting the constitution of the Society.

Regret has often been expressed that notwithstanding the widespread sense of the need for unity among chemists and druggists, the number of those connected with the Pharmaceutical Society still continues proportionately small. Yet it is generally admitted that the Society is the only possible body by which the trade can be represented, or through which the interests of chemists and druggists can be protected or promoted. Even to those who are disposed to question that fact, the failure of all attempts to establish other associations for those purposes should be a convicing proof of their error. The chief object of the Pharmacy Act of 1868 was to render a complete federation of the entire trade possible, that having been regarded as an important means of elevating the standing of the whole body. With that object access to the Society was made easy for all registered persons. The rights of chemists and druggists then in business were not curtailed or interfered with, and liberal provision was made for assistants. In so far as the Act was the means of establishing chemists and druggists in the position of a defined and recognized body, its object was attained by their registration, and that was done without any expense to themselves. If chemists had then done their part in acknowledging the service thus rendered to them by the Society, a complete federation of the trade would have been effected, and a strong representative corporation established, by which the legitimate interests of pharmacy would have been secured. But though the Act provided that every person who was or had been in business at that time should be eligible as a member of the Society, and though provision was also made for their representation on the Council of the Society, the opportunity that was thus offered for taking part in the work of the Society has not been taken advantage of by the majority of those for whom it was intended. By still remaining unconnected with the Society they shut themselves out from the possibility of exercising any influence upon its proceedings, and they reduce the power of the Society to take action as a corporate and representative body for protecting or advancing the interests of the class to which they belong. One of the circumstances which have been alleged as the reason for this anomalous condition of matters is the requirement of an entrance fee of two guineas from chemists and druggists becoming members of the Society under the provisions of the eighteenth section of the Act. That impediment has now been removed by the repeal of the bye-law which imposed an entrance fee, and it is now open to all chemists and druggists who were in business before 1868 to become members of the Society without paying an entrance fee. Another alteration in the bye-laws relating to connection with the Society is the practical abolition of the fee to be paid by those who may have ceased to be connected with it and desire to be restored to that position. The composition to be paid for obtaining a life membership has also been reduced to ten guineas, and this alteration may be expected to induce many who pass the Major examination to become life members of the Society. This provision as to a life composition will also apply to associates in business, although it is not possible by a simple alteration of a bye-law to admit them as members of the Society, as proposed in the Pharmacy Bill of last session. In order to extend the relations of the Society with men distinguished in science or any of the branches of knowledge embraced in the Society's educational objects, to a greater extent than has been possible by the election of honorary members, a further class of corresponding members has been established under the new bye-laws.

In regard to the examinations several alterations have been made. Thus, in exercise of the power given by the eighth section of the Pharmacy Act, 1852, another subject has been added to the Minor examination, in accordance with the recommendation of the Privy Council. In future, therefore, all candidates for this qualification will undergo examination as to their knowledge of the law relating to the sale of poisons. The fee for the Minor examination has been increased to five guineas, and a corresponding alteration has been made in the fee to be paid for the re-examination of candidates who have failed to pass. This increased fee is rendered necessary by the alteration of the mode of conducting the examinations which has recently been decided upon by the Boards of Examiners in the new regulations they have adopted. Additional expense will thus be incurred which must, of course, be borne by the candidates. But, considering that the passing of this examination confers a legal qualification to carry on the business of a chemist and druggist the amount of the fee is not disproportionate to the advantage thus gained. Moreover, the registration of those who pass the qualifying examination, while serving as a voucher to the public of their competence, is also a means of protecting the common interests of themselves and of all lawfully engaged in the trade. Therefore everyone who obtains the qualification should contribute something towards the expense of maintaining the Register of Chemists and Druggists, which is their only means of defence against unqualified and unlawful traders. By some slight alterations provision has been made for allowing the Board of Examiners to conduct the Major examination so that candidates may pass it upon showing that they possess high proficiency in two or even one of the subjects, with a fair know-

ledge of the others. The opinion that this should be done has long been entertained by the Boards of Examiners, and the plan has much to recommend it, since the Major examination relates to an honours qualification, and the real test of pharmaceutical competence is properly to be applied in the Minor examination. Concurrently with the possible alterations that may be made in this direction, the reduction now made in the new bye-laws of the fee to be paid for the Major examination to three guineas, offers additional inducement for taking the qualification of pharmaceutical chemist.

THE BENEVOLENT FUND ELECTION.

Though the benefits of the Benevolent Fund are now open to all members of the trade who may require to have recourse to it, whether they have been connected with the Society or not, it is but reasonable that the claims of those who have contributed to the Funds should be considered more favourably than those of candidates otherwise equally deserving. Those w o take an interest in the administration of the Benevolent Fund will therefore, no doubt, be pleased to have learnt that at the election last week effect was given to the principle that candidates who have been themselves subscribers to the Fund, or who are relatives of former subscribers, should have a preference over others who have not that recommendation. Among the candidates at the late election, Mr. Machon and Mrs. Mumbray were the only ones in that position, and we are pleased to see that both were elected. Mr. Machon was actually at the head of the poll, in regard to the actual number of votes polled at the election ; and Mrs. Rowan's higher place in the list was due to the fact that she had the advantage of a large number of votes registered at previous elections.

While mentioning this subject attention may be drawn to the large number of votes which were disallowed, in consequence of the voting papers having been incorrectly filled; no less than ninety-five voting papers, representing 296 votes, having been disallowed on that account. This circumstance alone may have materially affected the results of the election. But it is not the only one to which loss of votes is to be attributed. For several days after the election voting papers continued to arrive, which were of course quite useless. It may also be mentioned that in the filling up of voting papers the mistake is often made of giving the full number of votes to each of two or more candidates. Since that is contrary to the regulations printed on each voting paper, such votes become void, and the scrutineers have no alternative but to disallow them. The directions for voting given on each voting paper are, however, so explicit that with moderate care errors ought not to occur.

As reported last week, the committee to which was referred M. Bocquillon-Limousin's letter to the Council of the Pharmaceutical Society asking its opinion as to the desirability of summoning an international pharmaceutical congress to meet either in Madrid or Copenhagen has reported unfavourably upon both suggestions. This decision appears to be in accord with that arrived at by other similar bodies. In the first place, according to the *Apotheker-Zeitung*, the pharmacists of Copenhagen are not favourable to a congress in that city. The St. Petersburg Society also disapproves, for the reasons that there are very few pharmaceutical questions which allow of being solved internationally, and that hitherto nothing has been accomplished at such international congresses. The General Austrian Pharmaceutical Association has voted on several grounds against the convocation of a congress in 1893, and finally the Council of the German Pharmaceutical Association has decided adversely to the French propositions.

* * *

A Bill has been introduced into the Indiana Legislature making it illegal to sell "baking powder" containing cream of tartar, on the ground that cream of tartar, when taken even in small quantities continuously, is apt to disturb the digestion, and rochelle salt, the product of the reaction left in the bread, is also hurtful to the system.

* * *

In a communication to the *British Medical Journal* (Nov. 28, p. 1146), Mr. T. J. Walker reports a curious case of poisoning by absorption from a belladonna plaster. When first seen the patient, a woman aged 65, was unconscious and delirious, with rigid limbs, convulsive twitchings, dilated pupils and retained urine. A perforated belladonna plaster, about eight inches square, was found on the patient's back, the skin beneath it having the appearance of a healing blister. The raw appearance of the skin, it was explained, was consequent upon the application about three weeks previously of a "strengthening plaster," which had inflamed the skin and caused vesication. A second case is also mentioned in which a belladonna plaster from the same maker had caused inflammation of the skin, with serous discharge. This report has evoked one from Dr. E. T. Wynne (*British Medical Journal*, December 5, p. 1244), who mentions a case in which a belladonna plaster caused in two hours severe blistering of the skin of one patient wherever it had been in contact, whilst portions from the same roll of plaster applied to three other patients caused no inflammation or irritation.

* * *

We regret to notice that in the *Times* of Thursday there was an announcement of the death of Mr. W. Manning Watts, of the firm of Battley and Watts, Whitecross Street. Mr. Watts had been a member of the Society since 1853, and for several years he had occupied the position of an auditor of the Society's accounts.

* * *

We are indebted to Mr. C. A. Farmer for communicating information of the death of his father, Mr. John Farmer, of High Street, Putney, in his eighty-seventh year on the 8th inst. Mr. Farmer had been in business sixty-one years, and was at least one of the earliest members of the Society, if he was not actually one of the founders.

Transactions of the Pharmaceutical Society.

THE NEW BYE-LAWS.—ORDER OF COUNCIL.

The following letter, enclosing an Order of Council, approving of the Bye-laws adopted by the Pharmaceutical Society at the Special General Meeting on May 27, has been received by the Secretary:—

"Council Office, Whitehall,
"December 5, 1891.

"Sir,—I am directed by the Lord President of the Council to transmit to you, to be laid before the Council of the Pharmaceutical Society of Great Britain, the accompanying Order of Council of the 4th instant, approving certain new Bye-laws for the better conduct and regulation of the Society's business, etc., which were confirmed at a special General Meeting of the Society held on May 27, 1891.

"I am, Sir,
"Your obedient servant,
"(Signed) C. L. PEEL.

"The Secretary, Pharmaceutical Society,
"17, Bloomsbury Square, W.C.

'"At the Council Chamber, Whitehall,
The 4th day of December, 1891.

"'By a Committee of the Lords of Her Majesty's Most Honourable Privy Council.

Present:
Lord Hannen,
Sir William Hart Dyke, Bart.,
Lord Shand.

"'Whereas by an Act passed in the Session of Parliament held in the 15th and 16th years of Her Majesty's reign, cap. 56, intituled, "An Act for regulating the qualifications of Pharmaceutical Chemists," it was enacted that the Council of the Pharmaceutical Society of Great Britain should be, and the same were thereby, authorized and empowered to alter and amend the Byelaws of the said Society, made and established under or in pursuance of the Charter of Incorporation of the said Society, and to make and establish such new or additional Byelaws as they should deem proper and necessary for the purposes contemplated by the said Charter or by the said Act: Provided always, that all such original Byelaws and all altered, amended or additional Byelaws should be confirmed and approved by a special general meeting of the members of the said Pharmaceutical Society, and by one of Her Majesty's principal Secretaries of State:

"'And whereas by an Act passed in the Session of Parliament, held in the 31st and 32nd years of Her Majesty's reign, cap. 121, it was enacted that every person who shall have been registered as a Chemist and Druggist under that Act, by reason of having obtained a certificate of qualification from the Board of Examiners, shall be eligible to be elected an associate of the Pharmaceutical Society, and every such person so elected and continuing as such associate, being in business on his own account, shall have the privilege of attending all meetings of the said Society, and of voting thereat and otherwise taking part in the proceedings of such meetings in the same manner as members of the said Society, provided that such associates contribute to the funds of the said Society the same fees or subscriptions as members contribute for the time being, under the Byelaws thereof:

"'And whereas by "the Pharmacy Act, 1868," it was enacted that all powers vested by the Pharmacy Act in one of Her Majesty's Principal Secretaries of State, should be vested in the Privy Council:

"'And whereas the President of the said Pharmaceutical Society did, on the 3rd day of June, 1891, represent to the Lords of Her Majesty's Privy Council, that at a special general meeting of the members and associates of the said Society, held on the 27th May, 1891, certain new Byelaws for the better conduct and regulation of the Society's business, and for the more perfect performance of the Society's duties entrusted to it by its Royal Charter of Incorporation, the Pharmacy Act, 1852, and the Pharmacy Act, 1868, were confirmed:

"'And whereas the said Society have submitted the said new Byelaws for the confirmation and approval of the Lords of the Privy Council:

"'Now, therefore, their Lordships are hereby pleased to confirm and approve the said new Byelaws (a copy whereof is hereunto annexed).

"'(Signed) C. L. PEEL.'"

The Bye-laws, in the form in which they have received the approval of the Privy Council, are printed in the Pharmaceutical Journal for March 7, 1891, p. 821.

DONATIONS TO THE LIBRARY AND MUSEUM.

At the meeting of the Library, Museum, Laboratory and House Committee, held on Wednesday, the 9th inst., the undermentioned donations were announced, and it was ordered that the thanks of the Society should be communicated to the respective donors:—

To the Library in London—

Index Catalogue of the Library of the Surgeon-General's Office, U.S. Army, vol. 12, 1891. From the SURGEON-GENERAL.

University College, Nottingham, Calendar, 1891. From the COLLEGE.

Lescher (F. H.), Recent Materia Medica, 4th ed., 1891. From the AUTHOR.

Fraser (T. R.), Strophanthus hispidus, part 2, Pharmacology, 1891. From the AUTHOR.

Radcliffe Library, Catalogue of Books added during 1890. From the RADCLIFFE TRUSTEES.

Cullen (W.), Treatise of the Materia Medica, 1789, 2 vols. From Mr. H. LONG.

To the Library in Edinburgh—

Fraser (T. R.), Strophanthus hispidus. From the AUTHOR.

20 vols. Pharmaceutical Journal, 1870–90. From Mr. ALEXANDER NOBLE

To the Museum in London—

Chinese Opium Pipe. From Mr. W. LE FEVRE, Harrold.

Two Specimens of West African Copaiba. From Mr. J. C. UMNEY.

Specimen of Spurious Indian Pink Root. From Messrs. HODGKINSON, PRESTONS, and KING.

Specimens of Spurious *Pareira Brava*. From Mr. W. F. J. SHEPHEARD, Chester.

Specimen of *Pareira Brava* and Jalap and false Brazilian Sarsaparilla. From Mr. WARDLEWORTH.

Peculiar Specimen of Chinese Rhubarb. From Mr. E. S. MATTHEWS.

Further Specimen of Catechin from Oudh. From the DIRECTOR, Kew Gardens.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The monthly meeting of the Council was held on Wednesday, the 2nd inst., at the Society's House, 67, Lower Mount Street, Dublin, at 3 o'clock. The chair was taken by the President, Mr. William Hayes.

The other members of the Council present were the Vice-President, Mr. T. W. Robinson and Messrs. Wells,

Grindley, Dr. Burns, Hodgson (Treasurer), Boyd and Beggs.

Death of Mr. R. W. Pring.

Mr. Hodgson said that it was with pain that he referred to the loss they had sustained by the death of a late colleague, Mr. Pring. Mr. Pring had been a member of the Council from the commencement of the Society, and his gentlemanly conduct, suavity and intelligence always made him an agreeable colleague to sit with. He (Mr. Hodgson) moved the following resolution: "That the Council of the Pharmaceutical Society have heard with extreme regret of the death of their old and respected colleague Mr. Richard Ward Pring, and desire to convey their sympathy to Mrs. Pring and the other members of the family."

Mr. Wells said he regretted to have to second the resolution. Mr. Pring took the deepest interest in everything connected with the Society and had a hand in the getting of their original Act of Parliament. He was one of the first pharmacists in the country and his place of business was one of the finest and best conducted in the three kingdoms.

The President in putting the resolution said he had known Mr. Pring from the commencement of the Society's existence and he did not think he ever said a word at any of their meetings that was calculated to make an enemy or to cause anyone to disagree with him unpleasantly. When there was trouble he always tried to throw oil on the waters and otherwise invariably acted as a Christian gentleman should.

The resolution was unanimously passed in silence.

The President.

The President said before entering upon the programme of the day I desire to make a short statement. When leaving this country in relation to what was at the time a very sad matter to me personally, I left myself in your hands and I left the Society in the hands of Mr. Wells, who I felt confident would do everything that ought to be done. During my long absence you kindly showed your confidence in me by re-electing me President. I scarcely wished it, but at the same time said I left myself on your hands in the event of your thinking that I would be of any use. You have unfortunately taken me at my word and put me in this place of honour. I trust that we shall now get on with unity, peace and concord, and that the Society will prosper in its work. For my own part I have to thank you very much for your kindness and forbearance in the past, and I shall endeavour to deserve your goodwill in the future. I shall try to hold an even hand between contending parties, though I hope there will be no such thing as contention in the future. I left my son in Melbourne in a condition in which I never hoped to see him, and I have received a good account of him since. At Melbourne I called on Mr. Shillinglaw, the Secretary of the Pharmacy Board and of the Australian Pharmaceutical Society. He requested that I should meet his Board, and after I had come to Sydney I received an invitation to meet them at luncheon. I was kindly received by Mr. Blackett, the President of the Board, and Mr. Joseph George, the President of the Australasian Pharmaceutical Society. The latter informed me that he was in Dublin between the years 1850 and 1854 with Hugh Moone and Co., of Capel Street. I was also very kindly received by Mr. Bosisto, the head of the great firm of Bosisto and Co., the manufacturers of eucalyptus oil. He told me that the turnover of the firm in connection with that article alone is £50,000 a year, and that they have nine square miles of land covered with eucalyptus trees. The gentlemen whom I met in Melbourne are pharmacists of the highest class. Most of them have not only attained independence in business, but are men of high educational attainments, both in connection with their profession and otherwise, and I never met a number of gentlemen whose conversation was more interesting or with whom I felt more agreeably at home. I think it right to refer to these matters, because of course their entertainment of me was as your President, and not on account of any personal claims I had on the hospitality of the Victorian Board of Pharmacy.

The Vice-President said he was sure he only expressed the sentiments of all the members of the Council when he said how pleased he was to see the President back again, and to hear that the condition of his son was so hopeful. They all hoped that the health of the latter would soon be completely restored.

The President: I thank you very much for your kind feeling.

The Registrar read a letter from Mr. MacSheehan, Assistant Secretary of the Local Government Board, fixing the date for the deputation from the Council which waited on the Board on the 18th of last month in reference to the subject of the eligibility of pharmacists for poor law and other appointments as compounders and dispensers of medicines.

The Vice-President said the deputation, which consisted of Mr. Hodgson, Mr. Grindley, Mr. Wells, and himself were most courteously received by Mr. Morris, and the Secretary of the Board, Dr. Mooney. The other members of the Board were absent. The deputation left no point untouched, and Mr. Morris and Dr. Mooney went into the matter thoroughly. Before they left Mr. Morris asked them to send him a memorandum of the heads of the conversation to refresh his memory with. That had been done, and there was every hope that good would come of the interview, and that the position of pharmaceutical chemists in relation to appointments of the kind in question would be put on a sounder basis than it had been before.

Mr. Hodgson: The sympathy of the Board seemed to be quite with the Society. Mr. Morris said that Dr. McCabe had posted him up in all the details of the question, and that as far as they could they would assist us.

Letters were read from Dr. Ninian Falkiner and Dr. Montgomery thanking the Council for having re-elected them Examiners.

A letter was received from Mr. W. J. McNeight, A.D., stating that he had no instructions from Mr. Brogan to pay his subscription for the current year and requesting that a guinea which he (Mr. McNeight) had paid on account of that subscription should be returned.

The Vice-President explained that Mr. Brogan himself paid early in the past year and Mr. McNeight afterwards paid for him and a number of others.

The sum mentioned was ordered to be returned.

Some correspondence arising out of the decision of the Council as to the official organ was read.

Confirmatory Evidence.

A letter was received from Messrs. Alexander and Co., of Great Strand Street, respectfully calling the attention of the Council to the injustice which, the writers stated, was being done to some of their country clients by the "arbitrary straining" on the part of the Council of section 2 of the Pharmacy (Ireland) Amendment Act, relating to "other confirmatory evidence." Few country traders, it was stated, kept invoices extending back through the past fifteen years, and requiring them to exhibit such documents as a condition of receiving their statutory declarations was, in many cases, tantamount to ignoring their applications altogether. As the Council had declined to accept as "confirmatory evidence" certificates from Messrs. Alexander's firm that certain traders had been supplied by them with drugs and poisons previous to 1875, they ventured to make the present appeal to the

Council to re-consider the matter, as it seemed very hard indeed that traders who had been in the habit of selling drugs and poisons chiefly for veterinary purposes for years prior to 1875 should now be disqualified from so doing to their own loss as well as to the serious inconvenience of their customers.

The Registrar, in reply to the President, said that in several cases in which the Messrs. Alexander sent certificates the Committee marked them "further evidence required."

The President: I think our reply must be that the Committee have endeavoured, as far as possible, to admit all who are entitled to admission.

Mr. Boyd said he had always held that when they had a direct statement from a respectable wholesale firm like that of Messrs. Alexander and Co. that they had supplied certain goods to traders prior to 1875, it should be sufficient in itself without old invoices, or should at all events carry great weight with the Committee. He had himself struggled in favour of this contention against great odds time after time, but finding himself in a minority on each occasion and that it only gave rise to continual friction he abandoned doing so in the end.

Mr. Beggs thought it would be laying down a very dangerous precedent to take certificates from any wholesale house as sufficient evidence in themselves. He did not for a moment doubt that what Messrs. Alexander and Co. stated was perfectly correct, but it was only right for the Council to get the best evidence they could in each case. The Council knew that a tremendous amount of trickery was tried to be practised on them, including false statements, changing of invoices, and every other available kind of trick. It was therefore only right that they should be as strict as possible. How could any firm undertake to say whether or not a particular customer of theirs sold poisons twenty years back?

The President: In many cases, although the name of the firm remained the same, the individuals composing the company might have become quite different in the mean time, which necessitates strict inquiry.

Mr. Wells: That was one of the points we found we were tricked in.

Mr. Gibson said that in the north of Ireland there had been no difficulty, for the wholesale houses gave all the information that was required, and placed their books at the service of applicants.

Mr. Boyd said that the certificates had been only asked for in two or three cases where books were not available. In Messrs. Alexander's case the parties had been repeatedly told that the book prior to a certain date had been disposed of or destroyed.

Mr. Wells said he regretted that so many attempts were being made to show that the Committee had acted unfairly. He felt this the more because he had always done what he thought to be honest and right as regarded these declarations. He always considered that the Council had the licentiates of the Society, the registered druggists of the Society, and the public to protect in the matter. He did not think they should allow the proprietors of wholesale houses who were interested in the passing of those men, to be writing and making the statements that they did about the Committee. Mr. Boyd was himself a member of the Committee, and no man ought to know better than he that every case that came before the Committee had got the greatest attention and had been gone most fully into. He (Mr. Wells) asked the writers of the letter to point to any cases of applications that had been refused; and he ventured to say that they would be able to show very sufficient grounds for refusing them. At the very last meeting of the Committee, in a case in which they had a letter from Messrs. Alexander, and little or no evidence besides, they accepted the applicant. On a former day Mr. Hodgson was asked a question on the subject and spoke, as he always did, very fairly. Mr. Boyd asked that such a letter should be accepted. He (Mr. Wells) objected on the ground that it was utterly impossible for any man, no matter how great his brain power, to keep in mind all his customers and to be able to say that he supplied such and such a one with sublimate, arsenic, or strychnine prior to 1875. No doubt in an exceptional case a man might be able to do it. He (Mr. Wells) could himself make an affidavit that he had himself supplied some particular persons with such goods prior to 1875, but he believed that for any man to do so as a general rule was impossible. Mr. Hodgson said that he could not do such a thing and that he was sure there was not a young man in his house who would be able to make such a statement as a general rule. He had in his hand a letter, the writers of which said, speaking of an applicant: "We know him since he commenced business over twenty years ago, and know for a fact and can without hesitation state that he dealt in poisons, sheep dip, arsenic, sublimate, etc.," all of which was good enough, but then the letter went on, "and that he carried on this portion of his business with great care and attention, and that no accident of any kind ever occurred." He (Mr. Wells) did not believe that any one of his best friends in that room could undertake to say that no accident had ever occurred in connection with his business. He defied any man to do it. He therefore opposed the acceptance of such letters as sufficient evidence. They heard a good deal of talk about books being destroyed. He could show dozens of declarations containing statements that the parties had applied to Messrs. McMaster, Hodgson and Co., but that unfortunately their books had been destroyed in a fire.

Mr. Boyd said he did not think there were more than two cases in which such a statement was made.

Mr. Wells said there were several cases in which the statement was that application had been made to Messrs. McMaster, Hodgson and Co. for invoices and that the reply was that they could not be given because of destruction caused by a fire. Mr. Hodgson could state that his books were not burned, and he told them the other day of a case of a customer who asked his firm for an invoice, and that their books were hunted and not a single poison could be found charged to him.

Mr. Boyd said he knew of several cases in which the men themselves said they had had fires, but he did not know of a single case in which reference was made to fires at Messrs. McMaster, Hodgson and Co.

Mr. Beggs: As far as I can remember, I think it was mentioned.

Mr. Wells said that men who made false oaths would do anything. He objected to the testimony of any wholesale house being accepted as conclusive. In one case they actually had the testimony of Mr. Hodgson himself that the person was entitled, and yet they required invoices to be produced. And when the Committee did not take Mr. Hodgson's word why should they be asked to take anyone else's?

Mr. Hodgson: I have had a great many applications that I could not further or assist in the slightest possible degree.

Mr. Wells: It has been said that few, if any, of these druggists in the country keep their old invoices, but that statement has been blown to the winds. We have had hundreds of invoices going back as far as 1850.

Mr. Grindley: When we insist on getting the invoices we get them.

Mr. Wells: Some of them had the corners and the dates taken off them, but we know that they were old invoices. I think the answer the Council should give to this letter is that they see no reason why they should change their way of proceeding. If any man

who has been rejected can get fresh evidence we shall be perfectly ready to re-consider his case.

The President: Well, I think we should put it as mildly as possible to Messrs. Alexander.

Mr. Beggs said that if the Council had erred at all in this matter it had been in the direction of being too lenient. In several cases of parties whom they had registered they had been informed since that the parties had no right to be registered at all.

Mr. Boyd said there were about 150 of these applications still to be dealt with, and he hoped that the Committee would try to get through them a little quicker than they had done.

It was finally ordered that the Registrar should write to Messrs. Alexander, stating that if there was any particular case that they wished to be re-considered the Council and Committee would be pleased to give it their best consideration, but that the Council found it impossible to deviate from the principle which had all through guided them of granting certificates only to those who had proved themselves to be entitled to them.

A letter was received from Mr. R. D. Harman enclosing a letter from Professor Lett, of Queen's College, Belfast, in reference to a certificate of attendance at a course of practical chemistry, which Mr. Harman had attended. The letter stated that the course Mr. Harman had attended had always been considered a three months course, and that the Pharmaceutical Council had several times accepted certificates of it. The writer further said Mr. Harman should point out that his attendance had been daily and not for only two or three hours a week, and that it had often been for two or three hours each day.

Mr. Wells said what the Society required was a certificate of attendance at a course of practical chemistry of not less than three months duration, but Mr. Harman's certificate was only from January 17 to March 13.

Mr. Beggs said the case appeared to be a hard one, for this gentleman might have put in 100 hours between the dates mentioned.

The Registrar was directed to write to Mr. Harman, stating that if Professor Lett was able to certify that he had attended one hundred hours at the bench, the Committee would allow him to present himself at the January examination

Mr. Gibson asked when would the druggists' certificates be ready.

The Vice-President said that the Registrar was working hard at them.

The Registrar mentioned that he had received a letter from a gentleman who was entitled to a certificate as a "registered druggist," stating that he was a "chemist and druggist," and that those words ought to be in the certificate.

The Vice-President: We are not bound to put "chemist and druggist" into the certificates.

Mr. Hodgson said he thought the request was a reasonable one.

A report of the Declarations Committee was read, from which it appeared that the following had been accepted for registration as chemists and druggists in business as such prior to August 11, 1875:—Mrs. Bridget Colgan, Kilbeggan; J. S. Smallman, Portarlington; James Neatinge, Taghmon, Wexford; John Kehoe, Bagnalstown; J. S. Holton, Strokestown; James Moughty, Ballynacargy; John Jones, Roscommon; and John C. Cocke, Baltinglass.

On the motion of Mr. Wells, seconded by Mr. Lyons, Mr. William H. Griffin, of Dublin, and Mr. Richard Blair, of Cork, were elected members of the Society.

On the motion of Dr. Burns, seconded by Mr. Boyd, Mr. Alfred Clements, of Cootehill, was elected an associate druggist.

On the motion of Mr. Wells, seconded by Mr. Grindley, the following were nominated for membership of the Society:—Messrs. Robert L. Thompson, 24, Leeson Park Avenue, Dublin; Thomas Lemon, Sir P. Duns Hospital, and Dr. D. J. McKenney, Belfast.

On the motion of Mr. Hodgson, seconded by the Vice-President, Mr. Darcy was nominated for membership of the Society.

On the motion of Mr. Gibson, Mr. John Campbell, of Davis Street, Belfast, was nominated for election as an associate druggist.

Some other business having been disposed of the Council adjourned.

REGISTERED DRUGGISTS' EXAMINATION.

At an examination, held at Dublin on the 3rd inst., for the licence to act as registered druggist, the following passed:—Mr. G. W. Adams, Carrick-on-Suir; R. H. Burchall, Waterford; P. Crinion, Dublin; A. D. Devenish, Dublin; Miss H. R. Gaynor, Borrisokane; Miss M. Hely, Cappoquin; Mr. W. H. Johnson, Waterford; Mr. J. Lunny, Dublin; Miss A. E. Morris, Headford; Mr. T. H. F. Walker, Dublin.

Three candidates were rejected.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of the Chemists' Assistants' Association, held at 103, Great Russell Street, on Thursday, November 3, Mr. W. Lloyd Williams, A.I.C., President, in the chair, a paper was read on—

A Form of Nitrometer.

BY J. E. WHITLEY MCFALL, PH.C.

In the paper the author described what he considered to be a novel method of using the graduated tube of a Lunge's or Allen's nitrometer. The apparatus consists of a jacket made from a piece of combustion tubing closed at one end. This is filled to a marked point with mercury, and the stopcock of the graduated tube having been opened the tube is pushed down into the mercury until the tap is in contact with the top of the jacket tube. The stopcock is then closed. This leaves a small space about half a c.c. above the mercury filled with air. A little liquid, say sp. æther nit., is therefore put into the cup, the tap opened, the tube raised and lowered again into the jacket, when the space becomes filled with liquid, displacing the air. Owing to the difference in sp. gr. between the glass and the mercury the graduated tube constantly tends to rise, thus furnishing a self-adjusting nitrometer. In taking a reading the graduated tube is pushed down till the surface of the mercury in it is level with that outside. If it is desired to counterbalance a column of liquid on the inside of the graduated tube, after filling a portion of the mercury is poured out of the outer tube, if necessary, and liquid of the same sp. gr. as the one above the surface of the mercury in the inner tube is poured in to the same height. This form of apparatus, the author said, will hardly do for an estimation such as Crums' process for estimation of nitrates. But for simple estimations he considers it to be much more compact, while if the outer tube is not too large it takes less mercury than an ordinary nitrometer. It also does away with the indiarubber tubes, which are frequently a source of annoyance.

A second form described by the author is a modification by means of which an ordinary burette may be used as a nitrometer. A short stemmed funnel is attached to the burette by means of a small piece of rubber tubing, and the funnel is kept in position by means of a piece of stout wire, on which are bent two circles, the larger one to fit the funnel about half way

and the smaller one to fold round the tube of the burette. The method of using this is the same as the first form. It is necessary to know the value of the ungraduated space near the tap in the burette, generally holding about 6 or 7 c.c.

The President said it was a source of gratification that such papers as the one they had listened to were communications to the Association. He thought the first form of nitrometer described was compact, portable and of easy adaptation to the ordinary pharmaceutical apparatus, and there was great credit due to Mr. McFall for its devising. He (the speaker) had used the second form for three or four years, employing brine in the place of mercury. Their best thanks were due to Mr. McFall for his paper.

The remainder of the evening was occupied by the discussion of the following queries by members of the Association.

"*Why does Codeine turn Brown on Exposure to light?*"—The author of the query said that the bottle containing the sample he particularly referred to had a very marked brown film on the inside of the upper part of the bottle. He did not think it was due to the presence of an impurity. In the discussion which followed, in which the President, Messrs. Walton, Seccombe, Stead and Evans joined, it was stated that although salts of morphine were very prone to discoloration codeine and its salts had not been observed to have this peculiarity. The general opinion was that the sample in question was an abnormal one, and that an investigation would prove the presence of some impurity.

"*How to make Lin. Terebinth., B.P., thick.*"—The President, with Messrs. McFall, Walton, Evans, Morris, Stead and Wilson, joined in the discussion which followed. It was stated that as yet this liniment was not thoroughly understood. On one occasion the product would be one that would pour, and the next batch after that would be of the consistence of blanc mange. This latter product would in course of time thin down to the consistence of the first mentioned. It was suggested that different samples of turpentine had probably something to do with the difference in products. On the other hand the soap was a great factor in the consistence of the liniment. If it were a rule to always get a thick preparation, and the B.P. quantity of soap employed was found to be insufficient, the addition of a little more would produce the desired effect. The amount of water contained in the soap ought to be considered. Soft soap contained the glycerine formed by the decomposition of the fat by the alkali, and consequently was very hygroscopic; therefore the longer the soap was kept under ordinary conditions the more moisture it absorbed, and the quantities weighed did not represent the full amount of soap. The use of more water than ordered in the B.P. frequently had the effect of producing a good emulsion.

"*What is the best Disinfectant?*"—In the discussion of this query the President, Messrs. Walton, Stead, McFall, Tingle and Weber joined. It was thought that pharmacists and the public generally nowadays had so many good disinfectants, which were being constantly improved upon, at their disposal, that he would be a bold man who asserted he had attained the acme of perfection in this particular. The last word on disinfectants had not as yet been said. The following were considered to be the essential characteristics of a good disinfectant, in addition to its efficiency: A distinct colour, a peculiar odour or no odour at all, it should not stain, it should be non-poisonous, it should be cheap. Several disinfectants were mentioned, but to none was a distinct preference given. An improvement upon the usual mode of employing disinfectants was suggested; instead of using saucers or receptacles placed on the floor or tables in the room, baskets containing sawdust or moss, preferably moss, should be suspended in different parts of the apartment, the sawdust or moss being saturated with the disinfecting agent. In the case of permanganate of potash and similar preparations glass wool or asbestos might be substituted in place of the sawdust or moss. It was stated that on the American steamers the pneumatic door closers are made to perform the office of disinfectors, the air from the condensors being utilized to diffuse the disinfectants.

"*When Bismuth Subnitrate is ordered in a Mixture with Sodium Bicarbonate, how should it be Dispensed?*"—The President, Messrs. Seccombe, McFall, Morris, Ingram, Morley, Wilson and Neville took part in this discussion. The possibility of an explosion resulting if bismuth subnitrate were used was pointed out by some who had had accidents arising from this cause. Others, although they had had considerable experience, had never seen or had a bottle so burst. It was pointed out that bismuth subnitrate was necessarily of an acid nature, and this being the case, when brought into contact with a solution of sodium bicarbonate it would cause an evolution of carbonic dioxide. The majority thought the gas so generated would be insignificant and not sufficient to do any damage. When mixing the use of a little *warm* not *hot* water might be useful to promote the reaction. The substitution of bismuth subcarbonate was thought to be hardly admissible. The addition of mucilage to suspend the bismuth salt had not many advocates. The general idea was that in mixing the bismuth subnitrate should be triturated with the sodium bicarbonate and a little warm water, the bulk of the water then added gradually so as to get the insoluble salts well diffused and in a fine state of division.

"*How should Prescriptions be Stamped?*"—The President, with Messrs. Evans, Ingram, Walton, Wilson, Stead, McFall, and Morris, took part in this discussion. It was thought that although stamps, and particularly large conspicuous stamps, were a good means of keeping the individual pharmacist under the notice of his clients, still, these stamps, especially where the prescription was badly written, and in addition a well travelled one, tended to render the prescription illegible and caused the pharmacist considerable trouble. It was suggested that the prescription should be stamped on the back (although this could not apply to those written on both sides of the paper) or that the American system should be adopted, in which the pharmacist retains the original and gives a copy in its place.

"*Is Pharmacy of the Present as good as, or better, than that of Former Days as a Money-making Business?*"—The President, Messrs. McFall and Walton discussed this query. It was remarked that they, as assistants, could hardly discuss this question. Their interest in the profits of a business was rather limited, consequently the discussion must be somewhat of an academic character. In many districts, doubtless as yet, no great change had been observed. On the other hand, in large towns and centres the business had been revolutionized. The times had changed, and the old-fashioned half doctor, half druggist, was fast passing away. The question resolved itself into this—that the present day pharmacist, if a really good man, would make his mark; as an instance, the members of leading houses might be given. On the other hand, without a thorough knowledge of pharmacy they could not expect to be but men of very ordinary standing.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting was held on Thursday, December 3, Mr. E. F. Harrison, Vice-President, in the chair.

Mr. H. A. D. Jowett read a paper entitled "Hints on the Use of the Microscope," in the course of which, after touching on the historical points of the subject, and explaining with the aid of diagrams the theory of the instrument, he dwelt with more detail on the construction of the instrument and the points to be noticed in connection with its various parts and essential features. These were illustrated by instruments of varying pattern, monocular and binocular. Next the manipulation of the instrument and the preparation of sections were gone into in considerable detail, as well as the mounting and finishing, which were practically illustrated. The paper concluded with some remarks on stains and staining.

A discussion followed in which the Chairman, Secretary, Messrs. Garnett, W. Wilson, and E. White took part.

Mr. Garnett then gave a report on physics, the subject being "Solutions."

Solutions.

BY H. G. GARNETT.

The phenomena of solutions have furnished material for a great deal of valuable research work during the last few years, and some of the facts observed and theories developed are so important from chemical and physical standpoints that I propose to give a short *résumé* of a portion of the work of most general interest. For the greater part of my information I am indebted to Professor Ostwald's work on chemistry, a translation of that portion dealing with solutions having recently appeared.

All homogeneous mixtures which cannot be separated into their constituent parts by mechanical means must be looked on as solutions, whether the mixtures be of two gases, of a gas and a liquid, of two liquids, or of a solid and a liquid. I propose to deal chiefly with the last two cases.

A. *Solutions of Gases in Gases.*—As a rule when two gases are mixed and there is no chemical action, there is no increase or diminution in volume; but there are one or two exceptions to this. Thus when CO_2 and SO_2 are mixed the total volume is less than the sum of the two volumes; when CO_2 and H are mixed, on the other hand, there is a slight contraction. These differences are measured by noting the alteration of pressure measured by a manometer. The exact cause of these deviations does not seem to be explained.

B. *Solutions of Gases in Liquids.*—In addition to the laws of Dalton and Henry, Ostwald discusses the question as to the physical condition of the dissolved gas. He concludes that in all cases the gas must be considered to be in the liquid state, though not necessarily that the gas is first liquefied and then dissolved, as was supposed by Graham. This probably occurs only with those gases whose critical temperatures are above the temperature of the experiment. In these cases the molecules are probably in the same condition as in the gas liquefied by pressure.

C. *Solutions of Liquids in Liquids.*—There are three classes of liquids: (*a*) those which dissolve each other in all proportions; (*b*) those which are perfectly immiscible; (*c*) those which dissolve to a certain extent in each other. The number of pairs of liquids of the first class is limited, though we have familiar examples in alcohol and water, chloroform and carbon bisulphide. It is found, too, that in almost every case the volume of the solution is not the sum of the volumes of its constituents. Everyone who has mixed alcohol and water is acquainted with one instance of this; in some cases, curiously, there is expansion in volume. Further, there is almost always a change in temperature, this change being sometimes positive, sometimes negative. Little or nothing has been found out as to the cause of these variations. The enormous rise in temperature which occurs when strong H_2SO_4 and water are mixed, is attributable to the fact that chemical action takes place, resulting in the formation of definite hydrates of the acid. Probably there are few liquids which are completely insoluble in each other, but the number which mutually dissolve to an appreciable extent is very large. A noteworthy point is that any liquid which dissolves another to a slight extent is itself slightly soluble in that liquid, though not necessarily to the same extent. Thus ether dissolves about 10 per cent. of water, and is dissolved to the extent of about 3 per cent. by water.

Interesting phenomena are noticed when distilling mixtures of insoluble or partly soluble liquids. These depend on the circumstance that each substance in the state of vapour exerts its own vapour-pressure; so that if two immiscible liquids are evaporated, both liquids are found in the distillate, and the vapour-pressure is found to be equal to the sum of the vapour-pressures of the two liquids at the temperature of distillation, and as increased vapour-pressure is equivalent to a lower boiling-point, the boiling-point is lower than that of either constituent. This does not hold good when the liquids are partly or wholly intersoluble. Here generally the boiling point lies between that of the two constituents, but in some cases may be below that of the more volatile liquid. Sometimes there seems to be a tendency for such mixtures to boil at as low a temperature as possible, that is, one where the vapour-pressure is equal to the sum of the vapour-pressures of the two portions. Where this is so, no matter in what proportions the substances are mixed, a mixture having a constant boiling-point and composition will distil during part of the distillation, and this fraction cannot be separated by fractional distillation. This is the case with propyl alcohol and water. Examples of another kind are those of hydrochloric and nitric acids; here there is a tendency for a solution of the acid in water to distil over at a point where the vapour-pressure is at a minimum and the boiling-point at a maximum. Roscoe long ago showed that the hydrochloric acid which distils unchanged and contains about 22 per cent. of acid is only of constant composition so long as the pressure remains the same. Where the pressure varies an acid of different strength distils, thus disproving the theory that a definite chemical hydrate, HCl, $8\,H_2O$, exists. A solution of nitric acid in water behaves similarly.

D. *Solutions of Solids in Liquids.*—Solution of a solid in a liquid is effected by the attractive influence of the molecules of the liquid, which causes a diminution of the internal pressure exercised by the molecules of the solid on each other, so that some molecules from the solid pass into the interior of the liquid; at the same time a similar number of molecules of the solvent move towards the solid. This proceeds until the number of molecules so passing from the liquid to the solid and remaining there is equal to the number of molecules leaving the surface of the solid. When this equilibrium obtains a saturated solution results. If now, further concentration of such a solution is effected by evaporation or by cooling, in the absence of any particle of solid there is theoretically no reason why separation should take place, and we are thus able to obtain many salts in the state of supersaturated solution. But as soon as a particle of the dissolved solid is added to the liquid, and it is shown that an isomorphous salt answers as well as the salt itself, separation of solid at once takes place, owing to the equilibrium having been destroyed, and proceeds until an ordinary saturated solution results.

Some curious irregularities in the curves of solubility of many salts are interesting, but I do not propose to enter into particulars in the present paper. With regard to the formation of definite hydrates when anhydrous salts dissolve in water, evidence seems to show that though in the solid state the water is chemi-

cally combined, combination takes place only at the moment of the separation of the salt from solution, and that in the solution no such combinations occur. It naturally occurs to one to ask whether any definite laws have been discovered as to the relation of solvent and of salt, and why substances should be soluble or insoluble in the various solvents. Practically no definite rule governing these phenomena can be formulated, though many generalities hold good. Thus most bodies containing the hydroxyl group are soluble in water, while hydrocarbons are soluble in benzene; all alcohols, too, dissolve in ordinary alcohol. Salts of metals occurring in the same group in the periodic table of the elements usually resemble one another in their solubilities as in other general properties.

Much work has been done with a view to ascertaining the extent to which salts affect each other when two or more are dissolved in the same solvent. There are three general cases:—1. Where one salt interferes with the solution of the other, so that addition of a salt A to a saturated solution of B causes separation of B; therefore a saturated solution of both together contains less of each salt than a saturated solution of each by itself. 2. Where addition of a salt A causes separation of B, but A dissolves as if in pure water. 3. In this case each salt dissolves as if the other were not present. Moreover, salts as a rule are less soluble in the corresponding acid than in water; indeed, in the case of chlorides, the addition of HCl gas to a saturated solution of a salt throws out a proportion of salt containing the equivalent of chlorine present in the acid used.

Vapour Pressures of Solutions.—This subject, together with that of the lowering of the freezing-points, has been thoroughly investigated of late years by various workers, the most eminent of whom is Raoult, and with most fertile results; for by means of accurate observations an entirely new method of obtaining the molecular weights of chemical substances has been established. I will briefly indicate some of the facts and show how the theory may be put to practical use. It is well known that when a substance is dissolved in a volatile solvent, the vapour-pressure of that substance is lowered; or what is equivalent, the boiling-point of the solution is raised; and accurate experiments have shown that the extent to which the vapour, pressure is diminished is in direct ratio to the molecular weight of the dissolved substance. The original experiments were carried out by Raoult, by placing the solution over mercury in a barometric column and noting the extent to which the column was depressed, compared with the depression caused by the pressure of the vapour from distilled water (or the solvent used) at the same temperature and under exactly similar conditions; in all cases the vapour-pressure of the solution is less than that of the solvent. By means of apparatus, so arranged as to avoid all experimental error, fluctuations caused by bumping, etc., very accurate determinations have been made from the boiling-point method. From the rise in the boiling-point the vapour-pressure can be calculated. The following law has been found to hold good for such solvents as water, acetic acid, benzene and nine others: "The lowerings of the vapour-pressures of solutions in different solvents are equal when the proportion of the number of molecules of the dissolved substance to the number of molecules of the solvent is the same." By the boiling-point method, and starting with substances of known molecular weights, the molecular raising of the boiling-point has been determined for each solvent, using 1 per cent. solutions, that is, solutions of 1 molecular weight of the substance in 100 molecular weights of solvent. The molecular raising of the boiling-point for ether is 28·44, the boiling-point of a 1 per cent. molecular weight solution being ·2844° above that of pure ether. From this constant, often known as Raoult's constant, and determined by him for various solvents, the molecular weight of substances can be calculated from the formula

$M = S \frac{g}{\Delta}$, where Δ is the observed raising of the boiling-point, g the number of grains of substance dissolved in one molecular weight in grams of the solvent; S is the molecular raising of the boiling-point.

These are interesting deviations from the law, molecular weights obtained by this method being sometimes multiples of those ordinarily accepted. This is especially noticeable for solutions in water of ordinary metallic salts; in all these cases the vapour-pressure is lower (boiling-point higher) than that calculated. In fact the salts behave as if in solution they were broken up into smaller molecules; and further, the solutions which exhibit these peculiarities are all electrolytic; *i.e.*, can be decomposed into these ions by an electric current. Independent electro-chemical considerations had led chemists to the theory that in these solutions the salts exists in the state of ions; for example, in a solution of KCl, atoms of potassium and of chlorine exist in the free state. This remarkably confirms the theory of Raoult.

Freezing Points of Solutions.—The following is Raoult's law: "One molecule of any compound when dissolved in 100 molecules of a liquid lowers the solidification point of the liquid by an amount which is nearly constant, viz., ·62°. According to the same chemist the *molecular depression* is the amount of lowering in the freezing-point observed in a solution of one molecular weight in grams of the substance in 100 grams of solvent. The solvents used include water, acetic acid, formic acid, benzene, nitrobenzene and ethylene bromide, and the molecular depressions observed for solutions of different substances in the same solvent are fairly constant. But here again curious abnormalities occur. The depression in the freezing point noted when many organic substances dissolve in benzene, would seem to point to molecular weights twice as great as those obtained by the ordinary vapour-density method, and therefore to the formation of polymeric molecules, though perhaps not polymeric in the ordinary chemical acceptation of the term. Ostwald, in speaking of the valency of atoms, refers to "those finer or weaker combinations" of atoms "which in ordinary chemical action (a comparatively coarse process) do not come into consideration." On the other hand, as deduced from the boiling-points of solutions of metallic salts, especially electrolytes, a dissociation of the molecules would seem to have taken place, for the freezing points of such solutions are lower than that calculated.

The formula for calculating molecular weights from the freezing point is $m = \frac{K}{A}$. Where A is the specific depression of the freezing point, obtained by dividing the observed depression by the percentage contents of the solution, and K is a constant dependent on the nature of the solution, its value for water is 19, for acetic acid 39, for benzene 49.

Various other interesting points connected with solutions, some of them requiring for complete comprehension a somewhat advanced knowledge of mathematics, I have not dealt with, nor have I touched on the important questions of diffusion, osmosis, and other familiar phenomena which are fully discussed in Ostwald's work.

I will include a short notice of some work done lately (published in the *Philosophical Magazine*, No. 198, p. 473) by Wanklyn, Johnson and Cooper, on the nature of solution, with special regard to the volume occupied by salts when they enter into solution.

Work was done on this subject by Dalton, who, however, did not arrive at any definite conclusions.

The present workers find that there are three classes. (1) Where the volume of the solution is actually less than that of the water contained in it. Lime water is an example of this, the addition of a small amount of lime to a given bulk of water causing a definite decrease in volume. (2) Where the bulk of the solution is almost equal to the sum of the volumes of the solvent and the substance. $AgNO_3$ is an example. (3) Where an increase in volume occurs, the solution measuring more than the united volumes of salt and of water. NH_4Cl is an example: probably in this case there is dissociation.

Special and valuable results have been obtained from solutions of sugar, which is an example of a substance which dissolves in water without any decrease in bulk; and this fact holds good for sugar solutions of all strengths. It is inferred that in cases of indifferent organic substances (like sugar) which exhibit such phenomena, there is absolutely no chemical action of any kind when they are dissolved in water, and conversely that where substances do not obey this rule, there is invariably chemical action, resulting in either an increase or a decrease in volume. Perhaps such a conclusion is hardly warranted without further confirmation.

The report gave rise to a discussion, in which the Chairman, Messrs. White, Wilson, T. M. Taylor and the Secretary joined.

The Secretary announced that the Executive Committee had appointed the following Committee of Reporters on Science:—Pharmacy, Mr. T. M. Taylor; Botany, Mr. H. H. Sturch; Materia Medica, Mr. W. B. Hoile; Physics, Mr. H. Garnett; Organic Chemistry, Mr. E. F. Harrison; Inorganic Chemistry, Mr. E. White; Analytical Chemistry, Mr. A. J. Symons.

It was also decided that the Executive Committee should be instructed to collect materials for a Record of the School in commemoration of its fiftieth session.

The meeting then adjourned.

SOCIETY OF CHEMICAL INDUSTRY.

London Section.

A somewhat poor attendance of members of the section was the most noteworthy characteristic of the meeting held on Monday last, although the papers promised to be of average interest. A little formal business was first transacted, in the course of which the Chairman (Mr. Tyrer) mentioned that a suggestion had been made, although as yet nothing had been done officially, that the Society should hold its annual meeting for 1893 in America, the exhibition at Chicago which would be held that year being an attraction that, coupled with the possible invitation of American members, now numbering nearly 300, it would be hard to resist.

Mr. Watson Smith then related the results of some experiments he had carried out upon a highly remarkable sample of Japanese coal, which differed sharply from ordinary kinds inasmuch as it contained as high a percentage of resinoid constituents as 9·5 per cent. A table was given showing that all coals that could be reasonably compared with it contained on an average not much more than 1 per cent. of similar bodies. The coal was also noticeable in respect of the nature of its ash, which was calcareous in character, thus contrasting with the ash of ordinary coal, which is usually siliceous. The smell of the bituminous matter strongly recalled that of petroleum, and there appeared reason to believe that oily bodies of the class present in petroleum actually existed in the coal and were not merely the products of its destructive distillation. In spite of its peculiar composition no difficulty has been experienced in utilizing the coal as a fuel, it having been applied for some years for various industrial purposes, and its consumption having increased from the time when it was first worked according to modern methods up to the present date. The author had taken the trouble to get large scale experiments carried out in order to ascertain the value of the coal, both for making gas and producing coke of sufficiently hard and dense texture for use in the blast furnace, and had found that it gave excellent results for both these purposes. He considered that Japanese iron works, with a supply of coke made from this coal to hand, would be independent of Durham coke, hitherto imported at considerable expense.

The discussion started a little sluggishly and subsequently dragged a good deal, but was interesting in that it elicited the remark from Mr. Fletcher that the tar and ammoniacal liquor now recovered from coke ovens erected for the purpose of producing coke for blast furnace use, had become of sufficient pecuniary importance to almost dwarf that of the material for the manufacture of which the works had been originally put up, viz., iron. An interesting series of products obtained in the course of the author's examination of the coal and its resinoid constituents was exhibited, and the subject proved of sufficient importance to induce several Japanese gentlemen to attend.

Dr. Murray Thomson then contributed a paper on the Indian salt industry, which was largely geographical, dealing with the distribution resources and supply. Two points, however, may be noticed here. Dr. Thomson was required to devise a method whereby magnesium sulphate and chloride present in certain brines might be eliminated, in order that the salt obtained from them should be edible. He found that the magnesia could be satisfactorily precipitated by means of lime, the calcium sulphate formed being also largely thrown out of solution, while the calcium chloride remaining was less objectionable than the corresponding magnesium salt. The quantity of lime requisite amounted to about 2 per cent. of the brine to be treated, being much in excess of that theoretically necessary. With a smaller margin, however, complete removal of the magnesia could not be effected. The process, though fully practicable chemically, proved too expensive for adoption. It further appears that a good method of "methylating" salt, so as to render it unfit for human consumption while still usable by cattle, is much needed in India, as the remission of the duty on salt for the latter purpose would then be practicable. Dr. Thomson enlivened his paper by a spirited account of the smuggling of salt across the line of demarcation between two districts in which the amount of the duty differed, and the exertions of the copious staff of officials needed to keep it in check. The difficulty was solved by the late Lord Lytton, who rendered the tax uniform throughout the country.

In the discussion which followed, Mr. Christie declaimed against the official tendency to deal gently with any drug or chemical as soon as it was made sufficiently nasty, while Dr. Rideal gave an interesting account of what had been done in Massachusetts as an aid to the determination of the character of potable water, by the execution of some thousands of analyses of waters drawn from wells throughout the state, whereby the influence of the only considerable source of salt, namely the sea, could be allowed for, and a map constructed, showing "isohals" or lines along which the amount of salt present in the well waters was equal.

Dr. Schlichter brought the meeting to a close by reading a somewhat polemical note on photographic developers, of which hydroquinone may be taken as a type, communicated to him by a Berlin correspondent.

Provincial Transactions.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

At a meeting of this Association, held on Tuesday, December 8, Mr. H. W. Jones, F.C.S., read a paper on "Photography—Chemicals and Processes." Mr. C. Thompson took the chair.

The early stages of the art were discussed, and a short account given of the various processes in use prior to the introduction of the modern gelatine dry plate. The operations necessary to the production of the negative were explained and illustrated by plates in the exposed, developed and fixed conditions; and in conjunction with this the working of the various forms of lenses in general use described—such lenses as landscape, rapid rectilinear, wide angle, and the old form of portrait lens being shown. The different methods of printing from the negative were next considered, and Mr. Jones showed numerous examples of his own work, which were greatly admired. The illustrations comprised prints on albumenized paper, toned in various tints by different gold toning baths; silver prints on matt surface paper, toned with platinum; gelatino-chloride emulsion paper (aristotype), which had been put down on plate-glass to give an enamelled surface, the method of doing this being shown.

Of the various silver prints Mr. Jones said he preferred those made on ordinary drawing paper, or rough Whatman paper, as used for water colours. Samples of such papers were shown, and an account given of the method of salting and sensitizing, whereby they could be prepared at home, and of a character suited to individual taste. This process was spoken of as the very first printing method, and yet the one which was now being preferred by many workers who used silver as a medium for their prints. For the further illustration of printing in silver "bromide" and "alpha" papers were used, and a series of prints, illustrating the very varied tones obtainable on the latter variety was on view. All who used small cameras were advised to work bromide paper, as enlargements could easily be produced, and a pair of 12 by 10 prints made by the speaker from half-plate negatives were used by way of illustration. Mr. Jones considered, however, that the hot bath platinum process held the first place and gave the finest results. He said that it was a process easily carried out when the preliminaries of exposure had been mastered, and was artistic and permanent in its results. Sample prints in platinum black, and on the Platinotype Company's sepia-tint paper were shown. Mr. Jones said he had tried the "print-out" platinum paper known as the "Pizzighelli," and though it very easily, and without any process of development, yielded good results, such as was exampled by a print shown, he did not think it quite equal to the results produced by the hot bath, and the paper required extra care in storage and was more apt to deteriorate on keeping. "Kallitype," of which a print was shown, was an example of printing by means of iron salts, similar to platinotype, the image being formed of silver, and consequently of a much colder tone than platinum. The carbon or pigment process Mr. Jones said was now receiving increased attention at the hands of amateurs, and with the facilities now offered by certain firms who supplied tissue sensitised, and in small quantities, could easily be worked after a little practice. A so-called moonlight picture (12 × 8), but consisting of a sunset, showing the sun as a clear circular disc, and printed in blue pigment by the carbon process, served to show the results capable of being attained, and prints in various colours could be produced. The production of lantern slides and transparencies was alluded to, and illustrated by examples, and the chemicals used in the various processes were named, and the *rationale* of each entered into as fully as time would permit.

At the conclusion of the paper there was a short discussion. Mr. Churchill proposed a vote of thanks to the author, which was seconded by Mr. Cripps and carried unanimously.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The fourth meeting of the fourteenth session was held in the Pharmaceutical Society's House, 36, York Place, on Wednesday, December 2, at 9·15 p.m., Mr John Lothian, President, in the chair.

The minutes of last meeting having been read and approved—

Mr. Alexander Murray, who gained a ticket for Dr. Stevenson Macadam's Chemistry Class in last year's Association Prizes Competition, gave a very interesting account of his experience of "A Session at a Chemistry Class." The paper was illustrated by a number of striking and successful experiments, which showed that Mr. Murray had made good use of the opportunity afforded him by his success in gaining the prize.

Mr. Donald McEwan then described the recent additions to the Association's Herbarium. These included about 100 species, representing twelve natural orders, and were exhibited on the walls of the room. Mr. McEwan gave some very interesting details as to the derivation of the systematic as well as the popular names. He also touched upon the subject of plant lore, and referred to the medicinal properties and uses of some of the specimens. Among the plants exhibited were fine specimens of *Geum rivale*, *G. intermedium*, and *G. urbanum*.

The reading of the papers was followed by a discussion, taken part in by Messrs. Cowie, Hill, Lothian, McEwan, and Murray, and on the motion of the Chairman cordial votes of thanks were awarded to the authors.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

A successful conversazione was held in connection with this Association last Thursday evening in the Dundee Art Rooms. Bailie Ferrier, Honorary Vice-President of the Association, occupied the chair. A varied and attractive musical programme was gone through, the items being much enjoyed, and the thanks of the audience were awarded at the close to the artistes and to the Chairman. Dancing was then engaged in for a short time.

Obituary.

Notice has been received of the death of the following:—

On the 14th of November, Mr. Richard Thomas, Chemist and Druggist, Castle Street, Beaumaris. Aged 84 years.

On the 20th of November, Mr. Henry Wootten Sanders, Chemist and Druggist, Park Street, Bristol. Aged 79 years.

On the 28th of November, Mr. William Bayley, Chemist and Druggist, Earle Street, Crewe. Aged 72 years.

On the 5th of December, Mr. John Abraham Roper, Chemist and Druggist, Bristol. Aged 76 years.

BOOKS RECEIVED.

SUPPLEMENT OP DE DERDE UITGAVE DER NEDERLANDSCHE PHARMACOPEE. Uitgegeven door het Departement Rotterdam der Nederlandsche Maatschappij ter bevordering der Pharmacie. The Hague: Van Cleef Bros. 1891. From the Society.

Parliamentary and Law Proceedings.

Aniline Dye for Syrup of Violets.

At the Manchester County Court on Tuesday, Dec. 8, before His Honour, Judge Heywood, a case was heard in which Mr. Goodman, of Souch Street, Openshaw, claimed damages from Mr. John Richard Lateward, chemist, of the same locality, for a mistake committed by his assistant in giving some aniline dye in mistake for syrup of violets.

The case for the plaintiff was that on September 18 last Mrs. Goodman went into the defendant's shop and asked for twopennyworth of syrup of violets. On the previous evening her mother had obtained a small quantity of oil of sweet almonds. The two articles were mixed, as Mrs. Goodman requested, and subsequently a little more syrup was asked for and supplied. A teaspoonful of the mixture was given to Mrs. Goodman's baby, aged nine months, with the result that the infant became seriously ill, vomiting and showing other symptoms of the presence of an irritant in the stomach and bowels. Medical aid was obtained, and a portion of the liquid found in the bottle was analysed by Mr. Griffiths, a neighbouring chemist, who said it contained aniline dye. The plaintiff claimed £2 13*s.* 6*d.*, the amount of the doctor's bill, and £10 as damages for the trouble he had suffered through the mistake.

The case for the defence was a complete denial of the allegation. The assistant who supplied the articles positively affirmed that he made no mistake. He said he gave oil of sweet almonds in the first instance, and syrup of violets on the second occasion. At the third visit, as Mrs. Goodman desired to see the mixture a little darker, he added a few drops of the essence of violets. No aniline dye in a liquid form was kept in the shop. In cross-examination it was elicited that the defendant has five shops, and that the assistant who supplied the drug in this case is not fully qualified to act as a chemist's assistant, although he is a qualified dispenser. The defendant admitted that at the Court of Record not long ago a charge was preferred against another assistant of his of supplying carbolic acid instead of carbolic oil, and £5 damages was allowed; the judge, however, refusing to give the other side costs. In that case the assistant was supposed to be duly qualified, but whether he really was or not defendant would not now say.

The Judge held that a mistake had been somehow made by the defendant's assistant, and therefore gave a verdict for plaintiff, allowing him £3 10*s.* as damages (including doctor's bills), with costs on the higher scale.—*Manchester Evening News.*

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Pharmaceutical Examinations.

Sir,—The satisfaction which every right minded pharmacist will express at the changes about to be inaugurated regarding the examinations, needs no comment from myself. I feel compelled, however, to once again express my own opinion by stating that if an examination is to be fairly conducted it should be both practical, a written paper, and *vivâ voce;* this course the Board of Examiners, under our esteemed President, has decided upon. I trust, however, we are not to understand that the Major qualification is to be obtained more easily than formerly, but rather that a candidate, passing fairly in all subjects, will be permitted to show extra or special knowledge in one of these subjects.

I think with Mr. Carteighe practical work and a written paper will be more conducive to increase the number of Major candidates than anything, for the reason that frequently the most learned men are the most sensitive, and generally the sensitive man is the nervous man. These are the men who shrink from a *vivâ voce* examination, but would transfer their answers to paper with credit to themselves and satisfaction to the examiners. Frederick Davis.

The Estimation of Aconitine in Aconitum Napellus.

Sir,—The facts of the case concerning which Mr. A. H. Allen, Sheffield, writes to you at such length can be stated in a very few words.

When Dr. Alder Wright suggested his method for the quantitative estimation of aconitine by the saponification process ('Year-Book,' 1877, p. 463), which has been so slightly modified by Mr. A. H. Allen in the paper entitled "Suggestions for the Assay of Aconite and its Preparations," he added to it the rider "that this process can of course only give correct results in the event of no other substances being present that will yield on saponification with water either benzoic or dimethylprotocatechuic acids."

In the face, therefore, of subsequently recorded evidence pointing to the existence in *Aconitum Napellus* of a second saponifiable alkaloid, no process for the estimation of aconitine based on saponification can be accepted as accurate until it has been proved that this second alkaloid does not exist, which proof Mr. Allen has not given.

This is the gist of the criticism I made at Cardiff of Mr. Allen's paper, and to it I must adhere until we are in possession of the experimental evidence which alone can render it invalid. John C. Umney.

Southwark.

*** [This correspondence must now close.—Ed. P. J.]

Erratum.—Mr. W. Wilson writes to say that in the discussion following Mr. Rushton's paper on "Drugs and Preparations in Use in Dental Surgery," at the Chemists' Assistants' Association, he did not say, as reported on p. 463, that "some provincial dentists consider iodoform a most efficient dentifrice," but a "most efficient antiseptic."

J. B. Barnes.—It would be out of place to publish the information referred to in your letter, but the facts of the case can be ascertained by anybody desiring to do so for his own guidance.

H. R.—The conditions to observe are to prevent the access of germs, by which change is promoted. The methods of doing this have been frequently described in the Journal.

NOTICES OF MEETINGS.

Western Chemists' Association.—Wednesday, Dec. 16, at 9, at the Westbourne Restaurant, Craven Road.

Newcastle-on-Tyne Chemists' Assistants and Apprentices' Association.—Wednesday, Dec. 16, in Lockhart's Café. Paper: "Some Hints on How to Prepare for the Minor under the New Syllabus," by Mr. A. R. Bennet.

Edinburgh Chemists' Assistants and Apprentices' Association.—Wednesday, Dec. 16.—Open Meeting.

Chemists' Assistants' Association.—Thursday, Dec. 17.—Musical and Social Evening.

Chemical Society.—Thursday, Dec. 17, at 8.—Papers: "The Composition of Cooked Vegetables," by Miss K. Williams; "On Some Metallic Hydrosulphides," by S. E. Linder and H. Picton; "On the Physical Constitution of Some Solutions of Insoluble Sulphides," by H. Picton; "Solution and Pseudo-Solution," by H. Picton and S. E. Lindon; "The Change Proceeding in Acidified Solutions of Sodium Thiosulphate, when the Products are retained within the System," and "The Action of Sulphurous Acid on Flowers of Sulphur," by Dr. A. Colefax; "The α- and b-modifications of Chlorobenzene Hexachloride," by Dr. Matthews; "Camphrone," a product of the action of dehydrating agents on camphor, by Drs. Armstrong and Kipping; "Studies on the Dibromonaphthalenes," by Dr. Armstrong and Mr. Rossiter.

Liverpool Pharmaceutical Students' Society.—Thursday, Dec. 17.—Miscellaneous Notes.

Brighton Junior Association of Pharmacy.—Thursday, Dec. 17.—Paper: "Ambulance Notes," by Mr. A. P. Nosworthy.

Communications, Letters, etc., have been received from Messrs. Hesse, Home, Brinson, Day, Kirkby, Roberts.

THE MICROSCOPE FOR STUDENTS.

BY JOHN HUMPHREY.

(*Continued from page* 327.)

Proteid or albuminous substances may be conveniently studied in sections of ripe seeds. If a dried pea be halved in such a way that the cotyledons, or seed leaves, are cut transversely, and one half be firmly held in a small hand-vice, a number of sections may be taken with a sharp razor moistened with dilute glycerine. Observe the precautions taken when cutting the date stone, and do not be particular about obtaining large sections, since smaller pieces serve equally well. Mount in dilute glycerine, examine with a moderately high power, and compare with the illustration (fig. 12).

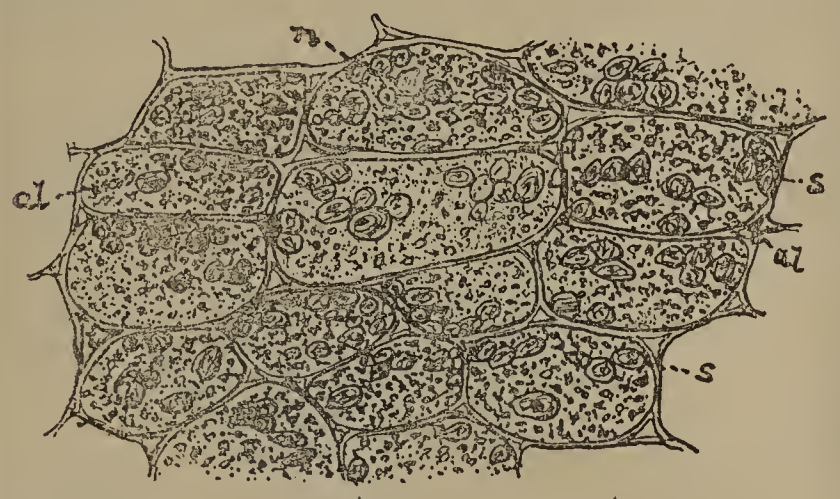


Fig. 12.—Pea: Cotyledon, T.S. *s*, starch; *al*, aleurone grains; *n*, nucleus; *i*, intercellular space. (× 100).

The cells are more or less rounded, and triangular intercellular spaces are seen where those cells adjoin one another. The larger grains consist of starch, which may be identified in the usual ways; the smaller ones are aleurone grains, and both are imbedded in a fine granular ground substance. Whilst the starch grains colour blue or violet with iodine, the other cell contents are stained yellow. The dark brown spots appearing in some of the cells are the nuclei which absorb colouring matters more readily than the other proteid substances. Hœmatoxylin affords another instance of this peculiarity, and, if it be desired to preserve a section permanently, this is the best staining material to use. A solution of methyl green in 2 per cent. acetic acid applied to a fresh section will be found to differentiate the nucleus very clearly. Borax-carmine also is useful, as it colours the albuminous bodies but does not affect starch.

The grains of wheat, oats, and other cereals show similar constituents to those of the pea under slightly varying conditions. Oily seeds, such as those of castor oil and the Brazil nut, are better for examining the proteids in detail. The endosperm of the former is easily cut and the section (fig. 13) mounted in distilled water, shows with a high power the protein crystals and globoids enclosed within the aleurone grains. The former are the crystalloids, so named from resembling crystals in appearance. They are distinguished by giving the characteristic reactions of proteids already specified, and also by swelling and dissolving on the addition of dilute potash solution. The rounded globoids, consisting of phosphates of calcium and magnesium, are not affected by this reagent, but dissolve in acetic acid. Drops of oil will gradually separate from the section mounted in water, and by now irrigating with absolute alcohol these will gradually dissolve, and the details of the "cleared" section appear more distinctly. The cotyledons of the almond contain an oil which is not dissolved by alcohol. Ether will, however, remove it. If a thin section be stained with tincture of alkanet, the oil globules become pink; whilst in a section treated with potash solution and warmed, the oil partially saponifies and becomes suspended in the liquid.

Fig. 13.—Castor oil seed: Endosperm, T.S. *al*, aleurone grains enclosing crystalloids, *c*, and globoids, *g*. (× 400).

Figure 14 represents part of a transverse section from a young stem of ivy. Mounted in water and examined with a low power, numerous highly refractive globules are seen. These are chiefly in or

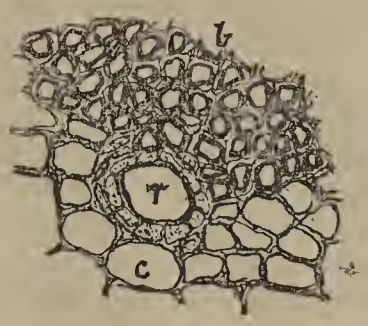


Fig. 14.—Young stem of ivy, T.S., showing resin passage, *r*, surrounded by secreting cells; *b*, bast fibres; *c*, cortical parenchyma. (× 100).

about the resin passages which are formed in the bast. Alcohol dissolves the globules, whilst tincture of alkanet stains them a dark red colour. These are the best indications of the presence of resin, which may also be studied in sections of Scotch fir.

An alternative and better method of applying the alkanine test is to lay the cross section of wood in a drop of water on a slide, cover this with a thin tangential section from the outer portion of dried alkanet root, irrigate with a little 50 p.c. alcohol, and leave for half an hour. The diluted alcohol has little effect in removing resin, but dissolves out the alkanine more rapidly, and so a beautifully stained preparation is obtained.

If one or two perfect sections of the ivy are found amongst those cut, this will be a favourable opportunity of practising permanent staining and mounting with a resinous medicine. The best and most permanent single stain is logwood. To use this dilute the hæmatoxylin solution to a light claret colour. The sections, which should be transferred to alcohol to harden as cut, are placed in distilled water for a few minutes, then left in the stain for two hours or more until stained sufficiently. Wash again with distilled water and fix by soaking in slightly alkaline hard water. Dehy-

drate by immersion in strong alcohol for two hours, then float on the surface of some oil of cloves or oil of cedar (this is less likely to cause sections to curl and become brittle) until they sink, when they are ready to mount. Successful double staining may be performed by immersing for an hour or longer in strong borax-carmine solution, then rinsing with water containing two drops to the ounce of nitric acid, next with alcohol; lastly immerse in methyl-green solution for a few minutes, just dip beneath the surface of alcohol to remove excess of green, and float upon oil of cloves as before. The parenchymatous tissues absorb the carmine, whilst the harder parts of sections take the green. Canada balsam is the most usual mounting medium and may be used two ways. The ordinary or rapid method consists in simply placing a drop of balsam dissolved in turpentine, chloroform or benzole upon the object (which has previously been taken from the oil of cloves, rinsed in rectified oil of turpentine, and centred on slide) and lowering a thin cover upon it. The balsam is then left to set of itself, which may be a process occupying months, or it is heated until all volatile matter is driven off, when the medium hardens on cooling. This is the simplest method, and if several objects be mounted in turpentine balsam, then placed in an oven over night, they will be usually be set by morning and free from air bubbles. For special work, however, Cole's slow or exposure method is preferable. "Supposing numerous sections are being mounted, a clean slip is breathed upon, and three clean covers are stuck upon it, each cover being placed on the slip the instant after a deep expiration of breath has bedewed the slip. The extremely minute layer of moisture suffices to make the cover sit fast on the slip. A section is placed on each cover, then a large drop of balsam (in benzole) is placed on each section, and the slip with its three covers, etc., is placed somewhere out of the way of dust. At the end of twelve or eighteen hours the covers are turned over on to well cleaned slides, the latter, not the covers, being warmed by being held in the flame of a spirit lamp a few seconds, which causes the balsam to run freely as the cover is lowered upon the warmed slip. A very minute drop of fresh benzole balsam may be placed upon the extreme edge of the cover, next to the condensed balsam, if thought desirable. This minute drop is made to touch the warmed slip first, and mingles with and sets going, so to speak, the condensed balsam."

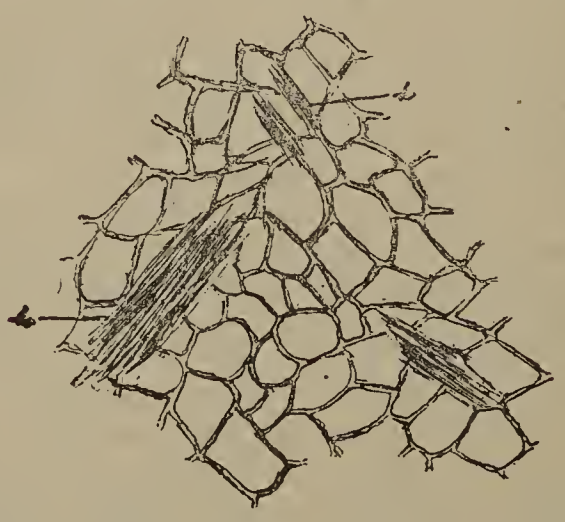


Fig. 15.—Fuchsia leaf. Raphides. (× 100).

Superfluous balsam is easily removed from slides by leaving them in a plate containing methylated spirit for a few minutes, and then clearing off with a camel hair brush. When dry and clean centre each slide in turn upon the turntable, and whilst rotating swiftly apply a brush charged with asphalte or other finishing varnish. Let the varnish ring dry, then polish the slide thoroughly and label as recommended in last article.

Crystals may be examined *in situ* in parts of many plants. The needle-shaped variety known as Raphides appears in the leaves of hyacinth and other monocotyledons, and may be seen best in longitudinal sections. In the fuchsia (fig. 15) the leaf may be examined without being cut, and shows the crystals arranged parallel to one another in bundles. The skin of the bulb scale in garlic (fig. 16) exhibits crystals of another form. Any attempt

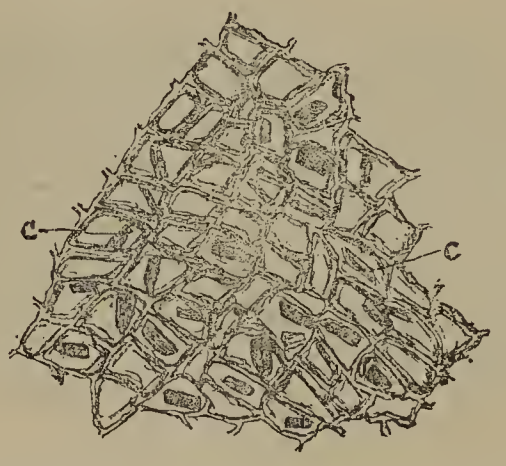


Fig. 16.—Garlic. Skin of bulb scale. Crystals of calcium oxalate. (× 100).

to stain them with iodine or other stain affecting crystalloids will fail. Acetic acid does not affect them, showing that they do not consist of calcium carbonate; nitric acid dissolves them, dilute sulphuric acid dissolves them, but fresh crystals of a different form (calcium sulphate) appear in the fluid. These reactions, together with the results of the ash of the plants, go to prove that the crystals consist of calcium oxalate.

What are known as sphere-crystals of inulin (fig. 17) are found in sections from tubers of dahlia

Fig. 17. Dahlia. Tuber, T.S. Sphere crystals of inuline. (× 100).

or of Jerusalem artichoke that have been kept some time in alcohol. Sections of fresh tubers show clear cell contents, but irrigation with alcohol causes a granular precipitate of inulin which may be re-dissolved by thoroughly irrigating with water.

Tannin is readily found in the tissues of the cortex and phloem of woody plants. Longitudinal sections of oak or pine treated with dilute solution of ferrous sulphate stain a greenish blue colour in certain parts, showing the presence of this gluco-

side. Potassium bichromate causes a deep brown coloration. A decisive reaction in doubtful cases is the voluminous yellow or brownish precipitate appearing in the cells on placing a section in a strong solution of molybdate of ammonium in ammonium chloride solution. Twigs of willow and alder show the reactions well, also in tangential sections from the green tissue of the cortex.

Cane-sugar is most readily identified in transverse sections of beetroot mounted in water. Note the coloured cell-sap which exudes from damaged cells, then treat section with alcohol, which causes crystals of sugar to form gradually. These re-dissolve by irrigation with water. If the section be soaked in Fehling's solution, washed quickly with water and mounted in same, then boiled gently over a spirit lamp, no precipitate will be formed either in the cells or surrounding fluid. In a section from a ripe pear or grape treated similarly a precipitate of cuprous oxide is formed, and the granules are seen within the cells of the tissue, thus indicating the presence of grape sugar. Another method of applying this test is to immerse sections in boiling Fehling's solution, and if the beetroot section be kept therein too long the cane-sugar is inverted, and the outer cells at least will show the change.

Table II.—Some Important Reactions of Cell-contents (after Behrens).

	Iodine reagents.	$CuSO_4$ and KHO.	HNO_3.	Alcohol.	General appearance.
1. Starch . . .	Blue.	—	—	—	Granules.
2. Dextrine. . .	—	Red ppt.	—	Unchanged.	Homogeneous fluids.
3. Inulin . . .	Uncoloured.	—	Dissolves.	Ppt. or spherical crystals.	
4. Glucose . . .	—	Red ppt.	—	Unchanged.	
5. Sucrose . . .	—	Blue fluid.	—	Unchanged.	
6. Veg. mucilage.	Blue, violet or yellow.	—	Dissolves, giving $H_2C_2O_4$.	Becomes flocculent or jelly-like.	Jelly-like fluids.
7. Gums . . .	Uncoloured.	Blue flocculent ppt.	Dissolves, giving mucic acid.	Becomes flaky or jelly-like.	
8. Proteids . . .	Yellow or brown.	Violet.	Brown.	Becomes coagulated or contracted.	Granular plastic substances.

OIL OF SASSAFRAS.*

Oil of sassafras is made from the roots of the sassafras tree, which grows more or less plentifully in all the Southern States, and as it is usually found in old fields and on thinly wooded slopes, landowners are as a rule very willing to allow it to be taken from the land without charge if the diggers fill up the holes and cut, pile and leave on the land the trunks of the trees. Many farmers get large pieces of new ground cleared and grubbed without cost in this way.

The general price paid for the clean roots is 20 cents per 100 pounds. Everything that grows beneath the surface is good. But in buying, the mill man must see that the stump is not cut higher than the surface of the ground, and that all the dirt and rocks are knocked out from between the roots. If they are not thoroughly cleaned the custom is to deduct from 10 to 25 per cent. of the gross weight to cover such losses. The roots may be dug at any season, though those dug between August 12 and May 15 yield the largest per cent. of oil, from the fact that during these months the sap is all down.

The roots are split up with axes and wedges to about the size of a man's leg, and they are then fed into the chopping machine, which is a heavy iron disc or wheel, usually about three feet in diameter, firmly keyed to a strongly journaled shaft which revolves at about 600 turns per minute. The wheel carries from one to four steel cutter blades set in slots like a plane bit, the number of cutters being determined by the power available. A 25 horse power engine driving a 4-cutter wheel will chop about 20,000 pounds of root in three hours, and this quantity of chopped root (sliced about one-fourth inch thick) will fill a wooden tank ten feet in diameter and eleven feet high. A good plan is to have the cutter elevated to within three feet of the head of the tank, and as the chips fly from the cutter wheel a man can shovel them on to the flat head of the tank, in the centre of which a square hole is cut about eighteen inches square, through which the chips are put. The root being split on the ground can be thrown up to the cutter floor very readily, though some of the large roots when brought in weigh over a thousand pounds each. The smaller roots, however, yield the largest percentage of oil.

The cutter is fixed to a heavy wooden frame, and up against the inner face of the wheel a heavy oak piece is bolted about 14 by 14 inches square and long enough to reach across the frame, say four feet long. In this block a sort of chute is hollowed out, with the bottom inclined toward the cutter blades. This chute is lined with hardened $\frac{1}{4}$-inch saw steel, and when the wheel is in motion the roots thrown into this chute are carried down the steel shod incline and cut very rapidly.

The tank is made of three inch kiln dried pine, which should be free from pitch. The staves are 4 to 5 inches wide, 12 feet long, tightly jointed, and strongly banded with six iron brands, about $\frac{1}{8}$ by 3 inches. The upper and lower heads are made of the same material as the staves, but wider, doweled together, and carefully fitted into a $\frac{3}{4}$-inch chime, cut in each end of the staves. There is a false bottom put in about three inches from the solid bottom, and the false bottom is bored full of augur holes. There is a trap door cut in the upper head for filling the tank, and a larger door cut in one side of the tank at the bottom for taking out the exhausted chips; this lower door is sealed up with clay and keyed in place. The tank is filled from above, and when full the upper door is securely keyed up with clay, and steam admitted between the false and real bottoms of the tank, through a $1\frac{1}{4}$- inch pipe. The bottom hoops have to be heavier than those higher up, and it is best to have two hoops close together, as the pressure at first is great, and will burst the tank if not made very strong.

From the *Oil Paint and Drug Reporter*, Sept. 14.

LIBRARY ST. BARTHOLOMEW'S HOSP

Steam is admitted at 40 pounds; cautiously at first, and after the steam works its way through the mass of chips, and shows itself at the top, which usually takes about three hours, then the pressure can be increased to 50 to 60 pounds.

The only outlet for the steam is through a copper pipe fixed to the upper head of the tank, which pipe, or "gooseneck," terminates in a coil of pipe situated in a smaller tank, through which tank a two-inch stream of cold water must be kept running during the entire process of distillation.

The steam entering the upper end of the copper condenser runs from the lower end as luke warm water, carrying little globules of the amber coloured oil in it.

It usually takes about fifty hours continuous steaming to exhaust the oil from 20,000 pounds of chips, and the average yield is about a gallon of oil—9 pounds—from each thousand pounds of chips, though if the steaming is allowed to stop for any reason, and then started again, the yield will not be nearly so great.

The distillation is continued until none of the oily globules can be seen in a clear glass bottle full of the water caught from the copper pipe, and held up to the light; then the steam is shut off and the lower door removed, when the circuit of cold air rushes up through the chips and forces out what little oil bearing steam remains in the chips, which are taken out of the lower door, and if spread in the sun a few hours will burn, but have very little value as fuel or anything else.

The stream of water which runs from the worm is caught in a copper funnel having a very long spout which reaches nearly to the bottom of a copper vessel of about 20 gallons capacity. The vessel is called a "bosh," and has an opening near the top, through which the milky coloured warm water overflows (the bosh always standing full), while the oil, being heavier than water, remains at the bottom and is drawn from a faucet in a thin, steady stream during the process of distillation. The faucet should be about three inches from the bottom of the bosh. After the operation is over the bosh may be emptied, and in the bottom will be found a gallon or more of dirty oil and water mixed, which is then filtered through coarse sand, and when caught in a pan the floating bubbles of water can be skimmed off and the oil put with the balance. The whole lot should then be filtered through clean sand, and if the roots were dug in the fall or winter months and from good soil the specific gravity of the oil will run from 1·070° to 1·085°, and will always bring a few cents over market quotations, which for the past few years have ranged between 35 and 60 cents per pound. There is a nice margin of profit in the manufacture of the oil if labour and roots are plentiful. The gathering of the roots ranks along with the picking of sumac leaves in so far as it is usually done by a class of men, women and children who have conscientious scruples against anything like working for wages, though some of them make good pay at getting the roots.

The uses to which the oil is put are many and varied; some of which are perfume for soap, candles, patent medicines, solvents for the various gums in the various manufactures, and the oil itself is a good counter-irritant or liniment for sprains or bruises, and enters more largely than the makers admit into the make-up of many of the highly advertised patent medicines.

The great distributing centre is New York city, where there is a steady demand for it, though at fluctuating prices. It is shipped in 5 gallon armoured cans; a wise man filters, tests and weighs his oil, putting 45 pounds to the can, then seals it before shipping, by which method he can soon get a trade from buyers who want a good article, and are willing to pay for it.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, DECEMBER 19, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*.

THE WORK OF LOCAL SECRETARIES.

THE recent alterations of the Society's bye-laws having removed two of the obstacles which have been put forward as reasons which prevented, on the one hand, chemists and druggists who were in business before the passing of the Act of 1868 from becoming members of the Society, and, on the other hand, prevented persons who have ceased to be connected with the Society from resuming their position, there is now an opportunity offered for a large accession to the ranks of the Society. To bring about a result so desirable from all points of view the assistance of the Society's local secretaries will therefore be especially valuable. We understand that an official circular has been issued to them requesting that they will make known in their several districts the alterations above referred to, and that they will endeavour to induce their neighbours to join the Society. Attention has recently been directed to the desirability of getting all the chemists of a district to take interest in the nomination of the local secretary by whom the Society is to be represented, and the present occasion appears to be peculiarly well adapted for submitting this view of the matter to the consideration of chemists who are not connected with the Society. It will be well to remind them of the fact that one of the objects with which the Society was founded is the protection of the interests of those engaged in the business. It will also be necessary to point out that for the attainment of that object it is indispensable that chemists should give their assistance. It is by them that the Society should be constituted and rendered effective for the work that has to be done. Every chemist and druggist who was in business before the passing of the Pharmacy Act, 1868, can now become a member of the Society, and those who have ceased to be connected with it can now resume their position on the payment of the nominal restoration fee of one shilling. It may therefore be hoped that under these conditions many who have hitherto abstained from joining the Society will do so. We hope, also, that local secretaries will generally endeavour to stimulate a greater interest in the Society's work, either by

holding meetings of the trade in their localities, or by any other means that may suggest itself to them. During the last few months we have received numerous letters from local secretaries on this subject, and we propose to refer to some of the remarks and opniions contained in those letters.

A local secretary writing upon this subject doubts whether anything more can be done because those belonging to the Society are in the minority. But that is precisely the condition which requires to be altered. No doubt there is deep-rooted prejudice against the Society, but it is equally certain that this prejudice is ill founded, and it lies with those who undertake the office of local secretary to exert themselves in overcoming that prejudice by showing how unreasonable it is. The argument that the subscription is too high and the assumption that no advantage would accrue from becoming a member are equally fallacious and equally capable of being disproved. Every registered person has been benefited by the legal definition of chemists and druggists that was obtained by the Pharmaceutical Society, and is benefited, even under existing conditions, by the maintenance of the register. It is therefore the duty of everyone to contribute towards the cost of that work. The statement that the Society does nothing for chemists and druggists is contrary to fact. Whatever truth there may be in the statement that the Society is unable to protect registered persons against unfair competition, those unconnected with the Society are to blame for it. The reason for such inability is that registered men do not sufficiently respect the restriction of trade which is capable of being made operative for their advantage, that they do not co-operate with the Society for maintaining the advantage which the law provides for them. On the contrary there is in some cases an unnatural sympathy with unregistered persons which can have no other foundation than the desire for cheap labour. For the sake of obtaining assistants on those terms, the only possible protection of the body is sacrificed, and its position rendered nearly as bad as if there were no restriction of the trade and no qualification required for carrying it on. The plea in regard to the amount of the subscription seems an utterly weak one, when it is considered that artizans contribute far larger amounts to the organizations for protecting their interests. It is a mockery, as the PRESIDENT told his hearers at Dundee, for two-thirds of the members of the trade to say they will join the Society when it has put a stop to company trading, and such remarks only exhibit the weakness of their position. If the competition of company trading is to be successfully overcome or attacked at all on behalf of the trade, it must be done in the name of the whole trade. The Executive of the Society must first be enabled to take that position by receiving the confidence and united support of the entire trade, and until that is the case there cannot be any ground for expecting the Society to attempt dealing with the matter of company trading in Parliament on behalf of the trade. These are points that should be explained and strongly urged upon the attention of chemists, and there is no means by which that can be done so effectively as by the Society's local secretaries in their respective districts. Of course the work thus thrown upon local secretaries would be considerable, and as the office is necessarily an honorary one there may be difficulty in finding men who are at once able and willing to devote to the task the time and labour that it would entail. It must, however, be remembered in regard to this point that the welfare of the whole body is at stake. Those connected with the Society are prejudiced, and their power of action weakened by the fact that two-thirds of the trade stand aloof, and are either indifferent or hostile to the Society. There is therefore some motive of individual self-interest that should stimulate the efforts of local secretaries to convince their brother chemists of the necessity of supporting the Society, and to bring about a better state of feeling in regard to it.

Another letter from the local secretary of a town where there are about forty chemists, but only six connected with the Society, dwells upon the difficulty there would be in such a case of calling a meeting of the trade to consider the nomination of a local secretary. Naturally, persons unconnected with the Society would have no voice in the selection. It is above all things indispensable that local secretaries should be in accord with the views held by the Council, as the elected representative of the Society. But as very much of the opposition and discontent on the part of outsiders arises from ignorance or prejudice, it is to the removal of these influences that the efforts of local secretaries should be directed. For instance, refusal to contribute to the Benevolent Fund by persons who are not connected with the Society cannot have any reasonable foundation. The Fund is for the benefit of all, and disapproval of the Society's proceedings in regard to pharmaceutical politics, on the part of those who will not help to influence them, cannot justify the refusal to support the Fund. It is a standing reproach to British chemists that on such meagre pretexts so many of them abstain from contributing to a charitable institution which is of such a liberal character, and capable of doing so much good. But they are precisely the persons to whom the efforts of a local secretary should be directed for the purpose of convincing them of the mistake they make in refusing to ally themselves with the body that is their natural representative, and in omitting to do

what they can towards making it so. That is really a senseless position. The same writer suggests that young men who pass the Minor examination should be offered greater inducements to join the Society. That is to a great extent a matter for further legislation, so far as the privileges of membership are concerned, and the provision for it formed a prominent feature of the late Bill. If that had been supported by the trade, so as to have a chance of being passed, everyone passing the Minor examination could have become a member of the Society. As it is the Council has proved its disposition to do what is possible in this direction by the recent alteration of the bye-laws. Everyone who passes the Minor examination can now become a life associate of the Society on going into business by paying a composition of ten guineas, and thus secure the right to vote for members of the Executive. The recent alteration of the Society's bye-laws and the abolition of the entrance fee that was required from chemists who were in business before the passing of the Pharmacy Act, 1868, ought to open the way for many to join the Society, and local secretaries should urge this circumstance upon their notice. The reduction of the fee for restoration to membership should also operate in the same direction. But it is not unfrequently said that chemists fail to perceive any advantage in being connected with the Society. Some even go so far as to question the utility of the Pharmacy Act. It certainly ought not to be difficult to convince sensible men that such views are erroneous. They are indeed often supported by the complaint that the chemists' business is interfered with by herbalists, grocers, and store companies. In regard to such complaints it may be asked how any remedy can be obtained except through the medium of the Pharmacy Act and by the action of the Society, that is to say, by the co-operation of chemists for that purpose. That is the reason why all chemists should be connected with the Society, and by their support of it, as their representative organization, create for themselves a power capable of dealing with conditions that operate to their disadvantage. So long as they remain disintegrated and isolated, there cannot be any power adequate to deal with their requirements. Those who are unconnected with the Society are the real source of weakness, and by remaining in that position they prejudice not only themselves, but also those who are connected with the Society. While two-thirds of the trade continue in that position, it is idle to complain of illegal competition, and declare that restriction of the sale of poisons is of no use to chemists, because it is sometimes disregarded. That is at any rate the only advantage given to chemists by the Pharmacy Act, in addition to their registration, and it should be turned to account as far as possible. For doing so effectually it would be necessary to replace vain lamentations by active co-operation. In localities where illegal trading is carried on, evidence of the fact must be collected by those who are thereby injured, and upon a sound basis of that nature the Society may be called upon to take action. But even in the complaints that are made by chemists, there is much which is unreasonable. In a letter now before us complaint is made of a herbalist who advertises paregoric containing no opium, quinine and iron tonic, etc., and the opinion is expressed that such practices should be put a stop to by the Society. It would, however, be unreasonable in any case to expect that to be attempted for the benefit of chemists who are not connected with the Society. And if it were possible to make the attempt at all it could only be done by a federation of the whole trade, and by a united endeavour to educate the public in recognizing chemists as the proper sources for the supply of drugs and medicinal preparations. If they would collectively uphold the position secured for them by the Pharmacy Act as the only persons legally authorized to deal in poisons, and if they would also support the endeavours of the Society to establish the principle that chemists, as specially educated persons, are alone competent to deal in drugs or dispense medicine, some of the good influence which the trade experiences the want of might be brought to bear for its advantage. If the Bill which has recently failed to receive the support of the trade had been passed into law it would have secured some of these advantages; but such a result can never be achieved unless due respect is shown for the legal qualification by which chemists are to be distinguished from the competitors of whom they complain. The remedy is in the hands of chemists, and the strengthening of the Society as their representative body is the only means by which it can be applied for the relief of their grievances.

An evening meeting of the Pharmaceutical Society will be held at the Society's House, 36, York Place, Edinburgh, on Wednesday, the 23rd instant, at 8.30 p.m. The chair will be taken by Mr. J. Laidlaw Ewing, and papers will be read on "Commercial Goa Powder," by Messrs. W. Duncan and T. S. Tweedie; "Solubility of Iodine in Chloroform," by W. Duncan; "Notes on Some Indian Drugs," by T. Stephenson; "Notes on Some Additions to the Museum," by J. Rutherford Hill.

* * *

In a letter from Mr. A. H. Allen, of Sheffield, which appears in this week's Journal, he protests against some comments which he assumes had reference to the non-publication of the results of

proceedings taken against vendors of samples certified by public analysts to be of objectionable character. But Mr. Allen is quite mistaken as to the object of the comments to which he refers. No objection can be raised to the publication of convictions under the Sale of Food and Drugs Act, for the sale of inferior drugs or medicinal preparations, but we do object to the publication of such cases without a statement of the sources from which the defective drugs or medicinal preparations were obtained. The want of information on that point is calculated to cast an unjust imputation upon chemists, since they are the proper sources of the supply of such articles, and since we have reason for believing that it is at grocers' shops and general stores that defective drugs and medicinal preparations are in most instances met with. That the analysts are not themselves made aware of the sources from which defective samples have been obtained is a matter of little importance in regard to the objection we have raised; but it is obviously the duty of the authorities by whose direction samples are analysed and prosecutions instituted to furnish such information as would prevent prejudice to those who do not deserve it. This is the sense in which objection has been raised to the mode of publishing public analysts' returns in the report of the Local Government Board, and Mr. Allen's remarks do nothing towards removing that objection.

* * *

We have hitherto been prevented from mentioning that we learn from Mr. W. S. Harvey, of Margate, that, with only one exception, the chemists of that town have agreed to close at an earlier hour during the winter months. This decision meets with sympathy from the public, and it is expected that the results will be beneficial both to assistants and apprentices, as well as to their employers.

* * *

The eighth annual conversazione of the Edinburgh Chemists' Assistants and Apprentices' Association took place on the 11th instant, at the Literary Institute, South Clerk Street. The chair was taken by Mr. John Lothian, the President, and the programme of the evening's entertainment included vocal and instrumental music and recitations.

* * *

We hear from Mr. Strachan, the Society's local secretary at Aberdeen, that Mr. John Sangster, of that city, died at the age of 72 on the 8th instant. Mr. Sangster had been a member of the Pharmaceutical Society since 1853, and he held a prominent position in connection with the municipal affairs of Aberdeen.

* * *

We have received information of the death, at Castletown, Isle of Man, on the 15th inst., of Mr. Edward Keene, of 143, New Bond Street. He will be remembered by many of those who have been connected with the establishment of Messrs. Savory and Moore as having for many years been engaged there as the principal assistant in the dispensing department.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

December 10 *and* 11, 1891.

Present on each day—Mr. Carteighe, President; Mr. Bottle, Vice-President; Messrs. Blunt, Bowen, Corder, Druce, Fletcher, Gerrard, Greenish, Holmes, Ransom, Saul, Symons, Tanner and Taylor.

Dr. Stevenson was present on each day on behalf of the Privy Council.

MAJOR EXAMINATION.

10*th.*—*Twelve* candidates were examined. *Eight* failed. The undermentioned *four* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Bertulès, Prosper.....London.
Matthew, Edwin.....Hadleigh.
Morgan, William Ellis .....London.
Sturton, Frederick .....Peterborough.

11*th.*— *Twelve* candidates were examined. *Five* failed. The undermentioned *seven* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Holt, Herbert Collins.....Bowdon.
Melhuish, Andrew Ralph .....Windsor.
Naylor, John .....Burley-in-Wharfedale.
Smith, Richard Sidney .....Dartford.
Softly, Alfred Ernest .....London.
Willsher, Charles Garrett .....Dover.
Woodcock, Herbert Hy. Addis.Margate.

MINOR EXAMINATION.

10*th.*—*Twenty-one* candidates were examined. *Fourteen* failed. The undermentioned *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Anness, Joseph Leonard .....Ipswich.
Blackie, Robert .....Dufftown.
Boucher, John Mycroft .....Bristol.
Briggs, Sam.....Halifax.
Carpenter, Joseph Edmund ...Welford.
Chettle, Herbert Tovey .....Trowbridge.
Cobb, Herbert Ernest.....Bury St. Edmunds.

11*th.* — *Twenty-one* candidates were examined. *Thirteen* failed. The undermentioned *eight* passed, and were declared qualified to be registered as Chemists and Druggists:—

Cooper, Lionel .....Southsea.
Davies, John .....Torquay.
Duckering, Richard .....East Barkwith.
Eldred, Charles William .....Shrewsbury.
Evans, Evan.....Llanelly.
Frost, John Ernest .....Worthing.
Gilding, Matthew .....Wainfleet.
Golland, James Henry .....Sheffield.

EVENING MEETING IN LONDON.

Wednesday, December 16, 1891.

MR. MICHAEL CARTEIGHE, PRESIDENT, IN THE CHAIR.

A lecture on "The Phenomena of Fermentation Considered with Especial Reference to the Chemical Problems they Raise," was delivered by Professor H. E. Armstrong, Ph.D., F.R.S., at the evening meeting of the Society, held in the Theatre of the Institution, on Wednesday evening December 16.

The CHAIRMAN, in opening the meeting, said he would not trouble them with any introductory speech, but would at once ask Professor Armstrong to be good enough to deliver his lecture. He might, however, say that it was not an easy matter in dealing with

such a subject as that to illustrate it in a very popular manner. Their members wanted instruction and knowledge on all questions connected with chemistry, and they wanted it in that particular branch of chemistry which Professor Armstrong had made his own—organic chemistry. That department of science had undergone a complete revolution within the last ten years; in fact, it seemed to him that it had been revolutionized three times since he first became acquainted with it; and he therefore felt some difficulty in following the work in regard to it. They were, however, very fortunate in having so distinguished a disciple of the organic school as Professor Armstrong to lecture to them.

Professor ARMSTRONG said the remark of the Chairman had to a certain extent anticipated what he was about to say in opening the subject. The desire in those lectures was not so much to give popular demonstration as to accomplish, if possible, some useful work. The subject which he had to deal with was one full of interest, but at the same time it was an excessively difficult one to handle, on account of its extreme complexity, and on account of the literature on the subject being an exceedingly wide one. But for several reasons the study of the chemical changes which underly the phenomena of fermentation is of extreme importance. An enormous revenue is derived by the State, in this country especially, from the duty levied upon one of the products of fermentation, and two very important branches of industry are founded upon the process, directly or indirectly contributing to the maintenance of very large numbers of people in nearly all parts of the world. But a still more general and immensely higher interest in the subject has been kindled within recent years by the momentous discovery that very many diseases both of man and animals have their origin in poisons, produced within the system by micro-organisms, or so called bacteria, introduced from without. In the fermentation of carbohydrates or allied compounds all the products are compounds of carbon, hydrogen and oxygen of a comparatively, if not entirely, innocuous character. The products of most bacterial fermentations would seem, on the contrary, to be of extraordinary virulence, which is entirely due to the circumstance that their activity is exerted in remoulding the constituents of nitrogenous compounds, and giving rise to products of an alkaloidal character. The discovery of the origin of zymotic disease has placed in our hands the power of controlling it, and affords a prospect of still more beneficent results in the future by the extension which Pasteur has given to Jenner's discovery of vaccination as a protection against small pox. There can no longer be a doubt that at least in many cases products are obtainable from bacterial fermentations which can counteract the morbific influence which the same organisms exert if allowed to exercise their power uncontrolled. But at present we know nothing of the nature of these products. A vast field for work is here opened up in ministering to the wants of suffering mankind, but our Legislature has practically guarded this field with the notice that "No English chemist need apply." It is entirely abandoned to foreigners. There are other directions in which the study of fermentation phenomena is full of interest. The rapid manner in which animal and vegetable substances decay when exposed to the air, especially in warm, moist climates, is well known. Kingsley's account of a Christmas spent in the West Indies bears testimony to this. Speaking of the primæval forests of Trinidad, and allowing for the influence of the sun in promoting oxidation, there is reason to believe that the "air-change" is in the main due to the agency of micro-organisms. Pasteur's classical experiment, *i.e.*, in which sterilized sawdust was shown to yield no carbon dioxide when a current of sterilized air was passed over it, while unsterilized sawdust under like conditions gave an abundance of the gas, also points in that direction, though it still remains unrecorded in most text-books. The stability of organic matters in the absence of micro-organisms is by no means fully recognized. But a more precise understanding of the question is highly desirable in regard to so important a sanitary question as the method of burial. Agriculturists at times suffer loss through outbreaks of various zymotic diseases among their cattle, which are undoubtedly the outcome of bacterial activity. But, on the other hand, they are indebted to micro-organisms which perform useful work. All plants require some form of combined nitrogen for their growth. We now know that micro-organisms are largely instrumental in effecting the oxidation of ammonia within the soil. It has long been held that plants derive their carbon exclusively from carbon dioxide. But it has been observed by those who have specially studied the nitrifying organisms that their growth and development require only the presence of a carbonate. Agricultural chemists have always been puzzled to account for the nitrogen of leguminous plants, such as clover, beans, etc., and for the fact that it is impossible to raise several crops of them in succession. This peculiarity appears to be associated with the action of bacterial bodies.

From these examples it will be obvious that the study of fermentation phenomena necessarily lead to the pursuit of inquiries in many different directions. Fermentations being in all cases conditioned by organisms, the study of the chemistry of fermentations may be said to embrace the study of vital chemistry generally, yet how absurdly limited is our knowledge. Notwithstanding the enormous scale on which alcoholic fermentation is conducted, we do not fully know what are the products of the fermentation of glucose by yeast. There is much reason to believe that the alcohols of fusel oil originate from an independent fermentation. It has been suggested that glycerol and succinic acid are not formed *pari passu* with alcohol and carbon dioxide as products of the revolution of the glucose molecule, but that they are, as it were, excretory products of vital changes within the organism. Evidently a very wide meaning must be attached to the term. Cane sugar dissolved and mixed with yeast is very rapidly changed into two new sugars, and one of the products of the change is dextrorotatory in a different degree, the other is lævorotatory. The sugar is therefore said to undergo inversion. Inversion involves the addition of the elements of a molecule of water to the cane-sugar molecule, and the consequent formation of two molecules of the same weight, thus—

$$\underset{\text{Cane sugar.}}{C_{12}H_{22}O_{11}} + OH_2 = \underset{\text{Dextro.}}{C_6H_{12}O_6} + \underset{\text{Lævo.}}{C_6H_{12}O_6}$$

The inversion of cane sugar by yeast is conditioned by a substance, which has been named invertase, which can be separated from the organism. This substance acts equally well when separated. We know it to be a member of the albuminoids, and it is destitute of structure in the ordinary morphological sense. It is the type of a large class of substances capable of producing actions similar to that which cane sugar undergoes, and known collectively as unorganized ferments from their connection with organisms capable of inciting fermentation. The effect they produce is not termed fermentation. The term inversion has also given way to the more expressive term *Hydrolysis*. The so-called unorganized ferments, then, are hydrolytic agents—substances which split up through the agency of water. There is nothing mysterious in their action to indicate that their activity is conditioned by their vital origin. The effect that they produce may be exactly imitated by the use of sulphuric acid.

Cane sugar, strictly speaking, is not fermentable.

What is commonly known as fermentation sets in only when the sugar has been resolved into dextrose and levulose; the dextrose and levulose being resolved into alcohol, and the gas carbon dioxide $C_6H_{22}O_6 = 2CO_2 + 2C_2H_6O$. The word fermentation is expressive when applied to the change wrought by ordinary yeast in a glucose; but it entirely loses its force when applied to the change which the same glucoses undergo when submitted to the action of the *Bacillus subtilis*, whereby the glucose is resolved into two molecules of lactic acid, $C_6H_{22}O_6 = 2C_3H_6O_3$.

In the acetification of alcohol no gas is evolved, but atmospheric oxygen is absorbed; and through the agency of the *Bacterium aceti*, it is used up in effecting the oxidation of the alcohol $C_2H_6O + 2O = C_2H_4O_2$ and H_2O.

These three examples illustrate the difficulty of giving any consistent definition of the term fermentation; that difficulty is increased by the fact that in some instances the change is not, as in the case of alcoholic and lactic fermentation, one of simplification, but, on the contrary, one involving increase in molecular complexity; lactic acid, for example, $C_3H_6O_3$ yielding both butyric and caproic acids, $C_4H_8O_2$ and $C_6H_{22}O_2$ in the butyric fermentation. Obviously, therefore, it is not only difficult, but impossible, to define fermentation except in the broadest possible way as an action or actions conditioned by an organism, the phenomena themselves being of a very diverse and often complex character. Professor Armstrong then referred to a short note published by him in the Chemical Society's Trans. of June, 1890, on "The Terminology of Hydrolysis, especially as effected by Ferments," as giving a condensed statement of a variety of points which it will be necessary to consider in the subsequent lectures. In conclusion, Professor Armstrong remarked that he had been very general and discursive, having merely wished to draw attention to the great variety of problems which must be taken into consideration in dealing with the subject of fermentation, but in the subsequent lectures he would be able to enter more fully into details.

The CHAIRMAN said it was only necessary for him to interpret the acclamations of the meeting by conveying to Professor Armstrong his hearers hearty thanks for his instructive lecture.

The second lecture on the subject would take place on Wednesday, January 13.

Pharmaceutical Society of Ireland.

REGISTERED DRUGGISTS' EXAMINATION.

At an examination for the licence to act as a registered druggist, held at Queen's College, Belfast, on the 8th inst., the following passed:—Messrs. B. W. Agnew, Belfast; J. Baxter, Armagh; J. C. Browne, J. D. Carse, J. and W. Clarke, Belfast; A. Hanna, Newtownards; J. Hinds, R. A. Jamison, T. A. Kirkwood, Belfast; G. W. Lawson, Dungannon; J. Montgomery, Belfast; C. Morton, Bellaghy; J. Richardson, W. H. Ringland, E. Roberts, Belfast; J. Rooke, Ballyjamesduff, and F. J. Shields and R. G. Stevenson, Belfast.

Seven candidates were rejected.

At a Druggists' Examination, held on the 16th inst., the following passed:—T. Earl, Ballycanew; Mary Fallon, Athlone; W. F. Kent, Borrisokane; D. Lynch, Portumna; J. McCrea, Newry, and C. P. Winton, Dublin.

Provincial Transactions.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

The second meeting of the session was held in the Memorial Hall, Albert Square, on December 9. The chair was taken by Mr. Geo. S. Woolley, President.

Mr. Wm. Kirkby, F.L.S., lecturer in pharmacognosy, Owens College, delivered a lecture on the microscopical characters of the more important official drugs. Microscopical sections of each of the drugs mentioned by the lecturer were shown with the aid of a lantern. The characteristics of each drug were carefully pointed out, to enable those present to recognize microscopically the true drugs, and to detect their most probable adulterations. Mr. Kirkby, in the course of his remarks, said that he particularly wished to reach the younger members present, and to induce them to take an interest in the study and work connected with microscopic analysis of the drugs they were in the habit of handling. There was real need of the microscope in such work, for members were doubtless aware that drugs were frequently gathered by inexperienced collectors, and manipulated in drug warehouses before reaching the pharmacist. It ought to be within the province of every intellectual pharmacist to identify drugs by means of their internal structure as revealed by the microscope, as well as by their external appearance, which was frequently deceptive. The constituents of plants varied very much with regard to their active principles; and a microscopical examination would frequently reveal to the careful observer a good deal of information which he would otherwise not be able to obtain. Again, the employment of the microscope was exceedingly useful in the examination of small quantities of powders, and especially where only a limited quantity of the substance was obtainable. Histological analysis could be performed on pretty nearly the same lines as chemical analysis, and above all things the student must bring his reason into play. Just as in the animal kingdom, by the examination of hair and bone, it could be demonstrated to what class of animal they had belonged, so in botany the microscopical examination of a plant section unfolded to them the plant or class of plants from which that section had been obtained. In the section of hemlock seed the difference between it and aniseed was made particularly clear. Owing to the similarity in their external appearance errors had arisen, and these two drugs had been found mixed; no doubt owing to ignorance. Particular attention was drawn to the trifid stigma of *Crocus Sativus*. The section on the screen exhibited a cleft down the side of one portion of the stigma, and this was characteristic of the true saffron. An excellent slide of *Nux vomica* seed showed the hairs covering the seed remarkably well defined.

The Chairman, in proposing a vote of thanks to Mr. Kirkby, said that he could not speak too highly in praise of the lecture he had just listened to. It was of such high order, so well illustrated and clearly described, that it should encourage the students present to go more thoroughly into the microscopical study of drugs, in order that they might, when engaged in the routine of their daily business, know something more about the drugs they were handling. He regarded this lecture as inaugurating a new era in the history of the Manchester Association, and he trusted that it would prove an incentive to many of the younger men to rally round the Association and put into it something of its former life and energy.

Professor Leech had great pleasure in seconding the vote of thanks. The microscopical examination of drugs was of the greatest importance to the pharmacist, and the ability to make such an examination was really necessary in the detection of adulteration. Pharmacists should be, in his opinion, competent to trace drug adulteration. If the public only saw or knew the way in which drugs were sent over to this country they would rub their eyes. At one time he had been accustomed to visit the great drug emporium in Fenchurch Street, and had wondered to see the vast

amount of drugs of all kinds and in all conditions that came in. The curator entrusted with the sampling found that different parcels of the same drug varied enormously. He himself was accustomed to procure drugs for the Owens College, and in doing so came across many strange specimens. He had recently obtained some ipecacuanha which would puzzle many present to recognize. Now where did all these various drugs go to? They were bought by brokers merely as a matter of speculation, and undoubtedly the larger portion of them was made into medicine. Druggists who bought these drugs too frequently did not know what they were buying. The study of pharmacognosy was all important, and he was glad to know that the first lectureship on the subject which had been established at a college in England was that connected with the Owens College. As regards the educational side of the question, the extension of the knowledge of this subject amongst pharmacists had received a good deal of attention from him during the past four months in his connection with the Medical Council. In his opinion the necessities of future pharmaceutical education would be a preliminary examination in botany in general, and in microscopic botany in particular. In the interests of the public, in the interests of the medical profession, in the interests of pharmacists themselves it was of the utmost importance that this should be done. He was quite certain on one point, it would thoroughly repay the pharmacist. As lecturer in materia medica it was his duty to teach the students not only to recognize plants but also, so far as was possible, to show them the changes which took place in them, as it was important to know whether a drug was in proper condition, and that could only be discovered by a careful examination of it. With the people who bought and sold these drugs it was a purely commercial transaction—they did not care what was put in so long as the goods were sold profitably. The quality and composition of drugs was specially important to druggists and also to medical men, for it was a curious and important fact that where one dose produced one effect a large or double dose might produce a diametrically opposite effect, and if they used a drug which had altered in condition they might produce an absolutely opposite effect in the patient to that which was intended. He was glad, therefore, to notice that the importance of drug standardization was receiving such attention. He hoped that the large number of students he saw before him might be stimulated to work in the direction he had intimated, and that the Manchester Pharmaceutical Association might long continue to flourish.

Mr. H. Wilson supported the vote of thanks. He remembered on a previous occasion that Dr. Leech had told them that the pharmacist himself must be the guarantor of the preparations he sold to the public. He (Mr. Wilson) was of opinion that the pharmacist must be not only guarantor of the preparations he retailed but also, to a great extent, of the crude drugs.

In reply to a question by Mr. Mercer, Mr. Kirkby stated that the literature on microscopical analysis suitable to the pharmacist was very limited.

Mr. G. S. Woolley referred to the difficulty which had been experienced by him for some time in obtaining jalap root capable of yielding the percentage of resin mentioned in the Pharmacopœia. He did not know whether it was the fault of the elements, but satisfactory jalap root was either becoming scarce or was going out altogether.

Mr. Kirkby suggested that it was just possible that in some of the earlier analyses of jalap too high a percentage of resin had been returned owing to defective drying of the resin, which he found required particular care. The percentage had been down as low as 3 or 4 per cent., but at the present time jalap root was occasionally obtained yielding 5 or 6 per cent. It certainly was a fact that the root now obtainable did not yield anything like the quantity of resin required by the Pharmacopœia.

LIVERPOOL PHARMACEUTICAL STUDENTS' SOCIETY.

The usual fortnightly meeting of this Society was held on the 3rd inst., Mr. J. R. Johnson in the chair. J. R. Logan, Esq., M.B., delivered a most interesting lecture on "Bacterio-Therapeutics," illustrated by numerous lantern slides. Dr. Logan treated this subject under four heads, viz.: the morphology, physiology, pathology or pathogeny, and therapeutics of bacteria. Under morphology the yeast plant might be included, which was a large organism, micrococci being much smaller. Micrococci and bacteria multiplied by fissure, while bacilli multiplied by fissure and by spore formation. Koch found the bacilli of anthrax to divide once in one hour, but some bacilli divide much oftener. Antiseptics have not as great a power over spore-formed bacilli as over fissure-formed. The greater number of microbes are harmless to man, because they cannot live in the human body. Some, as the bacilli of leprosy and syphilis, grow on man only. Some require plenty of air to sustain life, others a limited quantity, while to others again air is positively hurtful. To these the terms aërobic and anaërobic have been applied. All bacilli require more or less moisture, but while some can withstand desiccation, others, as those of cholera, die on drying. Microbes, like the human organism, produce substances which are poisonous to themselves. For instance, the yeast plant produces ethylic alcohol, which destroys the yeast itself. Among these poisons may be enumerated alcohols, acids, alkalis, alkaloids, enzymes, and albumoses. Dr. Logan then spoke of the immunity from a second attack, which persons enjoy who have once suffered from scarlet fever, etc. There were various theories as to the cause, one being the theory of exhaustion of the food of the special bacillus in the human body, another that the microbe leaves behind it something injurious to its own species. The theory which is now accepted is that of acquired tissue resistance, signifying that the cells in the body become acclimatized to the poison of the microbe. Dr. Logan, in conclusion, referred to the bacteria products which are now being utilized to combat disease, and specially mentioned that while blue pus bacillus kills the anthrax bacteria the product of blue pus bacillus (*procyanine*) not only kills the anthrax but confers immunity from a second attack.

Specimens of microbes in actual growth on nutrient jelly were shown to the audience.

A vote of thanks, proposed by Mr. J. H. Wardleworth and seconded by Mr. C. F. Symes, brought a most interesting meeting to a close.

NOTTINGHAM AND NOTTS CHEMISTS' ASSISTANTS' ASSOCIATION.

The annual dinner of this Association was held at the Masonic Hall, on Wednesday, December 9, and was very well attended, upwards of eighty being present.

The Mayor of Nottingham (Mr. Councillor Fitz-Hugh, President of the Association) presided, and was accompanied by the Sheriff; the Vice-chairs being occupied by Mr. W. H. Parker (vice-president) and Mr. A. Middleton. Among the guests were Professor Clowes, Mr. J. W. Carr, M.A., Dr. C. Haydon White, Drs. Hunter, Roberts, Mutch and Bailey, Mr. J. W. Rogerson, Mr. J. Marshall, Mr. Henry George, Mr. H. De Forges, Mr. Lofthouse, Mr. Cassons, Mr. Daniel, Mr. Parkhouse, Mr. D. Whittingham (county coroner), Mr. J. Haywood and Mr. F. Gill.

After the usual loyal toasts had been disposed of' the Chairman proposed "The Pharmaceutical Society," remarking that he hoped every chemist would make it a duty to be connected with the Society, as it had done much excellent work in the past, not only for the trade at large, but also for our own Association, and he would like to see it much better supported.

Mr. W. H. Parker, local secretary, in responding, said that he also would like to see the Society much better supported. Owing to defective Acts of Parliament the Society was not able to do much, but it did what it could for the trade, and no Society could do more. He was pleased to notice that there were gentlemen on its Council who were anxious to extend its usefulness, and they ought to be encouraged by knowing they had the support of the chemists as a body.

Mr. C. A. Bolton then proposed "The President of the Association," referring in very felicitous terms to the honour which had been done to Mr. Fitz-Hugh by the Town Council, in electing him to the office of Mayor. In a very able speech the speaker reviewed the history of the Association, pointing out the very many and great services rendered to it by Mr. Fitz-Hugh, and expressed the hope that he might long remain the President.

The toast was drunk amid great enthusiasm.

The Mayor said he greatly appreciated the kind manner in which the toast had been received. He had always endeavoured to do his duty, and it was gratifying to him to know that he had the respect, not only of the chemists but also of his fellow citizens. It was a proud day for him when he was elected Mayor of this town. In a sympathetic manner he referred to those with whom he worked at the formation of the Association in 1868, and expressed the indebtedness of the present day chemists to them.

Mr. W. J. Rogerson, in proposing "The Nottingham and Notts Chemists' Association," complimented it on its extensive educational work, on which he had been told eight-ninths of its regular income was expended. This would account for the high position it held among similar institutions in the kingdom. It deserved to succeed, and he heartily wished it may.

Mr. W. H. Parker (Vice-President), Mr. J. Wilford (Treasurer), and Mr. W. Gill (Secretary), briefly replied.

Mr. Beilby, in proposing "The Teachers of Classes," referred to the excellent work done by the teachers; he thought it would be much better if every chemist would make a rule of taking no youth as an apprentice until he had passed the Preliminary examination.

Professor Clowes, Dr. Haydon White and Mr. J. W. Carr, M.A., responded, the Professor speaking highly of the earnestness of the students.

"The Town and Trade of Nottingham," proposed by Mr. Henry George, was responded to by the Sheriff and Mr. J. Haywood.

The Chairman then proposed "The Medical Profession," to which Drs. Hunter, Mutch and Roberts responded, all of them expressing the hope that pharmacy might soon become more of a profession, a consummation which would be more easily reached if doctors would let dispensing alone.

Mr. A. Middleton proposed "The Visitors," to which Mr. S. Stevens (Chief Constable), Mr. Daniel and Mr. des Forges responded.

A very enjoyable musical programme was admirably rendered by Miss Maggie Jaques, Mr. F. Lightowler, Mr. C. S. Armstead, and Mr. Cassons, of Liverpool. Mr. Woodhouse was a very efficient accompanist.

NEWCASTLE-ON-TYNE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The annual social gathering in connection with the above Association took the form of a ball this year, and was held on the evening of Wednesday, December 2, in the Old Assembly Rooms, Westgate-road. There were about seventy couples present, among whom were Dr. Bailes, Messrs. T. Maltby Clague, Harold Proctor, G. F. Merson (President of the Association), W. Pescod, etc.

Dancing commenced at 8 o'clock, and was kept up with great spirit until 3.30 a.m., and the arrangements of the Committee gave every satisfaction.

Messrs. Peter Bell, A. Russell Bennet, and Healey Pattinson acted most efficiently as masters of ceremonies.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

At a Council meeting of the above Association, under the presidency of Mr. A. Southall, held at the Mason College Wednesday afternoon, December 9, Mr. R. D. Gibbs proposed the following resolutions:—1. "That every chemist on the Register of the Pharmaceutical Society living within a radius of fifty miles of Birmingham be a member of this Association in virtue of his qualification, without reference to any fee or subscription." 2. "That a tablet be prepared for presentation to each member notifying his membership." 3. "That this Council shall be elected from that entire body, and that the election shall be of such a character as shall bring each member a distinct representative on this Council by dividing the members into equal groups and appointing a representative for each group." 4. "That all the meetings of the Council be reported and published to each member."

Mr. Thonger seconded the same, and after much discussion, in which most present joined, it was resolved, on the proposition of Mr. Gibbs and seconded by Mr. Perry, that the whole subject be referred to a committee consisting of the President (Mr. A. Southall), together with Messrs. Gibbs, Perry, Prosser, Taylor, Thompson, Barclay, Poole, W. Jones, Morris (Walsall), Gibson (Wolverhampton), and the Hon. Sec.

The annual ball was fixed for Thursday, January 14, 1892, and it was decided not to officially issue any complimentary tickets.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The eighth annual conversazione took place in the large hall of the Literary Institute, South Clerk Street, on the evening of Friday, December 11, at 8.30, the platform and side windows being tastefully decorated with plants, kindly lent by Mr. James Buchanan.

Mr. John Lothian occupied the chair; and among others present were Mr. J. Laidlaw Ewing, chairman of the Executive of the North British Branch, and Mrs. Ewing, Mr. J. B. Stephenson, chairman of the Board of Examiners for Scotland, and Miss Stephenson; Mr. William Aitken, C. F. Henry, Mr. R. McAlley, Mr. R. I. McDougall, C. A. Macpherson, T. Thompson, J. Thompson and J. R. Young, junior.

Apologies were received from Messrs. Ainslie, Storrar and Watt.

The musical programme, which was of a high-class character and admirably rendered, included two orchestral pieces by Mr. Aitken's party, in which a violin solo by Mr. Winram was highly appreciated. The rest of the programme consisted of songs, recitations and instrumental pieces contributed by the Misses Richardson, Wilkinson, and Wright, and Messrs. Chalmers, Dow, Duncan, Gamley, Hogg, Thompson, and Wood, Mr. G. M. Lindores acting as accompanist. Much regret was expressed that, owing to influenza, Miss Yule could not appear.

On the motion of the Chairman, a hearty vote of thanks was awarded to the contributors, and on the

motion of Mr. J. L. Ewing, a similar vote of thanks was awarded to the Chairman.

Under the management of Messrs. A. G. Hendry and A. Robertson a dance programme, taken part in by upwards of seventy couples, was then proceeded with and maintained with great spirit till about 4.30 a.m.

A supply of aerated water was sent by Messrs. Baildon and Son, Duncan, Flockhart and Co., Mackay and Co., Macfarlane and Co., J. Robertson and Co., and T. and H. Smith and Co., and the Bovril Co. also sent a supply of their popular manufacture.

GLASGOW CHEMISTS AND DRUGGISTS' ASSISTANTS' ASSOCIATION.

The usual fortnightly meeting was held in the Waterloo Rooms on Wednesday evening, Dec. 9, Mr. James Robb, President, in the chair. The essayist for the evening was Mr. George Robertson, his subject being "Heat, Sensible, Latent, etc."

The lecturer commenced by remarking on the important part heat plays in the duties of the pharmacist, then touched on the theories of heat, stating that down to the present century the material theory had the greater number of supporters; the discoveries of Davy, Rumford, and others have, however, conclusively proved heat to be motion—energy of motion. The means used for the production of heat were next referred to, these being mechanical, chemical, electrical, and vital action, numerous illustrations being mentioned, remarking that whenever a body unites chemically with oxygen some heat is given off or becomes sensible. He proceeded to the effects of heat, touched on the difference between evaporation and vaporization, liquefaction and fusion. Expansion and contraction of solids, liquids, and gases were next dwelt upon, bismuth and indiarubber being exceptions to the general rule in the case of solids and waters amongst liquids; the important bearing this sole exception has on the Arctic regions he referred to, and then proceeded to the conduction of heat, which was treated in an exhaustive manner. The lecture concluded with a description of latent and specific heats, numerous simple, but illustrative, experiments being mentioned to show the presence of heat in its latent forms.

On the conclusion of the essay, which was attentively listened to, Messrs. Robb, Crail, and McKellar added some further remarks, and the meeting closed with the customary vote of thanks.

The British Association for the Advancement of Science.

ADDRESS TO THE CHEMICAL SECTION.

BY PROFESSOR W. C. ROBERTS-AUSTEN, C.B., F.R.S.

(*Continued from page* 243.)

In France, the country of so many metallurgists, men like Le Chatelier and Ditte are doing admirable service, by bringing the results of the labours and teaching of St. Claire Deville within the range of practical men. And if I do not refer more specifically to their work it is for want of space and not of appreciation, but a few simple cases of reversible actions will perhaps make the subject clear. In the blast-furnace the main reducing agent, carbonic oxide, is produced from the solid fuel by the reaction $CO_2 + C = 2CO$, a reaction which is theoretically impossible because it is endothermic, and would be attended by absorption of heat. But heat external to the system intervenes, and acts either by depolymerizing the carbon into a simpler form which can combine with oxygen of the CO_2 with evolution of heat, or by dissociating carbonic anhydride sets oxygen free which combines with the carbon. Reduction of oxide of iron in the blast furnace is mainly effected by carbonic oxide according to the well known reaction

$$Fe_2O_3 + 3CO = 2Fe + 3CO_2.$$

But the gas issuing from a blast-furnace contains carbonic oxide, an important source of heat. The view that this loss of carbonic oxide was due to the fact that the contact of the ore and the reducing gas was not sufficiently prolonged, led to a great increase in the height of blast-furnaces, but without, as Grüner showed, diminishing the proportion of carbonic oxide escaping from the throat. The reduction of an iron ore by carbonic oxide only takes place within certain well-defined limits, and a knowledge of the laws of chemical equilibrium would have saved thousands and thousands of pounds which have been wasted in building unduly high furnaces. I would add that large sums have also been sacrified in the vain attempt to smelt oxide of zinc in the blast furnace, for which operation patents have frequently been sought, in ignorance or defiance of the readiness with which the inverse action occurs, so that the reducing agent of carbon on oxide of zinc may be balanced by the re-oxidation of the reduced zinc by carbon anhydride, which is the product of the reduction. A further instance may be borrowed from an electro-chemical process which has been adopted for obtaining alloys of aluminium. As is well known, all attempts to affect the direct reduction of alumina by carbon have failed, because the reaction

$$2(Al_2O_3) + 3C = 4Al + 3CO_2$$

requires 783·2 calories, while only 291 calories would result from the conversion of carbon into carbonic anhydride, therefore the reaction cannot be effected; but in Cowle's process aluminium is nevertheless liberated when alumina is mixed with charcoal and strongly heated by the passage of an electric current. This result is due, not to a simple reduction of alumina, but to its dissociation at the high temperature produced by the passage of a current of 1600 ampères between carbon poles, the liberated aluminium being at once removed from the system by metallic copper which is simultaneously present and may not be without action itself.

An instance of the importance of these considerations is presented in the manufacture of steel by the basic process. Much care is devoted to obtaining conditions which will ensure not only the elimination, but the order of the disappearance of the impurities from the molten pig iron. In the basic process as conducted in the closed converter, the phosphorus does not disappear until the carbon has left the fluid bath, whilst, when the open-hearth furnace is used, the elimination of the phosphorus may be effected before that of the carbon, and it is asserted that if the carbon goes before the phosphorus is got rid of, a further addition of carbon is necessary. A curious and subtle case of chemical equilibrium is here presented. In the open-hearth furnace and Bessemer converter respectively, the temperatures and pressures are different, and the conditions as to the presentation of oxygen to the fluid bath are not the same. The result is that the relative rates of oxidation of the phosphorus and carbon are different in the two cases, although in either case, with a given method of working, there must be a ratio between the phosphorus and carbon in which they disappear simultaneously. The industrial bearing of the question is very remarkable. In the basic Bessemer process the tendency of the phosphorus to linger in the bath renders an "after-blow" necessary, it may be only of a few seconds' duration, but much iron is nevertheless burnt and wasted, and Mr. Gilchrist tells me that if this after-blow could be avoided, a saving of some 6 per cent of the yield of steel would be

effected annually, the value of which, at the present rate of output and price of steel, is no less than a quarter of a million sterling.

The volatization of sulphur in the converter while it is retained by the steel in the open-hearth furnace, and the increase in the percentage of manganese, which leaves the slag and returns to the bath of metal in the converter at the end of the "blow," will probably be traced to the disturbance of equilibrium which attends very slight variations in the conditions, especially as regards temperature and pressure, under which the operations are conducted.

In the blast-furnace the reducing action must be greatly dependent on the rate at which alkaline cyanides are formed, and Hempel has recently shown, by the aid of well-devised experiments, that the quantity of cyanides which may be obtained at a high temperature from carbon, nitrogen and alkaline oxides, increases as the pressure becomes greater.

Metallurgical chemistry is, in fact, a special branch of chemical science which does not comes within the ordinary sphere of the academic teaching of chemistry. It is often urged that metallurgical practice depends upon the application of chemical principles which are well taught in every large centre of instruction in this country, but a long series of chemical reactions exist which are of vital importance to the metallurgist, though they are not set forth in any British manual of chemistry, nor are dealt with in courses of purely chemical lectures. I feel bound to insist upon this point, because, as Examiner in Metallurgy for the Science and Art Department, I find that purely analytical and laboratory methods are so often given in the belief that they are applicable to processes conducted on a large scale, and at high temperatures.

We are told that technical instruction should be kept apart from scientific education, which consists in preparing the student to apply the results of past experience in dealing with entirely new sets of conditions, but it can be shown that there is a whole side of metallurgical teaching which is truly educational, and leads students to acquire the habit of scientific thought as surely as the investigation of any other branch of knowledge.

It is, in fact, hardly possible in a course of theoretical chemistry to devote much attention to specific cases of industrial practice in which reactions are incomplete, because they are limited by the presence of bodies that cannot be directly eliminated from the chemical system. Take, for instance, the long series of reactions studied by Plattner, whose published the results of his investigations in his celebrated treatise, 'Die Metallurgische Röstprozesse,' Freiberg, 1856, whose work I have chosen as a starting-point, on account of our presence in South Wales near the great copper smelting district of Swansea. A complex sulphide, of which copper is the main metallic constituent, contains some 50 ounces of silver to the ton. The problem may be supposed for the present to be limited to the extraction of the precious metal from the mass in which it is hidden, and the student deriving his knowledge from an excellent modern chemical treatise would find the case thus stated:—

"Ziervogel's process depends upon the fact that when argentiferous copper pyrites is roasted, the copper and iron sulphides are converted into insoluble oxides, whilst the silver is converted into a soluble sulphate which is dissolved out by lixiviating the roasted ore with hot water, the silver being readily precipitated from this solution in the metallic state."

It is certain that if an observant, chemically-trained student visited a silver extraction works, and possessed sufficient analytical skill to enable him to secure evidence as to the changes that occur, he would find a set of facts which his training had not enabled him to predict, and he would establish the existence of a set of reactions to the nature of which his chemical reading had hardly given him a clue. The process to be considered is a simple one, but it is typical, and applies to a large proportion of the 7,000,000 ounces of silver annually obtained in the world from cupriferous compounds. He would be confronted with a ton or more of finely divided material, spread in a thin layer over the bed of a reverberatory furnace. Suppose the material is what is known as a complex regulus as imported into Swansea or produced at Freiberg, to which are added rich native sulphides. The mixture then consists of sulphides mainly of iron and copper, with some sulphide of lead, and contains 50 or 60 ounces of silver to the ton, and a few grains of gold. It may also contain small quantities of arsenic and antimony as arsenides, antimonides, and sulpho-salts, usually with copper as a base.

The temperature of the furnace in which the operation is to be performed is gradually raised, the atmoshere being an oxidizing one. The first effect of the elevation of the temperature is to distil off sulphur, reducing the sulphides to a lower stage of sulphurization. This sulphur burns in the furnace atmosphere to sulphurous anhydride (SO_2), and coming in contact with the material undergoing oxidation is converted into sulphuric anhydride (SO_3). It should be noted that the material of the brickwork does not intervene in the reactions, except by its presence as a hot porous mass, but its influence is, nevertheless, considerable. The roasting of these sulphides presents a good case for the study of chemical equilibrium. As soon as the sulphurous anhydride reaches a certain tension the oxidation of the sulphide is arrested, even though an excess of oxygen be present, and the oxidation is not resumed until the action of the draught changes the conditions of the atmosphere of the furnace, when the lower sulphides remaining are slowly oxydized, the copper sulphide being converted into copper sulphate mainly by the intervention of the sulphuric anhydride formed as indicated. Probably by far the greater part of the iron sulphide only becomes sulphate for a very brief period, being decomposed into the oxides of iron, mainly ferric oxide, the sulphur passing off. Any silver sulphide that is present would have been converted into metallic silver at the outset were it not for the simultaneous presence of other sulphides, notably those of copper and of iron, which enables the silver sulphide to become converted into sulphate. The lead sulphide is also converted into sulphate at this low temperature. The heat is now raised still further with a view to split up the sulphate of copper, the decomposition of which leaves oxide of copper. If, as in this case, the bases are weak, the sulphuric anhydride escapes mainly as such; but when the sulphates of stronger bases are decomposed the sulphuric anhydride is to a great extent decomposed into a mixture of sulphurous anhydride and oxygen. The sulphuric anhydride, resulting from the decomposition of this copper sulphate, converts the silver into sulphate, and maintains as such, just as, in turn, at a lower temperature, the copper itself had been maintained in the form of sulphate by the sulphuric anhydride eliminated from the iron sulphide. When only a little of the copper sulphate remains undecomposed, the silver sulphate begins to split up, and the furnace charge must therefore be immediately withdrawn, or the whole of the silver sulphate would be converted into metallic silver, partly by the direct action of heat alone, and partly by reactions such as those shown in the following equations:—

$$Ag_2SO_4 + 4Fe_3O_4 = 2Ag + 6Fe_2O_3 + SO_2$$
$$Ag_2SO_4 + Cu_2O = 2Ag + CuSO_4 + CuO.$$

If the charge were not withdrawn, the silver would thus be effectually removed from the solvent action of water, and the smelter's efforts would have failed entirely. The charge still contains lead sulphate,

which cannot be completely decomposed at any temperature attainable in the roasting furnace, except in the presence of silica, and it is well to leave it where it is if the residue has subsequently to be smelted with a view to the extraction of the gold. The elimination of arsenic and antimony gives rise to problems of much interest, and again confronts the smelter with a case of chemical equilibrium. For the sake of brevity it will be well for the present to limit the consideration to the removal of antimony, which may be supposed to be present as sulphide. Some sulphide of antimony is distilled off, but this is not its only mode of escape. An attempt to remove antimony by rapid oxidation would be attended with the danger of couverting it into insoluble antimoniates of the metals present in the charge. In the early stages of the roasting it is therefore necessary to employ a very low temperature, and the presence of steam is found to be useful as a source of hydrogen, which removes sulphur as hydrogen sulphide, the gas being freely evolved. The reaction

$$Sb_2S_3 + 3H2 = 3H_2S + 2Sb$$

between hydrogen and sulphide of antimony is, however, endothermic, and could not, therefore, take place without the aid which is afforded by external heat. The facts appear to be as follows: sulphide of antimony, when heated, dissociates, and the tension of the sulphur vapour would produce a state of equilibrium if the sulphur thus liberated were not seized by the hydrogen and removed from the system. The equilibrium is thus destroyed and fresh sulphide is dissociated. The general result being that the equilibrium of the system is continually restored and destroyed until the sulphide decomposed. The antimony combines with oxygen and escapes as volatile oxide, as does also the arsenic, a portion of which is volatilised as sulphide.

The main object of the process which has been considered is the formation of soluble sulphate of silver. If arsenic and antimony have not been eliminated, their presence at the end of the operation would be specially inconvenient, as they give rise to the formation of arseniate and antimoniate of silver, insoluble in water, which may necessitate the treatment of the residues by an entirely different process from that which has hitherto been considered.

It will have been evident that effecting this series of changes demands the exercise of the utmost skill, care, and patience. The operations beginning at a dull red heat, or a temperature of some 500°, are completed at 700°, within a range, that is, of 200°. Judicious stirring has been necessary to prevent the formation of crusts of sulphates, which would impede the reactions, and, as has been shown, an undue elevation of temperature within a very limited range would, at any stage, have been fatal to the success of the operation It is difficult to appreciate too highly the delicacy of sight and touch which enables an operator to judge by the aid of rough tests, but mainly from the tint of the streak revealed when the mass is rabbled, whether any particular stage has or has not been reached, and it will be obvious that the requisite skill is acquired solely by observation and experiment. The technical instructor may impart information as to the routine to be followed, and the appearances to be observed, but scientific knowledge of a high order can alone enable the operator to contend with the disturbing influences introduced by the presence of unexpected elements or by untoward variations in temperature. In the training of a metallurgist it is impossible to separate education from instruction, and the above description of a very ordinary operation will show the intimate relations between science and practice which are characteristic of metallurgical operations. Practice is dependent on science for its advancement, but scientific workers too often hesitate to attack metallurgical problems, and to devote the resources of modern investigation to their solution, because they are not aware of the great interest of the physical and chemical problems which are connected with many very simple metallurgical processes, especially with those that are conducted at high temperatures.

Proceeding yet one step further, suppose that the copper smelter takes possession of the residual mass, consisting mainly of oxide of copper, he would smelt it with fresh sulphide ores and obtain, as a slag from the earthy matters of the ore, a ferrous silicate containing some small proportion of copper. The displacement of the copper from this silicate may be effected by fusing it with sulphide of iron, a fusible sulphide of iron and copper being formed which readily separates from the slag. By this reaction some twenty thousand tons of copper are added to the world's annual production. Proceeding a step further, suppose the smelter to have reduced his copper to the metallic state. If arsenic had been originally present in the ore, and had not been eliminated entirely in the roasting, extraordinary difficulties will be met with in the later stages of the process, in extracting small quantities of arsenic which resist the smelter's efforts. Copper, moreover, containing arsenic cannot be "overpoled," as the presence of arsenic hinders the reducing action of gases on the copper. The amount of arsenic which the copper smelter has to remove may vary from mere traces up to one per cent., and if the copper is destined for the use of the electrical engineer, he will insist on its being as pure as possible, for the presence of a trace of arsenic would materially increase the electrical resistance of the copper, and would be fatal to its use in submarine telegraphy. If, on the other hand, the copper is intended for the maker of locomotive fire-boxes, he will encourage the retention of small quantities of arsenic, as it is found to actually increase the endurance of the copper, and the smelter will in such a case have no inducement to employ the basic furnace lining which Mr. Gilchrist has offered him, nor will he care to use the special methods for the removal of arsenic with which he is familiar. It may all seem simple enough, but the modern process of copper smelting has been laboriously built up, and has a long and interesting pedigree which may be traced to at least the eighth century, when Geber described the regulus "coarse metal" as being "black mixed with livid," and our familiar "blue metal" as being "of a most clean and pleasant violet colour," and indicated the reason for the difference.

(3) The foregoing instances have been given to indicate the general nature of metallurgical chemistry. It will be well now to show how the great advances in metallurgical practice have been made in the past, with a view to ascertain what principles should guide us in the future.

It is a grave mistake to suppose that in industry, any more than in art, national advance takes place always under the guidance of a master possessed of some new gift of invention, yet we have been reminded that we are apt to be reverent to these alone, as if the nation had been unprogressive and suddenly awakened by the genius of one man. The way for any great technical advance is prepared by the patient acquisition of facts by investigators of pure science. Whether the investigators are few or many, and consequently whether progress is slow or rapid, will depend in no small measure on the spirit of the nation as a whole. A genius whose practical order of mind enables him to make some great invention suddenly arises, apparently by chance, but his coming will, in most cases, be found to have "followed hard upon" the discovery by some scientific worker of an important fact, or even the accurate determination of a set

of physical constants. No elaborate monograph need have reached the practical man—a newspaper paragraph, or a lecture at a mechanics' institute, may have been sufficient to give him the necessary impulse; but the possessors of minds which are essentially practical, often forget how valuable to them have been the fragments of knowledge they have so insensibly acquired that they are almost unconscious of having received any external aid.

The investigating and the industrial faculty are sometimes, though rarely, united in one individual. Rapid advance is often made by those who are untrammelled by a burden of precedent, but it should be remembered that though the few successes, which have been attained in the course of ignorant practice, may come into prominence, none of the countless failures are seen.

I would briefly direct attention to certain processes which have been adopted since the year 1849, when Dr. Percy presided over this Section at Birmingham, a great metallurgical centre. In that year the President of the Association made a reference to metallurgy, a very brief one, for Dr. Robinson only said "the manufacture of iron has been augmented six-fold by the use of the puddling-furnace and the hot-blast, both gifts of theory:" and so, it may be added, are most of the important processes which have since been devised. Take the greatest metallurgical advance of all, the Bessemer process, which has probably done more than any other to promote the material advance of all countries. It was first communicated to the world at the Cheltenham Meeting of the British Association, 1856. Its nature is well known, and I need only say that it depends on the fact that when air is blown through a bath of impure molton iron, sufficient heat is evolved by the rapid combustion of silicon, manganese, and carbon to maintain the bath fluid after these elements have been eliminated, there being no external source of heat, as there is in the puddling furnace or the refinery hearth. We have recently been told that at an early and perilous stage of the Bessemer process confidence in the experiments was restored by the observation that the temperature of the "blown" metal contained in a crucible was higher than that of the furnace in which it was placed. The historian of the future will not fail to record that the way for the Bessemer process had been prepared by the theoretical work of Andrews, 1848, and of Favre and Silbermann, 1852, whose work on the calorific power of various elements showed that silicon and phosphorus might be utilised as fuel, because great heat is engendered by their combustion.

The basic process for removing phosphorus, a process of great national importance, the development of which we owe to Thomas and Gilchrist, is entirely the outcome of purely theoretical teaching, in connection with which the names of Gruner and Percy deserve special mention. In the other great group of processes for the production of steel, those in which Siemens' regenerative furnace is employed, we have the direct influence of a highly trained theorist, who concluded his address as President of this Association in 1882 by reminding us that "in the great workshop of nature there is no line of demarcation to be drawn between the most exalted speculation and commonplace practice." The recent introduction of the method of heating by radiation is, of course, the result of purely theoretical considerations.

The progress in the methods of extracting the precious metals has been very great, both on the chemical and engineering sides, but it is curious that in the metallurgy of gold and silver, many ancient processes survive which were arrived at empirically,—a noteworthy exception being presented by the chlorine process for refining gold, by the aid of which many millions sterling of gold have been purified. The late Mr. H. B. Miller based this process for separating silver from gold on the knowledge of the fact that chloride of gold cannot exist at a bright red heat. The tension of dissociation of chloride of gold is high, but the precious metal is not carried forward by the gaseous stream, at least not while chloride of silver is being formed.

The influence of scientific investigation is, however, more evident in that portion of the metallurgic art which deals with the adaptation of metals for use, rather than with their actual extraction from the ores.

Only sixteen years ago Sir Nathaniel Barnaby, then Director of Naval Construction, wrote, "our distrust of steel is so great that the material may be said to be altogether unused by private ship-builders . . . . and marine engineers appear to be equally afraid of it." He adds, "the question we have to put to the steel makers is, what are our prospects of obtaining a material which we can use without such delicate manipulation and so much fear and trembling?" All this is changed, for, as Mr. Elgar informs me, in the year ending on June 30 last, no less than 401 ships, of three quarters of a million gross tonnage, were being built of steel in the United Kingdom.

Why is it, then, that steel has become the material on which we rely for our ships and for our national defence, and of which such a splendid structure as the Forth Bridge is constructed? It is because, side by side with great improvement in the quality of certain varieties of steel, which is the result of using the open-hearth process, elaborate researches have shown what is the most suitable mechanical and thermal treatment for the metal; but the adaptation of steel for industrial use is only typical, as the interest in this branch of metallurgy generally, appears for the moment to be centred in the question whether metals can, like many metalloids, pass under the application of heat or mechanical stress from a normal state to an allotropic one, or whether metals may even exist in numerous isomeric states.

It is impossible to deal historically with the subject now further than by stating that the belief of more than one "modification" is old and widespread, and was expressed by Paracelsus, who thought that copper "contains in itself its female," which could be isolated so as to give "two metals" . . . . "different in their fusion and malleability" as steel and iron differ. Within the last few years Schützenberger has shown that two modifications of copper can exist, the normal one having a density of 8·95, while that of the allotropic modification is only 8·0, and is moreover rapidly attacked by dilute nitric acid which is without action on ordinary copper. It may be added that Lord Rayleigh's plea for the investigation of the simpler chemical reactions has been partly met, in the case of copper, by the experiments conducted by V. H. Veley on the conditions of chemical change between nitric acid and certain metals.

Bergmann, 1781, actually calls iron polymorphous, and says that it plays the part of many metals. "Adeo ut jure dici queat polymorphum ferrum plurium simul metallorum vices sustinere." Osmond has recently demonstrated the fact that at least two modifications of iron must exist.

Professor Spring, of Liége, has given evidence that in cooling lead-tin alloys polymerization may take place after the alloys have become solid, and it seems to be admitted that the same cause underlies both polymerization and allotropy. The phenomenon of allotropy is dependent upon the number of the atoms in each molecule, but we are at present far from being able to say what degree of importance is to be attached to the relative distance between the atoms of a metal or to the "position of one and the same atom" in a metallic molecule, whether the metal be alloyed or free, and it must be admitted that in this respect

organic chemistry is far in advance of metallurgical chemistry. I cannot as yet state what is the atomic grouping in the brilliantly coloured gold-aluminium alloy $AuAl_2$, which I had the good fortune to discover, but, in it, the gold is probably present in the same state as that in which it occurs in the purple of cassius.

Much valuable information on the important question of allotropy in metals has already been gathered by Pionchon, Ditte, Moissan, Le Chatelier, and Osmond, but reference can only be made to the work of the two latter. Le Chatelier concludes that in metals which do not undergo molecular transformation the electrical resistance increases proportionally to the temperature. The same law holds good for other metals at temperatures above that at which their last change takes place, for example in the case of nickel above 340°, and in that of iron above 850°.

It is probable that minute quantities of foreign matter which profoundly modify the structure of masses of metal also induce allotropic changes. In case of the remarkable action of impurities upon pure gold I have suggested that the modifications which are produced may have direct connection with the periodic law of Mendeleeff, and that the causes of the specific variations in the properties of iron and steel may thus be explained. The question is of great industrial importance, especially in the case of iron; and Osmond, whose excellent work I have already brought before the members of this Association in a lecture delivered at Newcastle in 1889, has specially studied the influence upon iron exerted by certain elements. He shows that elements whose atomic volumes are smaller than that of iron delay, during the cooling of a mass of iron from a red heat, the change of the β, or hard variety of iron to the α, or soft variety. On the other hand, elements whose atomic volumes are greater than that of iron tend to hasten the change of β to α iron. It is, however, unnecessary to dwell upon this subject, as it was dealt with last year in the Address of the President of the Association.

It may be added that the recent use of nickel-steel for armour plate and the advocacy of the use of copper-steel for certain purposes, is the industrial justification of my own views as to the influence of the atomic volume of an added element on the mechanical properties of iron, and it is remarkable that the two bodies, silicon and aluminium, the properties of which when in a free state are so totally different, should, nevertheless, when they are alloyed with iron, affect it in the same way. Silicon and aluminium have almost the same atomic volumes.

The consequences of allotropic changes, which result in alteration of structure are very great. The case of the tin regimental buttons which fell into a shapeless heap whon exposed to the rigorous winter at St. Petersburg is well known. The recent remarkable discovery by Hopkinson of the changes in the density of nickel-steel (containing 22 per cent. of nickel) which are produced by cooling to 30°, affords another instance. This variety of steel, after being frozen, is readily magnetizable, although it was not so before; its density, moreover, is permanently reduced by no less than 2 per cent. by the exposure to cold; and it is startling to contemplate the effect which would be produced by a visit to the arctic regions of a ship of war built in a temperate climate of ordinary steel and clad with some three thousand tons of such nickel-steel armour; the shearing which would result from the expansion of the armour by exposure to cold would destroy the ship. Experimental compound armour-plates have been made faced with 25 per cent. nickel-steel, but it remains to be seen whether a similar though lessened effect would be produced on the steel containing 5 to 7 per cent. of nickel, specially studied by J. Riley, the use of which is warmly advocated for defensive purposes. Further information as to the molecular condition of nickel steel has within the last few weeks been given by Mercadier, who has shown that alloying iron with 25 per cent. of nickel renders the metal isotropic.

The molecular behaviour of alloys is indeed most interesting. W. Spring has shown, in a long series of investigations, that alloys may be formed at the ordinary temperature, provided that minute particles of the constituent metals are submitted to great pressure. W. Hallock has recently given strong evidence in favour of the view that an alloy can be produced from its constituent metals with but slight pressure if the temperature to which the mass is submitted be above the melting point of the alloy, even though it be far below the melting point of the most easily fusible constituent. A further instance is thus afforded of the fact that a variation of either temperature or pressure will effect the union of solids. It may be added that B. C. Damien is attempting to determine what variation in the melting point of alloys is produced by fusing them under a pressure of two hundred atmospheres. Italian physicists are also working on the compressibility of metals, and F. Boggio-Lera has recently established the existence of an interesting relation between the co-efficient of cubic compressibility, the specific gravity, and the atomic weight of metals.

Few questions are more important than the measurement of very high temperatures. Within the last few years H. le Chatelier has given us a thermo-couple of platinum with platinum containing 10 per cent. of rhodium, by the aid of which the problem of the measurement of high temperatures has been greatly simplified. A trustworthy pyrometer is now at hand for daily use in works, and the liberality of the Institution of Mechanical Engineers has enabled me to conduct an investigation which has resulted in the adoption of a simple appliance for obtaining, in the form of curves, photographic records of the cooling of masses of metal. A report on the subject has already been submitted to a Committee, of which the Director-General of Ordnance Factories is the Chairman; and Dr. Anderson, to whom I am indebted for valuable assistance and advice, intends to add this new method for obtaining autographic curves of pyrometric measurements to the numerous self-recording appliances used in the Government factories which he controls. It has proved to be easy to ascertain, by the aid of this pyrometer, what thermal changes take place during the cooling of molten masses of alloys, and it is possible to compare the rate of cooling of a white-hot steel ingot at definite positions situated respectively near its surface and at its centre, and thus to solve a problem which has hitherto been considered to be beyond the range of ordinary experimental methods. Some of the curves already obtained are of much interest and will be submitted to the Section. It is probable that the form of the curve which represents the solidification and cooling of a mass of molten metal affords an exceedingly delicate indication as to its purity.

Professor H. E. Armstrong holds that the molecules of a metal can unite to form complexes with powers of coherence which vary with the presence of impurity. Crookes by a recent beautiful investigation has taught us how electrical evaporation of solid metals may be set up *in vacuo*, and has shown that even an alloy may be decomposed by such means. We may hope that such work will enable us to understand the principles on which the strength of materials depend.

Before leaving the consideration of questions connected with the molecular constitution of metals I would specially refer to the excellent work of Heycock and Neville, who have extended to certain metals with low melting-points Raoult's investigations on the effect of impurity on the lowering of the freezing-point of solids. With the aid of one of my own students, H. C. Jenkins, I have further extended the experiments by

studying the effect of impurity on the freezing-point of gold. Ramsay, by adopting Raoult's vapour-pressure method, has been led to the conclusion that when in solution in mercury the atom of a metal is, as a rule, identical with its molecule. The important research on the liquation of alloys has been extended by E. Matthey to the platinum-gold and palladium-gold series, in which the manipulation presented many difficulties; and E. J. Ball has studied the cases presented by the antimony-copper-lead series. Dr. Alder Wright has continued his own important investigation upon ternary alloys, and A. P. Laurie has worked on the electro-motive force of the copper-zinc and copper tin and gold-tin series, a field of research which promises fruitful results.

In no direction is advance more marked than in the mechanical testing of metals, in which branch of investigation this country, guided by Kirkaldy, undoubtedly took the leading part, and in connection with which Kennedy and Unwin have established world-wide reputations. I would also specially mention the work which has been carried on at the Government testing works at Berlin under Dr. Wedding, and the elaborate investigations conducted at the Watertown Arsenal, Massachusetts, not to mention the numerous continental testing laboratories directed by such men as Bauschinger, Jenny and Tetmajer. Perhaps the most important recent work is that described by Professor Martens, of Berlin, on the influence of heat on the strength of iron.

I might have dealt at length on all these matters without doing half the service to metallurgy that I hope to render by earnestly pleading for the more extended teaching of the subject throughout the country, and for better laboratories, arranged on the model of engineering laboratories, in which the teaching is conducted with the aid of complete, though small "plant." The Science and Art Department has done great and lasting service by directing that metallurgy shall be taught practically, but much remains to be done. With regard to laboratories in works, which are too often mere sheds, placed, say, behind the boiler-house, when may we hope to rival the German chemical firm which has recently spent £19,000 upon its laboratories, in which research will be vigorously conducted? There is hardly any branch of inorganic chemistry which the metallurgist can afford to neglect, while many branches, both of physics and mechanics, are of utmost importance to him.

The wide range of study upon which a metallurgical student is rightly expected to enter is leading, it is to be feared, to diminution in the time devoted to analytical chemistry, and this most serious question should be pressed upon the attention of all who are responsible for the training of our future chemists. There can be no question that sufficient importance is not attached to the estimation of "traces," an analysis being considered to be satisfactory if the constituents found add up to 99·9, although a knowledge as to what elements represent the missing 0·1 may be more useful in affording an explanation of the defects in a material than all the rest of the analysis. This matter is of growing interest to practical men, and may explain their marked preference for chemists who have been trained in works, to those who have been educated in a college laboratory.

The necessity for affording public instruction in mining and metallurgy, with a view to the full development of the mineral wealth of a nation, is well known. The issues at stake are so vast, that in this country it was considered desirable to provide a centre of instruction in which the teaching of mining and metallurgy should not be left to private enterprise or even entrusted to a corporation, but should be under the direct control of the Government. With this end in view, the Royal School of Mines was founded in 1851, and has supplied a body of well-trained men who have done excellent service for the country and her colonies. The Government has recently taken a step in advance, and has further recognized the national importance of the teaching of mining and metallurgy by directing that the School of Mines shall be incorporated with the Royal College of Science, which is, I believe, destined to lead the scientific education of the nation.

It is to be feared that as regards metalliferous mining our country has seen its best days, but the extraordinary mineral wealth of our colonies has recently been admirably described by my colleague, Professor Le Neve Foster, in the inaugural lecture he delivered early in the present year on his appointment to the chair so long held by Sir Warrington Smyth ('Engineering,' vol. li., p. 200 *et seq.*). We shall, however, be able to rightly estimate the value of our birthright when the Imperial Institute is opened next year, and the nation will have reason to be grateful to Sir Frederic Abel for the care he is devoting to the development of this great institution, which will become the visible exponent of the splendours of our Indian and colonial resources, as well as a centre of information.

The rapid growth of technical literature renders it unnecessary for a president of a Section to devote his address to recording the progress of the subject he represents. As regards the most important part of our national metallurgy, this has, moreover, been admirably done by successive Presidents of the Iron and Steel Institute, but it may have been expected that references would have been made to the main processes which have been adopted since Percy occupied this chair in 1849. I have not done so, because an enumeration of the processes would have been wholly inadequate, and a description of them impossible in the time at my disposal. Nevertheless, it may be well to remind the Section of a few of the more prominent additions the art has received in the last half century, and to offer a few statements to show the magnitude on which operations are conducted. As regards iron, in the last twenty-five years the price of steel has been reduced from £55 per ton to £5 per ton, but, after giving the world the inestimable boon of cheap steel by the labours of Bessemer and of Siemens, we were somewhat slow to accept the teaching of experiment as to the best method of treating the new material; on the other hand, Hadfield has brought manganese steel and aluminium steel within the reach of the manufacturer, and J. Riley has done much to develop the use of nickel steel.

In the case of copper, we have mainly contributed to extraordinary development of wet processes for its extraction from poor sulphides, and have met the great demands for pure metal by the wide adoption of electrolytic processes.

As regards the precious metals, this country is well to the front, for Great Britain and her colonies produce about 38 per cent. of the gold supply of the world; and it may be well to add, as an indication of the scale on which operations are conducted, that in London alone one ton of gold and 5 tons of silver bullion can easily be refined in a day. No pains have been spared in perfecting the method of assay by which the value of gold and silver is ascertained, and during my twenty years' connection with the Royal Mint I have been responsible for the accuracy of the standard fineness of no less than five hundred and fifty-five tons of gold coin, of an aggregate value of seventy millions, five hundred thousand pounds sterling. In the case of the platinum industry we owe its extraordinary development to the skill and enterprise of successive members of the firm of Johnson, Matthey, and Co., who in later years have based their operations upon the results of the investigations of Deville and Debray. Some indication of the value of the material dealt

with may be gathered from the statement that two and a half hundredweight of platinum may easily be melted in a single charge, and that the firm, in one operation, extracted a mass of palladium valued at £30,000 from gold-platinum ore actually worth more than a million sterling,

I wish it were possible to record the services of those who have advanced metallurgy in connection with this Association, but the limitations of time render it difficult to do more than refer to some honoured names of past presidents of this Section. Michael Faraday, President of this Section in 1837 and 1846, prepared the first specimen of nickel-steel, an alloy which seems to have so promising a future, but we may hardly claim him as a metallurgist; nor should I be justified in referring, in connection with metallurgical research, to my own master, Graham, President of this Section in 1839, and again in 1844, were it not that his experiments on the occlusion of gases by metals have proved to be of such extraordinary practical importance in connection with the metallurgy of iron. Sir Lyon Playfair presided over this Section in 1855, and again in 1859. His work in connection with Bunsen on the composition of blast-furnace gases was published in the Report of this Association in 1847, and formed the earliest of a group of researches, amongst which those of Sir Lowthian Bell proved to be of so much importance. The latter was President of this Section in 1889. Sir F. Abel, President of this Section in 1877, rendered enduring service to the Government by his elaborate metallurgical investigations, in connection with materials used for guns and projectiles, as well as for defensive purposes. I will conclude this section of the address by a tribute to the memory of Percy. He may be said to have created the English literature of metallurgy, to have enriched it with the records of his own observations, and to have revived the love of our countrymen for metallurgical investigation. His valuable collection of specimens, made while Professor at the Royal School of Mines, is now appropriately lodged at South Kensington, and will form a lasting memorial of his labours as a teacher. He exerted very noteworthy influence in guiding the public to a just appreciation of the labours of scientific men, and he lived to see an entire change in the tone of the public press in this respect. In the year of Percy's presidency over this Section the *Times* gave only one-tenth of a column to a summary of the results of the last day but one of the meeting, although the usual discourse delivered on the previous evening had been devoted to a question of great importance—"The Application of Iron to Railway Purposes." Space, was, however, found for the interesting statement that "the number of Quakeresses who attended the meetings of the Sections was not a little remarkable." Compare the slender record of the *Times* of 1849 with its careful chronicle of the proceedings at any recent meeting of the Association.

In drawing this address to a close, I would point to the great importance of extending the use of the less known metals. Attention is at present concentrated upon the production of aluminium, and reference has already been made to the Cowle's process, in which, as in that of Héroult, the reduction of alumina is effected by carbon, at the very high temperature of the electric arc; while, on the other hand, in the Kleiner and similar processes, the electric current acts less as a source of heat than by decomposing a fluid bath, the aluminium being isolated by electrolytic action; and doubtless, in the immediate future, there will be a rapid increase in the number of metallurgical processes that depend on reactions which are set up by submitting chemical systems to electric stress. Incidental reference should be made to the growing importance of sodium, not only in cheapening the production of aluminium, but as a powerful weapon of research. In 1849, when Percy was President of this section, magnesium was a curiosity; now its production constitutes a considerable industry. We may confidently expect to see barium and calcium produced on a large scale as soon as their utility has been demonstrated by research. Minerals containing molybdenum are not rare; and the metal could probably be produced as cheaply as tin, if a use were to be found for it. The quantities of vanadium and thallium which are available are also far from inconsiderable; but we, as yet, know little of the action of any of these metals when alloyed with others which are in daily use. The field for investigation is vast indeed, for it must be remembered that valuable quantities may be conferred on a mass of metal by a very small quantity of another element. The useful qualities imparted to platinum by iridium are well known. A small quantity of tellurium obliterates the crystalline structure of bismuth; but we have lost an ancient art, which enabled brittle antimony to be cast into useful vessels. Two-tenths per cent. of zirconium increases the strength of gold enormously, while the same amount of bismuth reduces the tenacity to a very low point. Chromium, cobalt, tungsten, titanium, cadmium, zirconium and lithium are already well known in the arts, and the valuable properties which metallic chromium and tungsten confer upon steel are beginning to be generally recognized, as the last exhibition at Paris abundantly showed; but as isolated metals we know but little of them. Is the development of the rarer metals to be left to other countries? Means for the prosecution of research are forthcoming, and a rich reward awaits the labours of chemists who could bring themselves to divert their attention, for even a brief period, from the investigation of organic compounds, in order to raise alloys from the obscurity in which they are at present left.

It must not be forgotten that metallurgical enterprise rests on (1) scientific knowledge, (2) capital, and (3) labour, and that if the results of industrial operations are to prove remunerative, much must depend on the relation of these three elements, though it is difficult to determine accurately their relative importance. A modern ironworks may have an army of ten thousand workmen, and commercial success or failure will depend in no small measure on the method adopted in organizing the labour. The relations between capital and labour are of so much interest at the present time, that I do not hesitate to offer a few words on the subject.

Many examples might be borrowed from metallurgical enterprises in this and other countries to show that their nature is often precarious, and that failure is easily induced by what appears to be comparatively slight causes. Capitalists might consequently tend to select government securities for investment in preference to metallurgical works, and the labouring population would then severely suffer. It is only reasonable, therefore, that if capitalists are exposed to great risks, they should, in the event of success, receive the greater part of the profits. There is a widespread feeling that the interests of capital and labour must be antagonistic, and as it is impossible to ignore the fact that the conflict between them is giving rise to a grave apprehension, it becomes the duty of all who possess influence to strive not merely for peace, but to range themselves on the side of justice and humanity. The great labour question cannot be solved except by assuming as a principle that private ownership must be held inviolable, but it must be admitted that there was a time when capital had become arbitrary and some kind of united action on the part of workmen was needed in self-defence. If, however, we turn to the action of the leaders of trades unions in the recent lamentable strikes, we are presented with a picture

which many of us can only view as that of tyranny of the most close and oppressive kind, in which individual freedom cannot be recognized. There are hundreds of owners of works who long to devote themselves to the true welfare of those they employ, but who can do little against the influence of the professional agitator, and are merely saddened by contact with prejudice and ignorance. I believe the view to be correct that some system by which the workman participates in the profits of enterprise will afford the most hope of putting an end to labour disputes, and we are told that profit sharing tends to destroy the workmen's sense of social exclusion from the capitalistic board, and contents him by elevating him from the precarious position of a hired labourer. No pains should therefore be spared in perfecting a system of profit sharing.

Pensions for long service are great aids to patience and fidelity, and very much may be hoped from the fact that strenuous efforts are being made by men really competent to lead. The report of the Labour Commission which is now sitting will be looked for with keen interest. Watchful care over the health, interests and instruction of the employed is exercised by many owners of works; and in this respect the Dowlais works, which are being transplanted into our midst at Cardiff, have long presented a noteworthy example. Workmen must not forget that the choice of their own leaders is in their own hands, and on this the future mainly depends. "We may lay it down as a perpetual law that workmen's associations should be so organized and governed as to furnish the best and most suitable means for attaining what is aimed at, that is to say, for helping each individual member to better his condition to the utmost in body, mind and property." The words will be found in the Enclyclical letter which Pope Leo XIII. has recently issued on the "Condition of Labour." To me it is specially interesting that the Bishop of Rome in his forcible appeal again and again cites the opinion of St. Thomas Aquinas, who was a learned chemist as well as a theologian.

Those of us who realise that "the higher mysteries of being, if penetrable at all by human intellect, require other weapons than those of calculation and experiment," should be fully sensible of our individual responsibility. Seeing that the study of the relations between capital and labour involve the consideration of the complex problems of existence, the solution of which is at present hidden from us, we shall feel with Andrew Lang, that "where, as matter of science, we know nothing, we can only utter the message of our temperament." My own leads me to hope that the patriotism of the workmen will prevent them from driving our national industries from these shores, and I would ask those to whom the direction of the metallurgical works of this country is confided, to remember that we have to deal both with metals and with men, and have reason to be grateful to all who extend the boundaries, not only of our knowledge, but also of our sympathy.

Parliamentary and Law Proceedings.

Prosecution under the Sale of Food and Drugs Act.

At the Thames police-court, Christopher Pelham Maitland, a chemist and druggist, of 233, East India Dock Road, appeared to answer a summons, taken out by the Poplar District Board of Works under the Sale of Food and Drugs Act, for selling spirit of nitrous ether deficient in nitrous ether.

Mr. George Hay Young, solicitor, prosecuted.

Mr. A. Shadrake, sanitary inspector to the Poplar Board of Works, stated that on the 9th ult. he purchased 4ozs. of nitrous ether at defendant's shop. After completing the purchase, witness told the shopman that the ether was to be analyzed by the public analyst. He now produced the analyst's certificate showing the ether to be deficient in nitrous ether to the extent of 40 per cent.

Defendant, in answer to the charge, said that spirit of nitrous ether was the most variable article that could be sold in a chemist's shop. It was almost impossible to get it at the proper standard, as it evaporated every time the bottle was opened, and especially so in his neighbourhood, where the drug was sold in very small quantities. The spirit would gradually evaporate to the extent of 40 per cent.

Mr. Kennedy considered that the justice of the case would be satisfied by defendant's paying the costs—£1 3s.

Review.

Contributions to Practical Medicine. By Sir James Sawyer. Second Edition.*

The present edition of this interesting and useful volume contains two additional essays, one on that difficult and common affection known as gastralgia, and the other an account of some researches which the author has conducted on the use of ether as a menstruum in medication by the skin.

The aim of the book is, as Sir James Sawyer states in the preface, "utility in medical practice," and this phrase admirably sets forth the character of the book, for useful hints and suggestions abound on almost every page, and are clearly the outcome of close clinical observation, a firm belief in the efficacy of drugs in appropriate cases and great personal experience. Especially valuable are the chapters on the cause and cure of insomnia, the treatment of the severer forms of constipation, the treatment of gastralgia and medication by the skin. Those who are inclined to be sceptical as to the usefulness of drugs will do well to peruse the chapters just mentioned, and every practitioner who reads the experiences related in this book will feel grateful that the distinguished Birmingham physician has been so considerate as to publish, in this interesting form, the results of his great experience.

BOOKS RECEIVED.

The Principles of Chemistry. By D. Mendeléef. Translated from the Russian (fifth edition) by George Kamensky; edited by A. J. Greenaway. In two volumes. London: Longmans, Green and Co. 1891. From the Publishers.

An Introduction to Chemical Theory. By Alexander Scott, M.A., D.Sc. London: A. and C. Black. From the Publishers.

Elementary Inorganic Chemistry. By A. Humboldt Sexton, F.R.S.E., etc. New edition. London: Blackie and Son. 1891. From the Publishers.

Burdett's Hospital Annual and Year-Book of Philanthropy, 1891–1892. London: The Hospital, Limited. From the Publishers.

Golden Rules of Surgical Practice: for the Use of Dressers and Junior House Surgeons. By a Hospital Surgeon. Bristol: Wright and Co.

Photography Applied to the Microscope. By F. W. Mills. London: Iliffe and Son. 1891.

Les Aristoloches. Etude de Matière Médicale. Par Louis Planchon. Montpellier: Hamelin frères. 1891. From the Author.

* Cornish Brothers, Birmingham.

LEPROSY. By GEORGE THIN, M.D. London: Percival and Co. 1891. From the Publishers.

INDIGESTION. By GEORGE HERSCHELL, M.D., Lond. London: Bailliere, Tindall and Cox. 1892. From the Publishers.

A HANDBOOK OF BRITISH COMMERCE. By P. L. SIMMONDS. London: Moffatt and Paige, 1892.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Sir,—The case of substitution of aniline dye for syrup of violets, reported on page 488 of the *Pharmaceutical Journal*, reminds me of a recent experience, which, although not exactly parallel, may possibly throw some light on the matter. A sample purchased as syrup of violets was recently submitted to me under the Sale of Food and Drugs Act. It was found to be destitute of the characteristic colouring matter of violets, the blue colour which the sample possessed being due to an artificial coal-tar dye, the exact nature of which I did not succeed in identifying with sufficient certainty to state in my certificate. I understand that the vendor was prosecuted and fined.

I may take this opportunity of pointing out that it is no part of the duty of a public analyst to report to the authorities employing him the result of proceedings taken under his certificates. I mention this, as I have noticed repeated comments on the fact that the Local Government Board reports do not state the result of proceedings taken against vendors of samples certified to be of objectionable character. In the case of many samples submitted to me, I do not even know the town where the purchase was made, much less whether the vendor is a shopkeeper or a registered pharmacist; and often do not hear the result of proceedings, or even whether any action has been taken.

Sheffield. ALFRED H. ALLEN.

ILLEGAL SALE OF POISONS.

Sir,—Permit me to call attention to what I consider an infringement of the Act relating to the sale of poisons. Having recently taken up photography, I have been surprised to find it quite easy to obtain certain scheduled poisons from ordinary photographic dealers. Even where the Pharmaceutical Society had threatened action, the sale was still continued, and in this way. For example corrosive sublimate may be found in already prepared intensifying solutions bearing various fancy names.

A case came under my notice the other day where the dealer had been selling such solutions with full confidence that the Act did not extend thus far, and of this his wholesale agent had so assured him. Local secretaries and others having the interest of our calling at heart might do well to devote a little attention to this subject.

I consider, also, that the sale of mercuric sulpho-cyanate in the form of Pharaoh's serpent, indiscriminately to children of any age, by fancy toy shops, should be restricted, not only on account of the poisonous vapour evolved on burning, but from the liability of young children mistaking it for sweets. GEORGE MELVIN.

Richmond, S.W.

RHATANY.

Sir,—In a paper on the B.P. standards of purity of drugs and chemicals, published in the Journal of the 14th ult., Mr. T. A. Ellwood states that the B.P. description of *Krameria Ixina* is incorrect, and that it really refers to *Krameria argentea*. I find that the description of the root in the 'National Dispensatory' agrees with the Pharmacopœia, and it further states that the bark of *Krameria argentea* is not deep-fissured and is destitute of a purple tint. The B.P. and 'National Dispensatory' both state that these characteristics are peculiar to Savonilla rhatany.

Sherringham. W. H. BURRELL.

NOTES ON THE EXAMINATION OF URINE FOR GRAPE SUGAR.

Sir,—As the chemist is sometimes called upon to undertake urinary analysis for the busy medical practitioner, the following notes and observations taken from a notebook recording the examination of a large number of specimens and the result may prove interesting.

Specific Gravity.—Some text books give the lowest gravity of the urine in which sugar should be looked for as 1030. This in many cases is too high, and if gravity alone be depended upon many specimens containing sugar in considerable amount may be passed over.

In a large number of specimens examined containing sugar the gravities were taken with a good and reliable urinometer and varied from 1017 to 1047. Many specimens of specific gravity from 1017 to 1027 contained sugar varying from 7 grains to 13·7 grains in each fluid ounce, estimated by Fehling's solution, while the specimens of higher gravity contained sugar varying from 25 grains to 32 grains in each fluid ounce.

In many of the specimens of low gravity containing sugar albumen also was present, and it was noticed the specimens from the same patient gradually got lower in gravity, but still contained nearly as much sugar. Probably as the kidney disease advances, the kidney losing its power of excreting, the gravity of the urine falls through the urea being diminished until the fluid contains little else but albumen, grape sugar and water,

To be on the safe side all specimens of high or low gravity ought to be tested for sugar chemically, and gravity not depended on solely. Very high gravity is not always diagnostic of sugar; in many cases above 1030 urea was found to be the cause when no sugar was present. Many specimens from the same patient of nearly the same gravity do not always contain the same proportional amount of sugar in each. Thus one specimen, sp. gr. 1040, contained 28 grains of sugar in each fluid ounce, while another specimen from the same source, sp. gr. 1041, contained as much as 32 grains per ounce, hence proportion of sugar to gravity is no rule,

To be exact the gravity should be taken at the temperature of 60° F.

The following are the conclusions arrived at as to the value of the different tests for grape sugar:—

Moore's Potash Test.—Of very little practical use, as the colour deepens on boiling with some urines in which no sugar is present, and if the potash is kept in a white glass bottle it takes up lead from the glass and will give a black coloration of sulphide of lead on boiling with urine containing albumen or much sulphur.

Trommer's Test.—Based on the property of grape sugar of reducing cupric oxide to suboxide on boiling; a fairly good test—if copper and alkali are in right proportions, potash must be in excess.

Fehling's Solution.—This is the best and most reliable test for sugar both qualitative and quantitative. This test is also based on the reduction of cupric oxide to suboxide on boiling with grape sugar (for useful formula *vide* Attfield's Chemistry).

The urine must be added while Fehling's solution is boiling in the test tube, as the grape sugar only decomposes the copper at boiling point. If the urine contain albumen it should be boiled and filtered to remove it before testing for sugar, as it is noticed when albumen is present the suboxide of copper is not precipitated so quickly.

Dr. Robert's Fermentation Test.—This is a very good and easy test to estimate the amount of sugar after proving its presence by Fehling's solution. Three or 4 ozs. of the urine are placed in a 12 oz. bottle; a slit should be cut in the cork to allow the escape of CO_2, and a small piece of dried yeast added about the size of a hazel nut. The bottle should stand in a warm place for twenty-four hours to ferment; the gravity is then taken and subtracted from the gravity of another portion of the urine which has not been fermented. The loss in gravity indicates the number of grains of grape sugar in each fluid ounce.

Thus, portion not fermented, gravity 1040
Portion after fermentation 1012

28 grs. per fl. oz.

A. W. HUDSON.

EARLY BOTANY AND MATERIA MEDICA IN ENGLAND.

II.—WILLIAM TURNER, THE FIRST ENGLISH BOTANIST.

(*Continued from page* 206.)

"The true era of botany in England," says Pulteney, "must commence with Dr. William Turner, who was unquestionably the earliest writer among us that discovered learning and critical judgment in the knowledge of plants."

This "Father of English Physicke," as a contemporary calls him, was born at Morpeth early in the sixteenth century. As early as the year 1531, when he was still a student of physic at "Pembroke Hall, in Cambridge," he found it a great grievance that he "could learn never one Greke, neither Latin, nor English name, even among the physicans, of any herbe or tree; such was the ignorance in simples at that time." Nor was there in the English tongue any competent text books of simples. There was, indeed, one English herbal, but it was "all full of unlearned cacographies, and false naming of herbes."

This book, 'The Grete Herball,' first printed in 1516, seems to have been a fabrication from the 'Ortus Sanitatus' ascribed to Cuba. It contains scarcely any descriptions of plants and in several instances the same figure is prefixed to different plants. Some of these rude wood cuts are absurdly unnatural. In those of the mandrake, for instance, two perfectly human figures are represented with the plant growing from the head of each. Such recipes as the following make it not surprising that the apothecaries preferred to "get their recipes from the old wives that gather herbes or from the grocers." "Agaynst bytynge of a mad dogge. As sone as ye be byten, go to the chyrche and make thy offrynge to our ladye and pray her to help and hele thee. Then rubbe the sore with a newe cloth tyll yt blede and take three egges and bete them. Then take a cruse and fyll yt full of olyve oyle, and put the three beten egges therein, and bete them all togyther wythout salte, and then take whyte cassie well clensed and sethe the egges theryn wythout any oyle or grease and styr it alway apace tyll they be well soden, and when all is well soden togyther eate the better halfe and lay the other halfe on the wounde as hote as may be suffered, and ye shal be hole, and ye must fast three or four houres after and eate the playster bye three or four dayes after."

As a "poor fellow" of his hall, Turner pursued his studies in the "hort-yard" of Pembroke, and more than one reference to his Cambridge studies appears in his works. For instance, "the germander grown in gardens," he says, is called in Cambridgeshire "English triacle." At Cambridge, too, he imbibed the principles of his fellow student, Ridley, and for his itinerant preaching was banished the kingdom. His exile resulted in the enrichment of English botany. On the Continent the desire to recover the medicinal plants of the Greek physicians had led to the comparison of a great variety of indigenous plants, and in Italy, Germany, and the Netherlands the compilers of herbals were employed in the careful examination of the plants they described. The merit of each new herbal was now held to depend on what the herbalist added to his predecessors' observations from his own investigations. Italy was in the van of the new movement. The first botanic garden had been opened at Padua in 1545, and at Bologna at the time of Turner's banishment Lucas Ghinus, the first public professor of botany in Europe, was giving lectures on Dioscorides and "the seeking out of herbs." Turner became his ardent disciple, took the degree of Doctor of Physic at Ferrara, and while practising as a physician at Basle and in East Friesland, in which there was then only one apothecary's shop, and that at Emden, "sought diligently all kinds of herbes", and gained the friendship of Conrad Gesner, and other distinguished botanists of the time.

On the accession of Edward VI. Turner returned to England and was appointed Physician to the Protector, the Duke of Somerset, of whose garden at Sion he makes much mention. At Sion, too, he published his 'Names of Herbes in Greke, Latin, Englishe, Duche, and Frenche; with the Commune Names that Herbaries and Apothecaries Use.' This tiny volume dedicated to the Protector is dated 1548.

Three years later, in 1551, Turner published the first part of the work on which his name depends. It is a black letter folio with the title 'A New Herball; wherein are contayned the names of herbes in Greeke, Latin, English, Duch, Frenche, and in the Potecaries and Herbaries Latin, with the properties, degrees, and natural places of the same gathered.'

In the preface, after paying a tribute to Musa, Ruellius, Fuchs, Gesner and Bock, who, he says, "have greatly promoted the knowledge of herbes by their studies, and have each deserved very much thanks not only of their own countries, but also of the whole commonwealth," he complains that though there are "private herballs and bookes of simples by learned men in England who have as much knowledge of herbes as diverse Italians and Germans, the apothecary for lack or knowledge of the Latin tongue is ignorant of herbes and putteth either many a good man in jeopardy of his life or marreth good medicines." For the use of apothecaries, and also of physicians, many of whom had no knowledge of the Greek writers on materia medica, the first English botany was written, and like the early German herbals, its great object was to identify the materia medica of the ancients, especially of Dioscorides. How difficult a task this was may be gathered from the fact that the Iris of Dioscorides was identified by Fuchs with the charlock, by Ruellius with the vervaine, and by Gerardus with the watercress. Turner adds naively, "A man may use any of them."

The 'Herball' of Turner is the reverse of a slavish commentary. Turner often, indeed, uses the ancients rather roughly, preferring, as he says, to give credit rather to his own experience than to "Pliny's Hearsay." "Because," he says in another place, "I would not be like unto a cryer that cryeth a lost house in the market and telleth all the marks and tokens that it hath, and yet neither saw the house neither could know the house if he saw it. I went into Italy and into divers parts of Germany to know and see the herbes myself, and to know by practice their powers and working, not trusting only to the old herb wives and apothecaries, as many physicians have done of late yeares, but in the matter of simples myne owne eyes and

knowledge." There are few plants described by him of which he does not record that he has seen them growing.

During the reign of Edward VI. Turner reverted to preaching and was made Dean of Wells. Some polemical tracts published by him resulted in his banishment under Mary. He then took up his residence at Cologne, whence in 1562 he published the second part of his 'Herbal.'

On the accession of Elizabeth, Turner was restored to his deanery, and as a mark of his gratitude, dedicated to the Queen in 1568 the complete edition of his 'Herbal.' Four years previously, in 1564, he had inscribed the third part of his 'Herbal', to the Company of Surgeons with the comment: "The knowledge of herbes, trees, and shrubs is necessary for physicians and apothecaries, without the knowledge whereof they cannot duly exercise their vocation, for how can he be a good artificer that neither knoweth the names of his tools neither the tools themselves when he seeth them?" This third part contained "the herbes, rootes, and fruytes whereof is no mention made in Dioscorides, Galene, Plinye and other old authors."

Among the exotic subjects treated are cassia, fistula, cubebs, guaiacum, nutmegs, nux indica, nux vomica, sarsaparilla, senna, tamarinds, and "the noble herb, rhubarb." The arrangement of the 'Herbal' is alphabetical, according to the Latin names of the plants described, and after the description usually follow the places of growth. The medicinal use of each plant is fully dwelt on, but is relegated to a separate section.

In an interesting passage Turner records that "Tiragus (Bock), a Christian physician, doth not onlye say that ferne hath seed but writeth that he found upon midsummer even seed upon brakes." He then describes the collection of the spores.

Of the mandrake Turner says, "The pedlars roots, which are counterfeited and made like little puppets, which come to be sold in England in boxes, with hair and such form as a man hath, are nothing else but foolish feigned trifles. For they are so trimmed of crafty thieves to mock the poor people, and to rob them both of their wyt and their money. I have at divers times taken up the rootes of mandrake out of the ground, but I never sawe any such a thing upon them as are upon the pedlars' rootes that are commonly to be sold in boxes. It groweth not under gallosses as a certayn doting doctor of Colon in hys physick lecture dyd teach hys auditors."

Turner's merits as a botanist are well summed up by Pulteney, who says: "He nowhere takes any doubtful plants upon trust, but appears to have examined them with all the precision usually exercised at a time when methods and principles now established were unthought of; everywhere comparing them with the descriptions of the ancients and moderns. He first gave names to many English plants; and allowing for the time when specifical distinctions were not established, when almost all the small plants were disregarded, and the cryptogamia almost wholly overlooked, the number he was acquainted with is much beyond what could easily have been imagined in an original writer on his subject."

The figures in Turner's 'Herbal' are in part the same as those with which the octavo edition of Fuchs was first printed in 1545, but Turner has added about ninety new ones. He is the first author who has given a figure of the lucerne, which he is supposed to have introduced into England. He calls it the horned clover. Turner often points out the errors of the figures of Dioscorides, and where Mattioli has alluded to a plant without describing it, he says "he might have caused it to be paynted if he could not have come by the herb greene." In the infancy of plant description, correct figures were, indeed, of paramount necessity for identification.

Turner died in 1568, a few months after the publication of the complete edition of his 'Herbal.'

CULTIVATION OF MEDICINAL PLANTS IN JAPAN.

According to a recently published summary of the two annual reports of the Central Sanitary Bureau in Japan for the years 1888 and 1889, it appears that increasing attention is there being paid to the possibility of cultivating the medicinal plants of other countries. In Japan opium has been prepared from the poppy by various methods, with the view of determining which gives the best results. Two or three varieties of insect powder plants have been cultivated, and since the flowers of the Dalmatian kind after being powdered were found to be "more effective," owing to their freshness, "than what is sold in the shops," the conclusion had been arrived at that it would be advantageous to cultivate this variety more extensively. *Crocus sativus* grows luxuriantly and appears to increase rapidly. Coca brought from Java (and therefore presumably the var. *Spruceanum*) has been grown in the Island of Yaeyema, in Okina Wen, and the climate and soil of the island appear to suit it. The Japanese are also turning their attention to the cultivation of plants yielding essential oils, such as *Thymus vulgaris*, *Lavandula vera*, *Rosmarinus officinalis*, *Artemisia Absinthium*, etc., the oils of which they find as imported to be high in price, while "sometimes an impure article is sold." Fresh specimens of *Olea Europœa*, *Rheum officinale*, henbane, belladonna, dandelion, male fern and forty-four others grown in the medical botanic garden have lately been used in the pharmaceutical examinations, and doubtless unless the Japanese can import these drugs of good quality and as cheap as they can prepare them at home, they will grow them extensively for home use. At the three sanitary laboratories at Tokyo, Osaka and Yokohama, as many as 1111 samples of foreign and Japanese medicines and 1198 of medicinal compound were analysed, but in the next year only 679 samples were sent in for analysis and 478 medicinal compounds, a decrease which is attributed to the fact that there are in apothecaries' shops persons who are qualified in the science of materia medica, thus leading to the detection of faulty medicines. It is remarkable, however, that while only two samples of opium were analysed in 1880 the number amounted to 371 in 1889.

INDICATORS OF NEUTRALITY USED IN THE VOLUMETRIC ANALYSIS OF PHARMACEUTICAL CHEMICALS AND PREPARATIONS.

BY R. A. CRIPPS, F.I.C.

By volumetric analysis is meant the determination of the quantity of a given substance by means of a

solution of another substance of definite strength, which latter is known to react in a particular manner with the substance under examination; and therefore, the measure of the solution required for a certain weight or measure of the substance, is an indication of its purity or otherwise. For example, sulphuric acid is known to react with caustic soda, producing sodium sulphate and water; if, therefore, we have the means of showing the point at which this reaction is exactly completed, we have at our disposal a very simple method of analysis. A solution of caustic soda made of a certain definite strength is therefore called a "standard" solution. A given weight of the sulphuric acid is taken, and the soda solution added from a measuring instrument called a burette until the reaction is exactly finished; the measure of soda solution used is equivalent to the quantity of real acid actually present. In many cases the end point is indicated by the production of a precipitate or by the liquids ceasing to precipitate; as, for instance, when hydrocyanic acid is estimated by means of silver nitrate or acetate of lead by oxalic acid, these cases do not come within the scope of this paper. In by far the majority of cases, however, it is customary to use some third substance, which by giving some very striking reaction shows clearly the point of completion; such substances are called *indicators*. In the case cited above, litmus is the indicator most commonly used.

Until comparatively recent years litmus was practically the only indicator of neutrality employed in quantitative experiments, although cochineal had been used to some extent, and for qualitative purposes turmeric, infusion of roses or infusion of red cabbage. Now we have quite an army of indicators, and although there is plenty of room for experiment with new substances as indicators for special purposes, yet we can carry out analyses by simple volumetric methods, which until recently were only attainable by gravimetric processes.

Requirements of a Good Indicator.—The conditions to be fulfilled by a good indicator for any particular purpose are that:—

1. The end reaction should be marked by a prominent change of colour.
2. To effect this change the smallest possible quantity of reagent should be required.
3. High tinctorial power, which of itself assists in the fulfilment of the second requirement, less indicator being used.
4. The change should be unaffected by the impurities commonly present in the substance under examination.
5. This change should be unaffected by the products of the reaction.

No one indicator of acidity or alkalinity at present known will fulfil these last two conditions in all cases in which neutrality indicates the end reaction, and such a substance is likely to remain a desideratum. The chemist must, therefore, select his indicator after due consideration of the reactions involved, and the impurities present in each case.

In addition, it is a distinct advantage if the colour reaction is equally decided in alcoholic as in aqueous liquids.

Litmus.—This is a relic of the good old days, not to be despised on that account; nor, on the other hand, should we hold so fast to the old friend that the claims of new ones are disregarded.

Preparation.—It is prepared from various species of lichens, *Roccella tinctoria*, etc. The lichen is ground and mixed with half its weight of potassium carbonate, and then repeatedly moistened with urine saturated with ammonium carbonate, or with an aqueous solution of that salt; the mass passes through certain changes of colour until in from thirty to forty days it acquires a fine blue tint. The mass is then mixed with chalk or gypsum, moulded into cakes and dried.

Characters, Composition, etc.—Litmus occurs in small blue lumps composed of gypsum or chalk impregnated with a smaller proportion of the colouring matters. It contains several distinct colouring matters, the chief of which are azolitmin, erythrolitmin, and erythrolëin. The first of these is the most important. It is soluble in water, but insoluble in alcohol. Erythrolitmin and erythrolëin are readily soluble in alcohol, but only sparingly so in water.

Forms for Use.—The method of preparing solution of litmus B.P. is to boil 1 ounce of powdered litmus with three successive quantities of spirit (10 ounces in all), allow to settle, and pour off the spirit; the residual powder is then digested with 10 fluid ounces of distilled water, and finally filtered. In this way a large proportion of the azolitmin is obtained in solution, with very little erythrolitmin or erythrolëin, these having been to a large extent removed by the spirit. Much of the colouring matter, however, remains as an insoluble lake in the residual powder. When kept in closed vessels solution of litmus gradually loses colour, but this returns on exposure to the air and consequent absorption of oxygen. For this reason the solution should be stored in bottles having a slit in the side of the cork, so as to admit air, or the difficulty may be overcome by saturating the solution with sodium chloride, which prevents the fermentation to which the loss of colour is due.

It is also occasionally used in the form of papers; these are prepared by dipping fine bibulous paper into a stronger solution containing a trace of ammonia, or a trace of hydrochloric acid; when dried, blue and red litmus papers are respectively produced.

Uses.—Litmus may be used in a very large number of titrations. It is of value in the titration of most mineral acids, and a few organic acids, *e.g.*, benzoic or oxalic. It also answers well in the titration of alkaline hydrates when free from carbonates, but for carbonates, bicarbonates, or substances containing these salts, the liberated carbonic acid must be dissipated by boiling before a reliable end reaction can be obtained. It answers fairly well for ammonia, and under certain conditions for carbonate of ammonium, and preparations containing it; also for borax. It is useless for phosphoric or arsenic acid, phosphates or arseniates, on account of the gradual change of tint. For many organic acids, *e.g.*, tartaric and citric, it is unsatisfactory, as the end reaction is very indistinct.

Inorganic Acids, Oxalic Acid, etc.—The acid to be tested is weighed into a flask, diluted with water, two or three drops of solution of litmus added, and solution of soda (free from carbonate) added from a burette until the red colour changes to blue. The change of colour is readily distinguished; it is a great mistake to use too much litmus solution, thereby obscuring the tints.

Hydrates, Carbonates, Bicarbonates.—Alkaline hydrates almost always contain more or less carbonate. When using litmus as indicator the standard solution of sulphuric acid is added until the blue colour becomes purplish-red; then boiled, the blue colour returns as the CO_2 escapes; more acid is then added and again boiled; this alternate addition and boiling is continued until the blue colour ceases to return on boiling.

Organic Salts of Alkalics.—Organic salts, such as tartrates, citrates, acetates, benzoates, etc., yield carbonate of the metal when ignited. On this account their volumetric estimation is easy. A weighed quantity is incinerated very gently and gradually until no more tarry vapours are emitted, the carbonaceous residue washed several times with water, and the filtered washings, which should be colourless, titrated by means of sulphuric acid and litmus as indicator, as for carbonate. In this way cream of tartar, rochelle salt, citrates of potassium and lithium, tartrate of

potassium, benzoate and salicylate of sodium may be examined.

Ammonia may be treated just the same as sodium hydrate, but *not boiled*.

Ammonium Carbonate.—If treated like carbonate of sodium, the ammonia would be boiled off with the CO_2. The best way to overcome the difficulty is to add a known excess of standard H_2SO_4, boil to get rid of CO_2, cool, and then add soda solution till the blue tint appears. The difference between the quantities of acid and soda solutions represents the alkalinity of the ammonium carbonate.

Spiritus Ammon. Aromat.—This may be treated in exactly the same way as ammonium carbonate.

Borax.—The liquid assumes a wine-red tint before the reaction is complete; it must be continued till a distinct red colour is produced. The reaction is fairly distinct.

Vinegar and Coloured Liquids.—Solution of litmus cannot be used with coloured liquids such as vinegar, lime-juice, oxymel, etc., the change of tint is so much obscured by the changes which occur in the colouring matter. It was formerly usual to overcome this difficulty by the use of litmus paper, which was dipped into the liquid from time to time as the titration progressed, the paper being rinsed with distilled water when near completion. This expedient is quite unnecessary now that other indicators have been introduced.

Origin of Cochineal.—Cochineal is the body of the female insect, coccus cacti, which lives on a species of Opuntia growing in the West Indies, Spain, Algiers, etc.

Characters, Composition, etc.—As met with in pharmacy cochineal insects are about one-fifth of an inch long, somewhat oval in outline, flat or concave below, convex above, transversely wrinkled, purplish-black or purplish-grey in colour; readily powdered, producing a dark red powder. During life the insect is about the size of a small ladybird, wingless, and marked with deep incisions and wrinkles. It has six feet, which are only used directly after birth; it fastens itself upon the plant by means of a trunk placed between its fore feet, and remains there till it dies, feeding meanwhile upon the sap of the plant. The male is a small, red-winged insect. The female protects her eggs beneath her body, and dies as soon as the young appear. They are gathered shortly before they lay the eggs (when they are rich in colouring matter), killed by steam or hot water, and dried in the sun.

Forms for Use.—Cochineal solution is prepared by macerating 3 grams of cochineal in 250 c.c. of a mixture of rectified spirit and water (1 to 3) for a few days and filtering. It is pale orange-red in acid liquids and purple with alkalies.

Uses.—Cochineal is a delicate indicator. It may be used with advantage in place of litmus for the titration of ammonia and its preparations. It possesses the great advantage of not being affected by carbonic acid, consequently carbonates and bicarbonates may be titrated without boiling. It has been used for the estimation of alkali in soap; but has been superseded by newer indicators.

Phenolphthalein. Preparation.—Phenolphthalein is obtained by heating phenol with phthalic anhydride, and sulphuric acid to 120° to 130° C. for several hours, boiling with water, and dissolving the residue in soda solution. The liquid is filtered, and acetic acid added with a little hydrochloric acid, when the phthalein is precipitated, and may be purified by solution in alcohol and boiling with animal charcoal. The alcoholic solution, when mixed with water and boiled, deposits the phenolphthalein.

Characters.—Phenolphthalein is a nearly white or pale yellowish powder, nearly insoluble in water, but soluble in alcohol or proof spirit. It possesses feeble acid properties and forms deep pink solutions of its salts with soda or other alkalies; hence its value as an indicator.

Forms for Use.—The B.P. tincture is a solution of 1 part in 500 parts of proof spirit. A single drop of this solution is sufficient for most titrations.

Uses.—Phenolphthalein is a most valuable indicator, its well-marked and prompt change from colourless to pink or *vice versâ* is so readily observed. It may be employed in the titration of mineral and organic acids and most alkalies, but it is quite useless in the presence of ammonia and its salts unless special precautions are taken. It is neutral to bicarbonates; therefore to estimate carbonates the liquid must be boiled, as with litmus, or it must be largely diluted. For borax also it is inapplicable, the colour gradually fading away as the acid is added. Phosphates and arseniates containing one atom of replaceable hydrogen are neutral to phenolphthalein; consequently phosphoric acid may be titrated by its use, but more satisfactorily by other indicators. Phenolphthalein does not produce the characteristic pink colour with most alkaloids, but a few, *e.g.*, atropine, daturine, and hyoscine may be estimated by its use. One great advantage possessed by phenolphthalein over litmus is that its indications can be clearly read in many coloured liquids, such as vinegar, lime-juice, aromatic sulphuric acid, etc., and another is the possibility of its employment in alcoholic solutions, with which the indications are almost as sharp as in water. On account of this latter fact, phenolphthalein is the best indicator for the estimation of free alkali or acid in soap, and of free fatty acid in oils.

Organic Acids.—The method of titration is the same as that described for mineral acids with litmus, the soda solution being added till a permanent pink coloration is produced.

Carbonates.—If the water used for dilution be recently boiled and in large quantity, so as to prevent evolution of CO_2, carbonates may be titrated directly without boiling, the neutral point being reached when the whole of the alkali exists as *bicarbonate*, but it is preferable to boil, as with litmus, the neutral point being then the same as with that indicator.

Alkaloids.—Atropine, etc., cannot be titrated in alcoholic solution; they should be dissolved in an excess of $\frac{HCl^*}{100}$ and then titrated back with $\frac{Ba(HO)_2}{200}$ the difference between the quantities of acid and alkaline solution used represents the alkalinity of the alkaloid present. Baryta is preferable to soda, as it is of necessity free from carbonate, barium carbonate being insoluble. It should be standardised immediately before use.

Soap.—To determine the amount of free caustic alkali in soap 10 grams are exhausted by treatment with strong spirit (56° or upwards), which has been previously rendered exactly neutral by the addition of soda. Filter if necessary, and add 5–10 drops of phenolphthalein solution. If a pink coloration be produced titrate with $\frac{HCl}{2}$ or $\frac{HCl}{10}$ and calculate to NaHO or KHO. If no pink coloration the soap is either neutral or acid; in the latter case $\frac{NaHO}{10}$ is used to titrate.

Fixed Oils.—The proportion of free fatty acid present in olive and other fixed oils is of great importance. It may be accurately ascertained by titration with phenolphthalein as indicator. Five to 50 grams (or c.c. if the sp. gr. of the oil be known) are mixed with about

* This formula means *centinormal* hydrochloric acid, a *normal* solution being one which contains a molecular weight in grams in each litre of liquid. $\frac{HCL}{100}$ will therefore contain ·365 grm. HCl per litre.

double its volume of neutral spirit and heated to boiling, thoroughly agitated, phenolphthalein added, and $\frac{NaHO}{10}$ run in with frequent agitation until the permanent pink colour appears. One c.c. $\frac{NaHO}{10} = \cdot0288$ gram oleic acid.

Saponification.—Another test of great value in some cases is the estimation of the quantity of caustic potash required to completely saponify an oil or fat. About 2·5 grams of the fat is accurately weighed into a flask, 25 c.c. of an alcoholic solution of potash added of about semi-normal strength. The flask is provided with a return condenser and heated on a water-bath for about half-an-hour, or until solution is complete. A similar flask containing 25 c.c. of the potash solution is heated in the same way. One c.c. of phenolphthalein solution is now added to each flask, and the residual alkali titrated with $\frac{HCl}{2}$. The difference between the two represents the KHO combined with the oil.

Gallein, syn. anthracene violet, pyrogallol phthalein.—This was proposed as an indicator by M. Dechan (*Pharm. Journ.*, [3], xv., p. 849).

Preparation.—It is prepared by heating a mixture of 1 part phthalic anhydride and 2 parts of pyrogallol to a temperature of 190–200° C.; the fused mass is dissolved in alcohol and precipitated by the addition of water. The crude compound so obtained is purified by re-solution and re-precipitation a few times and then converted into the acetate by heating with acetic anhydride. Finally this is re-crystallized several times and decomposed by potash.

Forms for Use.—A solution in rectified spirit 1 in 1000 is employed.

Uses.—Gallein is a more delicate indicator towards alkalies than phenolphthalein; many of the alkaloids may be estimated by its use, amongst which may be mentioned strychnine, morphine, quinine, cinchonidine, and atropine. It may be used in presence of ammonia or ammoniacal salts, and, like phenolphthalein, indicates sharply with citric, tartaric, and other organic salts. I, however, prefer phenolphthalein in the titration of organic acids, and, contrary to M. Dechan's experience, I do not find it wholly unaffected by carbonic acid. I have, however, examined only one sample, which probably explains these differences. Speaking generally, gallein may be used for most purposes for which phenolphthalein is employed, and also for ammoniacal compounds and many alkaloids.

Methyl Orange, syn. Poirrier's orange III.; helianthin; mandarin orange; sodium or ammonium dimethylamidoazobenzene-sulphonate or parasulphobenzene-azodimethylaniline.

Preparation.—It is produced by the action of diazosulphanilic acid upon dimethylaniline; the acid so formed is converted into sodium salt; purified by reprecipitation with HCl and again converted into sodium or ammonium salt.

Characters, Tests, etc.—Methyl-orange exists as an orange-coloured powder, soluble in water, especially when hot; slightly soluble in alcohol, more soluble in proof spirit.

The conflicting statements as to the value of methyl-orange have tended to bring this indicator into disrepute; it is therefore of great importance that the characters and tests of a good article should be carefully described. This has already been done by Mr. A. H. Allen in a paper published in the *Pharm. Journ.*, [3], xix., p. 903. They are:—

(1) Aqueous solution not precipitated by alkalies (orange I. becomes red-brown, orange II. brownish-red).

(2) Hot concentrated aqueous solution yields with HCl microscopic acicular crystals of the free sulphonic acid, soon changing to small lustrous prisms or plates having a violet reflection. (Orange I. gives yellow-brown colour or flocculent precipitate, orange II. brown-yellow precipitate.)

(3) Dissolves in concentrated H_2SO_4 with a reddish or yellowish-brown colour, which on dilution becomes a fine red.

(4) $BaCl_2$ yields a precipitate.

(5) $CaCl_2$ yields no precipitate. (Orange I. gives a red precipitate.)

(6) PbA_2 yields an orange-yellow precipitate (acid yellow gives no ppt.).

(7) $MgSO_4$ in dilute solutions precipitates the colouring matter in microscopic crystals.

To these may be added the following test of delicacy:—To 50 c.c. of distilled water add one drop of a solution of methyl-orange in 25 per cent. spirit, containing 1 grain in the ounce; the colour will be yellow; add now $\frac{HCl}{20}$ from a delicate pipette or burette; ·2 c.c. should produce a complete change of colour to pink. Orange IV. is far less delicate.

I have met with two distinct articles sold under the name methyl-orange, and another as helianthin. Mr. Allen gives "gold orange" or "tropæolin" as synonyms of methyl-orange, but according to Thorpe's 'Dictionary of Applied Chemistry,' this body contains diphenylamine in place of dimethylaniline, and is the same as "Orange IV."

These trade names are a little uncertain, and should not be used in buying indicators.

A sample of "tropæolin" I have examined is distinct from either of the three above named.

Form for Use.—Methyl-orange is dissolved in a mixture of rectified spirit and water, 1 to 3, in the proportion of 1 grain in 1 fl. ounce. One drop of such a solution is sufficient to tint 100 c.c. of water a distinct orange-yellow colour, which becomes pink on addition of a mineral acid.

Uses.—Methyl-orange is one of the most valuable of indicators. It is a salt of a comparatively powerful acid, consequently only those acids which are capable of displacing it in combination will give the indication, while, on the other hand, when the free acid is present in a liquid the introduction of almost the weakest of bases is immediately shown. Methyl-orange is therefore a very delicate indicator of alkalinity but not of acidity, unless the acid be one of the powerful mineral acids. Its great value consists in the fact that carbonic, hydrosulphuric, boric, silicic, arsenious, oleic, stearic, and many other acids are totally without effect upon it, and therefore the bases in their soluble alkaline or alkaline-earthy salts can be determined with accuracy, just as though they were in the free state. It answers well for ammonia, but is altogether useless for the titration of citric, tartaric, oxalic, acetic and almost all organic acids, the end reaction being only gradually produced; it acts well for sulphuric, nitric and hydrochloric acids, but is decomposed by nitrous acid. Phosphoric and arsenic acids are rendered neutral to methyl-orange when only one-third of the acid has been combined with a base, the end reaction being well-defined. We have previously seen that phenolphthalein indicates neutrality when two-thirds of the acid is combined. Thomson, in a most valuable series of papers upon indicators (*Chemical News*, xlvii., pp. 123, 184; xlix., pp. 32, 40, 119, and lii., pp. 18, 29) suggests this as a good method of estimating phosphates or arseniates of sodium and potassium and phosphoric and arsenic acids.

Phosphates of Sodium, Phosphoric Acid, etc.—To a solution of 5 or 10 grams of the salt add a drop of methyl-orange solution and sufficient normal sulphuric acid or normal sodic hydrate to produce exact neutrality. The solution is boiled to expel CO_2 if present, phenolphthalein added and then normal soda, until a faint pink coloration is permanent; the amount

of soda solution used is exactly one-third of that required to produce a normal salt, with the whole of the phosphoric acid present (free or combined); consequently each c.c. equals 0·098 gram of phosphoric acid, H_3PO_4.

Phosphate Syrups, etc.—Methyl-orange can also be used for liquids containing free phosphoric acid in conjunction with iron salts, such as syrup of phosphate of iron, but the result is not quite so accurate, and requires some practice to detect the end reaction with precision. For the case mentioned take 5 c.c. of the syrup, dilute with about 50 c.c. of water, add 2 drops of solution of methyl-orange and $\frac{NaHO}{10}$ until the first distinctly orange-yellow colour appears. The number of c.c. used × ·0098 equals the weight of H_3PO_4 in the 5 c.c. used.

Borax.—Methyl-orange is all that can be desired for this assay.

Carbonates and Bicarbonates of Sodium, Potassium, etc.—These may be titrated directly with H_2SO_4 in the cold.

Soda, Potash and Lithia Water, Fluid Magnesia, etc.—These can all be accurately estimated by using methyl-orange and $\frac{HCl}{10}$ or $\frac{H_2SO_4}{20}$

Sulphate of Copper and other Metallic Salts.—If precipitated by SH_2, filtered, and titrated with $\frac{NaHO}{1}$ and methyl-orange, the acid radical in many salts may be accurately determined.

Alkaloids.—Methyl-orange may be used for most alkaloids in the same way as gallein.

Sulphites.—The acid sulphites, $NaHSO_3$, etc., are neutral to this indicator, but their estimation is not accurate in presence of carbonates.

Combined Alkali in Soap.—To the same solution that was used for estimating the free alkali by phenolphthalein, a few drops of methyl-orange solution are added and a considerable quantity of water, and the titration continued with $\frac{HCl}{2}$ or $\frac{HCl}{10.}$ The additional quantity required to produce an acid reaction is due to alkali combined with fatty or resin acids. The residue on the filter from the original alcoholic solution contains any carbonate of sodium or potassium, and may be titrated with methyl-orange as usual.

Methyl-orange cannot be used in alcoholic solution.

Fischer's Reagent, syn.—Dimethylamido-azobenzene.

Preparation.—This is prepared by dissolved 9·3 pts. of aniline in 30 parts of HCl (25 per cent.). The acid liquid is diluted with water, and when cold a solution of 7 parts of sodium nitrite added, whereby the aniline hydrochlorate is converted into diazobenzene chloride. The liquid is poured into a solution of 12 parts of dimethylaniline in 15 parts of hydrochloric acid, and after allowing the mixture to stand, 30 grams of sodium acetate are added. The crystals which separate are purified by re-solution in alcohol and recrystallization.

Characters, Tests, etc.—Dimethyl-amido-azobenzene occurs as an orange-yellow crystalline powder, soft and silky to the touch. It is almost insoluble in water, but soluble in alcohol. Its melting point is 113° C.

Form for use.—A solution in rectified spirit containing 1 in 500 is of convenient strength, 1 drop of such a liquid is sufficient for 100 c.c. of liquid.

Uses.—Speaking generally, Fischer's indicator may be employed in place of methyl-orange, which it advantageously replaces on account of the rather brighter tints; in alkaline solutions, yellow, in acid, pink. I have used it in a great many titrations, and have at present found only one substance, spirit. ammon. fœtid., with which its indications are not equally good as methyl-orange. I have not tried it for soaps.

Lakmoid, syn.—Resorcin-blue.

Preparation.—100 parts resorcinol, 5 parts sodium nitrite and 5 parts water are heated to a temperature not exceeding 120° C., until ammonia ceases to be evolved. The mass is then dissolved in water, filtered, and precipitated by hydrochloric acid.

Characters.—A glistening brown powder, very little soluble in water but readily so in alcohol. Like litmus its solution is blue in alkaline, but red in acid, liquids.

Forms for Use.—Solution in dilute alcohol (1 of S.V.R. to 1 of water) containing 1 grain in 1 fluid oz., or as papers, prepared by dipping thin bibulous paper into a solution of double this strength and drying: the papers may be rendered distinctly blue or red by adding a trace of ammonia or hydrochloric acid to the solution before dipping, or by exposing the damp papers to acid or alkaline vapours for a moment before use.

Uses.—R. T. Thomson devotes considerable attention to lakmoid in the papers above referred to. My results confirm his and are briefly as follows:—For strong acids or alkaline hydrates lakmoid solution answer well, but for carbonates, sulphides, sulphites, phosphates, arseniates or borates, it is far preferable to use the papers, a minute drop of the liquid being removed by a glass rod and applied to the paper. In this way lakmoid may be used in place of methyl-orange or Fischer's reagent for the titration of borax, carbonates of sodium, ammonium, etc., effervescing preparations of magnesia, lithia, and other carbonates, phosphates and many other salts. It is even preferable for phosphatic syrups, such as Easton's or syr. ferri phosph. It is, in fact, more nearly allied to methyl-orange than to any of the other indicators, and the factors are the same; like it, lakmoid cannot be employed for citric, oxalic, lactic, acetic, tartaric and some other organic acids. I have not tried its value for alkaloids.

Phenacetolin and Rosolic Acid.—My experience of these indicators has been very limited, and by no means satisfactory; the end reactions in some cases are too indefinite for satisfactory estimations. See, however, Thomson's paper (*Chemical News*).

Congo Red.—This indicator has been shown by R. T. Thompson (*Journ. Soc. Chem. Ind.*, vi., p. 195) to be an unsatisfactory indicator, on account of being affected by weak acids, such as CO_2, SH_2, and to be useless for acetic acid. My results point to a similar conclusion. I know of no single titration in which congo red is superior to other indicators. It is red in alkaline and blue in acid liquids.

Iodeosine, syn. Erythrosine, Tetraiodfluorescein (fluorescein = resorcinol phthalein anhydride). This is a new indicator, which has formed the subject of a paper in the *Chemical News* for November 6, 13, 20, and 27 by F. Mylius and F. Foerster.

Preparation.—By mixing solutions of fluorescein and iodine in sodium hydrate, and adding acetic acid. It appears in commerce as sodium or ammonium salt, and may be purified by treatment with ether and acetic acid, shaking out from ethereal liquids with dilute NaHO, and precipitating by strong NaHO. The ppt. is washed with spirit and crystallized from hot alcohol, from which it separates in plates.

Forms for Use.—Messrs. Mylius and Foerster recommend an ethereal solution of the colouring matter purified as above, containing 2 mg. per litre. I have used an aqueous solution, containing 1 in 10,000, of which 4 drops will be sufficient for a titration. The actual titration is carried out differently from those with the usual indicators; the solution to be tested is contained in a stoppered flask, the ethereal solution of iodeosine added, or 4 drops of the aqueous solution and sufficient ether to give a distinct layer after agitation. If the liquid be acid the ether will be coloured a yellowish tint, which becomes colourless when rendered alkaline and shaken, the aqueous liquid becoming a pale rose tint. The authors claim that this indicator

is capable of reacting accurately with millenormal solutions. I find that the change of tint takes place by the use of a single drop of a centinormal solution of soda.

Uses.—This indicator is of value in such cases as require great delicacy; it possesses little if any advantage in the majority of daily assays, but for estimating alkaloids I find it by far the best indicator I have at present employed. As pointed out by the authors of the paper, it is of service in estimating the alkalinity of water, and traces of acids or acid salts in so called neutral chemicals. I have tried it only in the titration of strychnine, codeine, morphine, quinine, atropine, physostigmine and cocaine; for all of which, except the last, it answers admirably. My plan is as follows:—From 20 to 50 mg. of the alkaloid (or alkaloidal residue from assay of drugs) are dissolved in 5 c.c. of $\frac{HCl}{20}$ and diluted to 20 c.c. with neutral water, 4 drops of iodeosine solution added and 10 c.c. of neutral ether. $\frac{Ba(HO)_2}{200}$ is now added from a burette with frequent agitation, until the aqueous liquid becomes rose-coloured. A previous titration has determined the value of the baryta solution; the difference between the two titrations being due to the alkaloids.

In conclusion, I have to thank Mr. F. Casson for assistance in the work entailed by this paper.

RAPHIDES, THE CAUSE OF THE ACRIDITY OF CERTAIN PLANTS.*

BY R. A. WEBER, PH.D.

At the last meeting of the American Association for the Advancement of Science, Professor W. R. Lazenby reported his studies on the occurrence of crystals in plants. In this report he expressed the opinion that the acridity of the Indian turnip was due to the presence of these crystals or raphides. This opinion was opposed by Professor Burrill and other eminent botanists, who claimed that other plants, as the fuchsia, are not at all acrid, although they contain raphides as plentifully as the Indian turnip. Here the matter was allowed to rest.

The U. S. Dispensatory and other works on pharmacy ascribe the acridity of the Indian turnip to an acrid, extremely volatile principle insoluble in water and alcohol, but soluble in ether. Heating and drying the bulbs dissipate the volatile principle, and the acridity is destroyed.

At a recent meeting of Ohio State Microscopical Society this subject was again brought up for discussion. It was thought by some that the raphides in the different plants might vary in chemical composition, and thus the difference in their action be accounted for. This question the writer volunteered to answer.

Accordingly, four plants containing raphides were selected, two of which, the *Colocasia* and Indian turnip, were highly acrid, and two, the *Fuchsia* and *Tradescantia*, or Wandering Jew, were perfectly bland to the taste.

A portion of each plant was crushed in a mortar, water or dilute alcohol was added, the mixture was stirred thoroughly and thrown upon a fine sieve. By repeated washing with water and decanting a sufficient amount of the crystals was obtained for examination. From the calla the crystals were readily secured by this means in a comparatively pure state. In the case of the Indian turnip the crystals were contaminated with starch, while the crystals from the fuchsia and tradescantia were imbedded in an insoluble mucilage from which it was found impossible to separate them. The crystals were all found to be calcium oxalate.

Having determined the identity in chemical composition of the crystals, it was thought that there might be a difference of form of the crystals in the various plants, from the fact that calcium oxalate crystallizes both in the tetragonal and the monoclinic systems. A laborious microscopic examination, however, showed that this theory also had to be abandoned. The fuchsia and tradescantia contained bundles of raphides of the same form and equally as fine as those of the acrid plants. At this point in the investigation the writer was inclined to the opinion that the acridity of the Indian turnip and calla was due to the presence of an acrid principle.

Since the works on pharmacy claimed that the active principle of the Indian turnip was soluble in ether, the investigation was continued in this direction. A large stem of the calla was cut into slices, and the juice expressed by means of a tincture press. The expressed juice was limpid and filled with raphides. A portion of the juice was placed into a cylinder and violently shaken with an equal volume of ether. When the ether had separated a drop was placed upon the tongue. As soon as the effects of the ether had passed away, the same painful acridity was experienced as is produced when the plant itself is tasted. This experiment seemed to corroborate the assumption of an acrid principle soluble in ether. The supernatant ether, however, was slightly turbid in appearance, a fact which was at first ignored. Wishing to learn the cause of this turbidity a drop of the ether was allowed to evaporate on a glass slide. Under the microscope the slide was found to be covered with a mass of raphides. A portion of the ether was run through a Munktell filter. The filtered ether was clear, entirely free from raphides, and had also lost every trace of its acridity.

The same operations were repeated upon the Indian turnip with exactly similar results.

These experiments show conclusively, that the acridity of the Indian turnip and calla is due to the raphides of calcium oxalate only.

The question of the absence of acridity in the other two plants still remained to be settled. For this purpose some recent twigs and leaves of the fuchsia were subjected to pressure in a tincture press. The expressed juice was not limpid, but thick, mucilaginous and ropy. Under the microscope the raphides seemed as plentiful as in the case of the two acrid plants. When diluted with water and shaken with ether, there was no visible turbidity in the supernatant ether, and when a drop of the ether was allowed to evaporate on a glass slide, only a few isolated crystals could be seen. From this it will be seen that in this case the raphides did not separate from the mucilaginous juice to be held in suspension in the ether. A great deal of time and labour were spent in endeavouring to separate the crystals completely from this insoluble mucilage but without avail. With the tradescantia similar results were obtained.

From these experiments the absence of acridity in these two plants, in spite of the abundance of raphides, may readily be explained by the fact, that the minute crystals are surrounded with and embedded in an insoluble mucilage, which prevents their free movement into the tongue and surface of the mouth, when portions of the plants are tasted.

The reason why the Indian turnip loses its acridity on being heated, can be explained by the production of starch paste from the abundance of starch present in the bulbs. This starch paste would evidently act in a manner similar to the insoluble mucilage of the other two plants.

So also it can readily be seen that when the bulbs of the Indian turnip have been dried, the crystals can no longer separate from the hard mass which surrounds them, and consequently can exert no irritant action when the dried bulbs are placed against the tongue.

* From the *Am. Journ. Pharm.*, Nov.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, DECEMBER 26, 1891.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

F. PASSMORE.

THE tribute that all must pay has again been exacted from amongst those who have been intimately associated with the official work of the Society. But a few weeks ago we had to record the death of one of the Society's most distinguished past Presidents, and now it is with profound sorrow that we notify the death of Mr. F. PASSMORE, which took place last Tuesday after a few days illness. Mr. PASSMORE has for nearly twenty-two years occupied the position of sub-editor of the Society's Journal, and in that capacity had adapted himself to the work in a manner that rendered his services especially useful. By the loyalty and ability he displayed, no less than by his high moral qualities, he gained the esteem and respect of all who came in contact with him. His death is a serious loss to the Society, and by none will it be more felt than by the editor of the Journal, to whom he had so long been a most faithful, zealous and efficient assistant.

THE TRADE IN PROPRIETARY MEDICINES.

THE present position of American pharmacists and chemists in regard to the trade in secret remedies and proprietary articles furnishes a lesson that is deserving of notice because it may be useful on this side of the Atlantic. The trade in those articles has developed in America in a most remarkable manner, but the pharmacists of that country are now awakening to the fact that it is rapidly tending to undermine their legitimate business. So long as this trade remained in their hands comparatively little attention was paid to the matter. Within the last few years, however, the sale of proprietary articles has been taken up by grocers, general stores, and all kinds of traders in such a way that chemists have had to encounter a serious competition, arising not only from an actual increase in the number of vendors, but also from the sale of these articles at prices below the advertised retail prices fixed by the proprietors. The lines upon which a grocer's business is conducted are such as to allow of these proprietary medicines being sold like other packetted articles at a rate of profit considerably less than would be requisite for the fair remuneration of a pharmacist or chemist. Hence there has grown up a system of selling these articles at prices far below the ostensible retail prices. For some years past the American pharmaceutical journals have been filled with complaints of the injury thus done to chemists, and of the loss of trade they have suffered in consequence of that practice. Many attempts have been made to devise a suitable remedy, and numerous propositions are still being put forward with the same object. Retailers as well as manufacturers of proprietary articles have expressed their willingness to unite in carrying out any feasible plan for the mutual protection of their interests, but as yet without being able to agree as to the means to be adopted. The great difficulty arises from the action of the intermediate dealers or jobbers from whom supplies are obtained by those traders who sell proprietary articles at reduced prices and are able from the extent of their business to purchase them in much larger quantity than chemists require, with a corresponding commercial advantage over the smaller transactions. This is one reason that has led to the increased sale of proprietary medicines by grocers and general stores. But there is another circumstance that has largely contributed to the same result. The sale of proprietary medicines, like that of other packetted articles, requires no skill on the part of the seller beyond the mere ability to read their names and prices. A grocer's errand boy can supply them as well as the most accomplished pharmacist. Nothing is supposed or required to be known of the contents of the packets. The purchasers do not rely upon the seller for giving them what they desire to buy; they can judge for themselves, and any confidence they place in the articles bought is based upon the statements in the advertisements of the proprietary manufacturers. The act of sale is a mere manual exchange of a certain packet for the equivalent sum of money. There is a total absence of any of those conditions which attach to the supply of a drug or medicine by a pharmacist. In the sale of proprietary medicines there is, in fact, no need for those conditions being observed. It is indeed remarkable that in the face of these facts the sale of proprietary medicines should have been promoted so largely as it has been by chemists without their perceiving the detriment that might be expected eventually to result from the practice. They have in this country as well as in America made themselves the distributory agents of the proprietors of secret medicines, and have thus helped to create a competition with their own more legitimate business which is the

most fatal and damaging to their own interests and to the true interests of medicine that can possibly be imagined. But it cannot be otherwise than vexatious for chemists to find that, after setting this trade upon its legs, other traders take to it and sell the articles at prices which are inconsistent with the business of a chemist. The public, taking no heed of this latter circumstance, is naturally attracted by the reduced prices, especially under the present rage for low priced articles, and for the reasons already mentioned there cannot be much ground for surprise that this is the case.

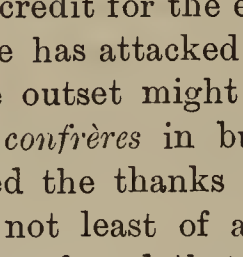
It is, however, thought by many chemists that the sale of proprietary medicines at reduced rates is an injustice to them, and attempts have been made to put a stop to it. One scheme having that object has recently been devised by Mr. W. JOHNSTON, of Camberwell, who has taken great pains to bring it under the notice of chemists and to obtain their support. Mr. JOHNSTON has sent us an account of his work in this direction, but since the result was an entire failure, as we think might have been anticipated, we are unable to spare the space required for its publication. There is not any other reason for referring to it than that of giving him credit for a well-meant desire to be of service to his fellow chemists. On that ground, however, some brief mention of Mr. JOHNSTON'S scheme may be of interest. The fundamental principle was to secure the co-operation of proprietors with retailers by offering the former some inducement to join in an arrangement for regulating the retail price of proprietary medicines. This inducement was to be a pledge that retailers would not push their own preparations when proprietary medicines were asked for. Subject to that condition retailers were to sign an agreement not to sell proprietary articles for less than certain fixed prices. In the case of retailers who would not thus bind themselves, proprietors were to agree not to supply them, or to charge them such prices for their articles as would preclude the possibility of their being sold at reduced rates. A reservation was to be made in this agreement in regard to cases where the retailer may be asked to give his opinion as to the merits of a proprietary medicine. In such a case the retailer was to be at liberty to recommend his own preparations. The working of this scheme would obviously have involved a system of numbering and registering every packet of any proprietary medicine in order to be able to trace sales at less than the price agreed upon. That in itself would have caused additional trouble.

Circulars setting forth the details of the scheme were first sent to about a thousand chemists. Of the 547 replies received eighty per cent. were more or less in favour of the scheme. To ascertain the views of wholesale dealers in proprietary articles, a circular was then sent to twenty London and provincial houses. Seven replied sympathizing with the movement; but one of them refused to agree to register numbers, two sent word that they would not agree to the scheme, and the rest took no notice of it. A circular was then sent to one hundred of the leading makers of proprietary articles. Only twenty of them replied. Of that number seven gave a decided refusal, while only three expressed unconditional approval and promised their adhesion to the scheme. The rest made their approval of the agreement so conditional that it practically amounted to a negative. Mr. JOHNSTON therefore came to the conclusion that it is not practicable to establish a uniform scale of prices for proprietary articles. Some of the letters received by Mr. JOHNSTON on this subject contain remarks that are of interest, no less from a practical than from an ethical point of view. Thus one writer, who says that he objects to having his business regulated by a combination even when the object is to help him, adds that he must admit it has in fact been so regulated by stores and others who sell at reduced prices. His approval of Mr. JOHNSTON'S scheme went no further than the choice of the lesser of two evils. Another, who objected to the scheme as wanting in any sound principle, pointed out that the chemist's superior knowledge, experience, skill, probity, or any other qualification distinguishing him from the grocer's boy are really of no account in the sale of proprietary medicines, and that as no skilled service is rendered there can be no justification for a higher charge by the seller in the one case than in the other. In regard to substitution this writer says that though an honourable man should be above cajoling the unwary into purchasing things they do not want, the public can have been no loser if chemists have largely substituted their own preparations for secret proprietary medicines. He adds that when chemists come down to the trade level of grocers, and still charge three or four times as much for their services in the same line, they are justly convicted of dearness. The undiscriminating public extends that judgment to the chemist's proper business, and thus the whole body is unjustly prejudiced, in regard to transactions to which the same principle does not apply. As illustrating opinions on the opposite side, one writer states that by selling proprietary articles at reduced rates he has acquired the reputation of being "the cheap chemist" of the town. Another says he will not be muzzled, and a third that he makes the utmost possible show of "cutting," and does as little of it as possible. To those holding this extreme diversity of opinion we offer these remarks, without comment, as food for reflection. As regards the practical object of the scheme in question, it is obvious that the difference of sentiment expressed by these quotations is in itself

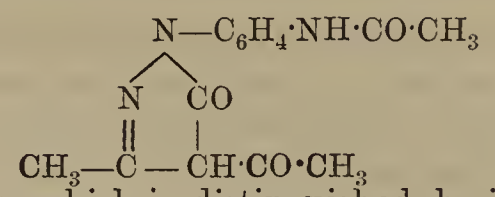
sufficient evidence of the futility of any such scheme as that proposed by Mr. JOHNSTON. It is an attempt to cultivate ground outside the proper domain of pharmacy, and from which the harvest due to merit is not to be expected. But though Mr. JOHNSTON has in reality been flogging a dead horse, he deserves credit for the energy and enterprise with which he has attacked a problem which he believed at the outset might be solved to the advantage of his *confrères* in business. In that sense he has earned the thanks of every member of the trade, and not least of all, we think, for having shown and confessed that he was in error.

GERMAN CHEMICAL PATENTS.

AT the instance of the German Patent Office a series of lectures are being delivered in Berlin by eminent legal and scientific authorities, indicating the progress made in technicology since the introduction of the first patent law in 1877, and also placing in a tangible form before future patentees the accumulated experience of past years, with regard to the general conditions and essential details to be observed in applications for the patenting of machinery, processes or products. Interest has been especially aroused in medical and pharmaceutical circles, owing to the extensive introduction into pharmacy in the last few years of compounds prepared by synthetical methods, that are the subjects of patents. Professor KOHLER pointed out that a medicament, like an article of food, cannot be itself patented, but the patent may be made to apply to a definite method for the production of a new or a well-known compound, even if it occur in nature, provided that the method be new or only previously employed for a different purpose. Two new therapeutical remedies, for which patents have been recently granted, are cited (*Pharm. Centralh.*, Dec. 3, p. 698) as examples of the position assumed by the German Patent Office towards new synthetical preparations. The first compound, prepared by well-known synthetic methods from a well-known chemical compound, is a new derivative of phenylmethylpyrazolon, the mother-substance of antipyrin, to which KNORR attributed the constitution expressed by the formula:—



If seventeen parts of phenylmethylpyrazolon be dissolved in five times its volume of concentrated sulphuric acid, and nineteen parts of a mixture of two parts 83 per cent. nitric acid and three parts concentrated sulphuric acid be poured into the cooled solution, upon subsequent dilution by the addition of ice, a yellow precipitate separates, which can be recrystallised from alcohol. This body consists of a nitrophenylmethylpyrazolon in which the nitro-group is contained in the benzene nucleus, though in what position is undetermined. By its reduction with tin and hydrochloric acid the corresponding amido compound is obtained and by treatment of the latter with acetic anhydride a di-acetyl compound of the composition—



results, which is distinguished by its pronounced antipyretic properties. The second new compound mentioned bears a similar relation to salol, the phenyl ester of salicylic acid, which was introduced into medicine in 1886. It possesses the composition— $C_6H_4<^{COOC_6H_4\cdot NH\cdot COCH_3}_{OH}$, and is prepared from salicylic acid and para-nitrophenol by esterification, and subsequent reduction of the nitro to an amido group and acetylating the latter. It is described as occurring in small crystals, sparingly soluble in water, and melting at 187° C., but it is claimed that its administration is unaccompanied by the toxic effects sometimes observed with salol.

TREHALOSE IN FUNGI.

MONS. E. BOURQUELOT has investigated the distribution of this sugar in different parts of fungi; his experiments being conducted on the two species *Boletris edulis*, Bull., and *Boletris aurantiacus*, Bull., which were chosen chiefly on account of the ease with which the spore-bearing membrane can be detached from the cap or pileus. He finds, as he had previously supposed, that the sugar is present in different proportions, in different parts of the plant, the largest quantity being present in the stem or stipes, especially at its base, much less in the cap, and none at all in the hymenophore. He therefore concludes that the carbohydrate is used up by the spores, and that for comestible purposes it is advisable that the hymenophore should always be removed, as it contains no sugar. This distribution of the carbohydrate also explains why the larvæ of diptera (and colloptera) are always found in the stem, less frequently in the cap, and rarely if ever in the gills or pores of the agaricini. As there is some difficulty in crystallizing trehalose M. Bourquelot points out that the best plan to detect the presence of trehalose is to make an extract of the fresh fungus with strong alcohol, evaporate it to a syrup, and then take a crystal of trehalose, rub it on a microscopic slide, and place a drop of the syrupy liquid on the rubbed slide and covering it with a glass cover. Octahedral crystals of trehalose form almost immediately. To make the bulk of the syrup crystallize readily, some of the crystals so formed are placed in the syrup and determine the speedy crystallization of the trehalose.

The death of Mrs. Emma Pitman, aged 84, which occurred at Westbury, Wilts, on the 15th instant, again reduces the number of annuitants. Mrs. Pitman had been an annuitant on the Benevolent Fund since 1887.

* * *

We have received information of the recent sudden death of Mr. Alfred Rose, of Edgware Road. In 1865 Mr. Rose was Pereira medallist, and in the same year took the Society's prize medal in Practical Chemistry.

* * *

Mr. John Fraser, of Helmsdale, N.B., has been appointed vice-convener of the County Council of Sutherlandshire.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

December 16, 17, *and* 18, 1891.

Present on each day — Mr. Carteighe, President; Mr. Bottle, Vice-President; Messrs. Blunt, Bowen, Corder, Davies, Druce, Fletcher, Gerrard, Greenish, Holmes, Ransom, Saul, Symons, Tanner and Taylor.

MINOR EXAMINATION.

16*th*. — *Thirty-one* candidates were examined. *Twenty* failed. The undermentioned *eleven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Andrews, Walter.....Winchester.
Hargreaves, Henry .....Leeds.
Hawthorne, Archibald .....Stafford.
Hull, John William .....Tamworth.
Keall, Allan Adolphus .....Swansea.
Kennard, John.....Denbigh.
Marris, Frederick Lake .....Grimsby.
Marston, John Thomas .....London.
Mercer, Alfred .....Rochdale.
Merrett, Edward Lionel.....Romsey.
Monger, George James .....Folkestone.

17*th*.—*Thirty* candidates were examined. *Fifteen* failed. The undermentioned *fifteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Gibson, Mary .....London.
Hall, Samuel William .....Lichfield.
Morris, Thomas James .....Jersey.
Olds, George .....Farnboro' Station.
Parker, George Brook..... ...Bradford.
Peck, Wm. Henry Wesley.....Teignmouth.
Reynolds, Joseph .....Trecynon.
Rhodes, Thomas George .. ...Keighley.
Ridge, Herbert William .....Towcester.
Routly, Owen .....London.
Sage, Charles Edward .....Frome.
Sansom, Maurice.....Barrow-in-Furness.
Shepherd, James Henry .....Leicester.
Sowden, George .....Spilsby.
Spafford, Henry John.....Hull.

18*th*.—*Thirty* candidates were examined. *Twenty* failed. The undermentioned *ten* passed, and were declared qualified to be registered as Chemists and Druggists:—

Neale, Matthew Henry .....Woolwich.
Toohig, Albert William.....Narberth.
Towers, Wm. Londesborough..Barrow-on-Humber.
Treadwell, Saml. Ernest Davis.West Dulwich.
Tulley, Frederick Rudrum.....London.
Walden, William Herbert.....Reedham.
Watts, Joseph Wormall.....Brighton.
Williams, David Llewelyn.....Colwyn Bay.
Williams, George Alfred .....Shrewsbury.
Wright, Frederick Charles ...Birmingham.

FIRST EXAMINATION.

18*th*.—Certificates by approved examining bodies were received from the undermentioned in lieu of the Society's examination:—

Athey, George Hedley .....Morpeth.
Birch, Charles William .....King Stanley.
Birnie, Arthur William .....Christchurch.
Calvert, Albert Boston .....Southwark.
Critchley, Charles Albert .....Blackburn.
Edkins, Thomas .....London.
Falding, Walter Bullock .... .Wakefield.
Hart, Walter Richard.....Folkestone.
Jones, John Elias .....Bala.
Lewis, Richard Rice .....Barmouth
Lloyd, Thomas Henry .....Southport.
Savage, George Bernard.....Brighton.
Simpson, James .....London.

Pharmaceutical Society of Ireland.

REGISTERED DRUGGISTS' EXAMINATION.

At a druggists' examination, held at Belfast on Friday last, the following passed:—Mr. N. Kirkwood, Larne; Mrs. Annie McGavock, Glenarm: Mr. T. Moore, Belfast; Messrs. C. and J. E. O'Neill, Maghera; Mr. J. Wiley, Loughmourne. One candidate was rejected.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of this Association, held at 103, Great Russell Street, on Thursday, December 10, Mr. W. Lloyd William, A.I.C., President, in the chair, a paper was read on—

Floral Formula and Floral Diagrams.

BY E. B. SHERLOCK.

In the course of my studies it has often occurred to me that the use of signs and figures in botanical descriptions might be much more widely adopted than at present, with the result of making such descriptions more concise and more readily intelligible. This is perhaps not an important branch of botanical science, but it is by no means devoid of interest, and will, I think, well repay study, although it is unfortunately in a state of great confusion. I shall try to indicate the various methods which have been or are employed for conveying a maximum of information respecting the details of floral structure with a minimum of effort, and shall then proceed to offer some suggestions as to which of their features might be most profitably retained to form the basis of a system of botanical abbreviations.

The idea of instituting a symbolical notation which should do for botany what the notation of chemistry has done for that science is not new, but the attempts at realization have hitherto been unsuccessful. As De Candolle remarks, "the facts are too numerous, too variable, too badly defined as to limits to allow of their being represented by exact and regular figures."

An objection to the use of signs and symbols is to be found in the confusion already referred to. Almost every writer of a botanical text-book has a system of his own which he usually introduces without adequate explanation, and even if he does include a list of abbreviations it is concealed in the text instead of being placed conveniently for reference, *e.g.*, on the inside of the cover. But the general use of formulæ and diagrams affords sufficient evidence of their value, and an acquaintance with the principles involved in their production is expected in everyone who has pretensions to botanical knowledge. It will be convenient to consider the two branches of the subject separately, starting with floral formulæ.

The earliest attempts at constructing these were clumsy in the extreme. Bergeret in his 'Phytonomatotechnic Universelle' tried to represent various floral characters each by a different letter, and twenty-six not being enough for his purpose he had to use the same letters more than once, attaching numerals to distinguish them, while Cassel, in 'Morphonomia botanica,' employed Roman and Arabic numerals, the former marking the number of similar organs in a group and the latter the relationship between different

groups. Concerning Seringe and Guillard's mode of "representing the characters of plants by analytical signs which replace descriptive phrases," Alph. de Candolle, in his 'La Phytographie,' says, "Although many characters, particularly those relating to cryptogamic and microscopical forms, are omitted, the number of signs is 151, and their forms are often so strange that the formula of a genus resembles a hieroglyphic tablet of the ancient Egyptians."

Different letters were used to denote different portions of the plant by Bayer in his 'Monographia Tiliæ generis,' but the number required merely to distinguish the several species of the same genus, which naturally do not exhibit much variety, shows that the extension of such a system to plants in general would make it as unwieldy as the rest. In the 'Monograph des Malpighiacées,' dated 1843, A. de Jussieu adopted the plan of using the initial letter of the name of the organ, taking the corresponding Greek letter if that recurred. The arrangement of Van Tieghem has the letters S P E C denoting the floral whorls, preceded by numerals showing the number of parts in each whorl, and having the letter repeated with an index if there be more than one whorl of similar organs. Superposition, *e.g.*, of stamens on petals is shown by placing a small letter denoting the outer whorl at the base of the capital letter used for the inner one, and attachment of organs is marked by brackets, *e.g.*,

Primula = [5S]+[5P+5E*p*]+[5C]

If the inferior position of the ovary be regarded as due to the adhesion to it of the calyx, it is clear that the corolla must be upon the calyx, and the stamens either upon the calyx or upon the corolla; there being in either case adhesion between the different whorls. Van Tieghem accepts this view, and consequently, when the ovary is inferior, he places the whole formula within brackets, thus:—

Alstræmeria = [3S + 3P + 3E + 3E′ + 3C.]

The systems of modern text-books are usually more or less erratic modifications of that employed by M. J. Sachs in 1868. Here the letters K C A G are used for the whorls, and the number of parts in each is expressed by figures placed after the letters, distinct whorls being shown by a + sign between the figures, and an absent whorl by O. Superposition is indicated by a vertical line between the parts concerned and branching; *e.g.*, of stamens by a numeral placed as an index. Thus $A3^2$ means three stamens each with two collateral branches; $A\ 5^r$ = five stamens with several branches. Henfrey uses the letters S P A G, arranged in two parallel vertical columns, with a straight line between, to show superposition, and curved ones for attachment. He places a numeral, to denote the number of parts in the typical whorl, outside the formula in connection with the letter F, to show that a flower is referred to; thus for primula—

$$F\ 5 = \widehat{S} \mid \widehat{P}$$
$$\widehat{G} \mid A$$

or if the parts alternate in a regular manner,

$$F\ 5 = \begin{matrix} S \\ A \quad P \\ G \end{matrix}$$

The calyx may be taken as a whole and indicated by K (Germ. Kelch) or C, or it may be considered as made up of sepals, the letter S being then used. For the corolla there is the letter C or P, signifying that it is composed of petals, while P and Per. are used for the perianth. The andræcium or staminal whorl is denoted by A, An., St. and E (Fr. Etamine) and the gynæcium or pistil by G, Gy, and C; thus the letter C has done duty for three out of the four whorls, while P has two distinct meanings attached to it. To be consistent we should retain all through on the one hand the letters indicating the floral whorls themselves, or on the other those standing for individual members, consequently such a formula as S P, An, Gy, is not desirable. Probably it will be best to use a sign for each floral leaf, say the letters S P, St, C. This is done in the English translation of Goebel's 'Outlines of Classification and Special Morphology,' and as the work is easily accessible I refer to it for what seems the most rational of the systems yet employed in representing peculiarities of number, position, cohesion, adhesion, abortion, and chorisis in the parts of the flower. One point, however, may be noticed; the andræcium of certain species of the leguminosæ is denoted by $St\ _5+_4+_1$ which ought, in agreement with the other formulæ, to represent three whorls of stamens containing respectively 1, 4 and 5 members, the two outer whorls being united. What is meant is that one stamen of the inner whorl is free, and this I think would be better understood if the second + sign were omitted thus, $St\ \widehat{_5+_4}\ _1$ or replaced by the other sign of addition, &, thus, $St\ \widehat{_5+_4}\ \&\ _1$. Besides those already mentioned other symbols indicating sex, time of flowering, etc., may be combined with the formula, though it is necessary as a preliminary to attach only one meaning to each, which is not the case at present, as the following table shows—

Character.	Symbol.
Flowering once only. .	⊙
Moncœcious	(♂ ♀), ♁ − ♀, ♂ ♀
Dicœcious.	♂ : ♀, ♂ − ♀
Hermaphrodite . . .	☿
Hybrid	☿, ×
Those which might best be retained are perhaps—	
Male	♂
Female	♀
Hermaphrodite	☿
Hybrid	×
Moncœcious	♂ ♀
Dicœcious	♂ : ♀
and possibly—	
Polygamous	♂ ♀
Having staminodes . .	† (Prantl)
Di-, tri-, tetra-, pentamerous	$\sqrt{2}$, $\sqrt[3]{}$, $\sqrt[4]{}$, $\sqrt[5]{}$ (Balfour)

But a glance at such a book as Loudon's 'Encyclopædia of Plants' will at once make it evident that this sort of thing can be carried too far. In that work a large number of abbreviations are used, and though by their aid a good deal of information is condensed into a small space, the descriptions lose considerably in clearness, and constant reference to the explanatory table is required. There is a want of definition about the formula which prevents it mentally suggesting the flower it is intended to represent, since it takes no account of the relative sizes of parts, and does not indicate the numerous little peculiarities which go to make up the flower's individuality. In his 'New and Easy Method of Studying British Wild Flowers by Natural Analysis,' Messer tries to overcome this difficulty, though the attempt has not been particularly successful. Several of the most widely distributed natural orders have their chief characters shown by arbitrarily chosen signs bearing some general resemblance to what may be regarded as the typical forms of sepals, petals, stamens and carpels.

Where these figures are insufficient recourse is had to diagrammatic sketches and to brief verbal notes. Descriptions drawn up in this way occupy quite as much space as, for example, those in Babington's 'Manual,' where only abbreviations are employed; still, as they do not require much knowledge of technical terms they perhaps present advantages to the beginner in botany. But against floral diagrams proper no objection can be raised on the ground of lack of conciseness or clearness, for by using them as

much can be gathered at a glance, as would be conveyed by pages of letterpress. As met with in text-books they are of two kinds, the empirical and the theoretical, and while superficially these bear a strong resemblance to each other their purposes are widely different. Briefly it might be said that the former represent the facts and the latter their interpretation. A comparison with the empirical and graphic formulæ of chemical notation gives some idea of the difference between them, but is hardly a fair one, since even the empirical formulæ of chemistry are built up on theoretical grounds, whereas the empirical diagrams of botany are merely representations of flowers as we see them. The subject of theoretical diagrams has been exhaustively dealt with by Eichler in his 'Blüthen-diagramme.' It is one involving many debateable points, and requiring for its just appreciation a much more profound knowledge of the structure and life-history of plants than I can lay claim to. I shall therefore confine myself to the consideration of empirical diagrams, though it may be noted that the materials used in constructing both are the same. A. P. de Candolle* seems to have been one of the first to show the arrangement of the floral organs on a ground plan, but since his time there has been evolved some want of uniformity in the means employed, for different signs are to be found in different botanical works as representing the sepal, petal, stamen, staminode and bract.

Above the diagram there is usually placed a dot to mark the position of the axis of the inflorescence to which the flower belongs. Instead of a dot, an outline of the cross section of the floral axis can be used; *e.g.*, a circle, and the type of the inflorescence, whether centripetal or centrifugal, can be shown by arrow-points.

If the inflorescence is mixed, add also the outline of the primary axis, placing the arrows so as to show whether there are a number of centripetal inflorescences arranged in a centrifugal manner, as in the Compositæ, or *vice versâ*, as in the Labiatæ.

The relative position of the flowers on the floral axis can be shown, as with phyllotaxis, by means of a fraction placed within the outline.

It is not necessary to indicate the bract, from the axil of which the flower stalk arises, by placing a sign at the side of the figure opposite to the axis. For the flower itself it is usual to employ a series of concentric circles, equal in number to the whorls of the flower, upon which are shown by dots or otherwise the relative positions of the parts of the whorl. In cases where the arrangement of the parts is not cyclical, a spiral can be used instead of the concentric circles; and the turns of the spiral or the circles can be adjusted at distances from each other, proportional to the distances of the floral whorls. By suitable arrangements, such as are already employed in some manuals, peculiarities of æstivation and cohesion may be expressed.

For the stamen, an outline of the section of its essential portion—the anther—may be used; the figures being placed close together, if the anthers are so in the flower, and joined by a thick line if the filaments are connected.

The figure standing for the innermost whorl is essentially a drawing of the cross section of the ovary with the addition of numerous details which would not become evident by making only one cut. Thus, besides the placentation, the manner of the subsequent opening of the fruit can be shown, as in the diagrams used in text-books to illustrate the various modes of dehiscence. To introduce particulars of the style and stigma would complicate the diagram very much and would necessitate a wider deviation from the ordinary type than is desirable, especially as such information is not usually of much service in diagnosis. Within the cavity of the ovary a seed can be sketched to show its point of attachment to the placenta, and whether it be orthotropous, anatropous, etc., and by its side may be placed a numeral indicating the number present, while with a little skill in drawing the number of cotyledons and the presence or absence of albumen may be also shown.

Less general features may be included, thus, for the spurs found in aquilegia and viola modifications of the signs representing the organs affected will naturally suggest themselves.

If a member of a whorl is entirely absent no attempt should be made to indicate in an empirical diagram what is considered to be the vacant place, but the noting of partially developed or otherwise incomplete members is admissible; thus dots may be used for staminodes. Although in the production of empirical diagrams theoretical considerations are to be avoided, so much should be known of the development of the flower as will prevent the making of erroneous observations, such as the mistaking of the different parts. This is especially true when dealing with the questions of cohesion and adhesion, points of great importance, any misapprehension of which will lead to confusion. The modern view of the structure of epigynous flowers is that the inferiority of the ovary is due to the adhesion, not of the calyx tube, but of a circular upgrowth of the torus or extremity of the floral axis. Again, the common base of cohering or adhering members may be derived from the torus or, in the case of stamens, the observed condition of attachment may be due to the branching of one stamen or the cohesion of several. It will therefore be advisable to denote an inferior ovary by putting a line round, instead of attempting to connect it with the calyx ring, but as regards the other whorls it will be more convenient to ignore the information afforded by the study of the life history and simply mark the groupings of organs without discussing the reason for it. This can be done by joining the whorls concerned by means of a line. It may be noticed here that little has been done in the way of employing symbols when describing features other than those of the flower, though Loudon gives twenty-three signs indicating the habit of plants and sixteen for the duration and place of growth, besides a long list of initial letters. This is perhaps partly because the leaves, stem, etc., are not of so great value in classification, and partly because their divergencies from the typical form are even wider than in the case of flowers.

Experience alone will show how far it is advisable to supplant verbal description by symbolical representation, but provided generally recognition be given to one simple plan this will be capable of considerable development.

* 'Mémoire sur les Crucitères,' 1821.

The President said Mr. Sherlock had treated a somewhat dry subject with great lucidity. He had been reminded whilst listening to the explanation of the formula and diagrams of the old chemical symbols now relegated to the show carboys. Some of these old symbols, as Mr. Sherlock had shown, were in fact employed by botanists. The great drawback to this shorthand in botany was that as yet no standard system of expression had been adopted, each botanist considering his the best, and it would require the memory of Macaulay or an admirable Creighton to remember them all. One could not help noticing the small amount of botanical work done by Englishmen. Out of one hundred names of well known botanists three or four only would be those of Englishmen, the remainder German and French. He thought botany certainly ought to be retained in the pharmaceutical curriculum. In the medical curriculum it was not now compulsory, and the pharmacists were the only body who retained its study for professional purposes.

He complained of the great dearth of English botanists; it would be still greater but for the English pharmacists.

Mr. Helbing thought that if what they had listened to had only a limited degree of practical importance, it had yet been made interesting and was no doubt useful. In older botanical works, say twenty or thirty years back, more signs were to be found than appeared to be still employed. The chief value of such formulæ in his opinion was to express the annual biennial or perennial character of a plant, or to show if it were male, female or hybrid. Used for these purposes the identification of species would be very much simplified, owing to the condensation of material which had to be gone through in the works of reference. The annual or biennial character of a plant was of less importance in systematic botany. In the books he had himself used such signs were adopted which had proved very serviceable. The worker in practical botany kept as a rule to one book, and so readily acquired familiarity with the meaning of the signs. Floral diagrams were valuable sometimes in identifying a plant from a flower bud; the arrangement of the parts and its agreement with various diagrams could be seen by making a cross section. He protested against the neglect of the study of botany by pharmacists, and pointed out the necessity of the subject if one was to acquire a proper knowledge of materia medica. Further the science of botany was capable of affording the earnest student a great deal of pleasure and enjoyment.

Mr. McFall thought the colouring of the diagrams a very good idea, and one of great practical value. As Mr. Helbing had said, the value of the study of botany to the pharmacist could not be over-estimated.

Mr. Parry said he was sorry that Mr. Sherlock had determined to confine himself to empirical diagrams; for, in his opinion, the chief value of diagrams belonged to the theoretical ones. From the standpoint of the theory of descent and by the comparison of allied forms, we could compare and correctly classify doubtful forms, and many of these allied forms gave the same empirical diagram, but when analyzed carefully yielded the same theoretical diagram, which must be regarded as the typical one, and, so to speak, the head of the family, which is a material help in the comparison of these allied plants. For example, Verbascum, one of the *Scrophularineæ*, is a pentamerous flower; in one species of *Veronica*, a closely allied plant, we find but four members in the corollas; whilst in *Veronica latifolia* the fifth petal is represented by a minute tooth. These three plants, all with different empirical diagrams, have the same theoretical one, and the relationship is thus clearly indicated.

Mr. Walton said he had listened with great interest to the paper. The subject was one that required a large amount of time and study. This being the case it appeared to him that to a practical botanist whose time was limited, the preferable method was one he had used, which was advised by Oliver. He could quite understand that "floral formulæ" are of great service, but where time was of importance the system appeared to him to be too extensive for general use.

Mr. Sherlock, on replying, said that he must begin by differing from the President. Mr. Williams had referred to the study of botany as a dry and dusty road, whereas it was to him the most fascinating one with which he was acquainted. The existing confusion in regard to botanical matters was much to be regretted, and was not confined to the branch he had that night taken up; for instance, his attention had recently been directed to the fact of there having been four different names, those of *Scilla nutans*, *Hyacinthus nonscriptus*, *Agraphis nutans* and *Endymion nutans*, applied to the common bluebell. English botanists had not usually so high a standing as their German co-workers because, in his opinion, they did not pursue the same methods of elaborate and prolonged research upon some special point, devoting themselves more to the dissemination of the knowledge already possessed than to the acquirement of more. The literature dealing with floral formula seemed to be chiefly French. He was glad to find that both the President and Mr. Helbing insisted so strongly upon the necessity for botanical training on the part of the pharmacist. As regards Mr. McFall's remarks, he considered that care was to be exercised in using colours in plant description, as erroneous ideas might be conveyed, but a student might conveniently employ coloured crayons in taking notes. He had not dealt with theoretical diagrams, for the reason stated in the paper, and because he did not see that any good purpose would be served by recapitulating what had been done in connection with them when he was not in a position to add anything new. In reference to the other point raised by Mr. Parry, he had omitted to mention that Goebel denoted the interposition of fresh members between those of the old whorl, as in *Dictamnus Fraxinella*, by placing a dot between the figures representing the whorls.

Provincial Transactions.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The fifth meeting of the fourteenth session was held in the Pharmaceutical Society's House, 36, York Place, on Wednesday, December 16, at 9.15 p.m., Mr. John Lothian, President, in the chair. The following communications were read:—

Note on a Bismuth Mixture.

BY WILLIAM DUNCAN.

The following prescription is frequently ordered by a medical practitioner in a provincial town, and was met with by one of my former pupils who, thinking it might interest the members of this Association, sent it on to me:—

R. Liq. Bismuthi B.P.	℥iss.
Acid Nitric Dil.	q.s.
Aquam. ad.	℥iv.

Ft. mist. Sig. ℥ij. ter. in die ex. aq.

The intention of the prescriber is said to be to add nitric acid till the bismuth is precipitated as oxynitrate, his opinion being that freshly precipitated oxynitrate is more active than any other bismuth salt. Liquor bismuthi contains 60 grains of citrate of bismuth in 1½ fluid ounce, equivalent to 67·68 grains double citrate of bismuth and ammonium—

$$(NH_3)_3BiC_6H_5O_7.$$

It therefore requires 163 grains by weight, or almost 3 fluid drachms dilute nitric acid for precipitation, according to the following equation:—

$$(NH_3)_3BiC_6H_5O_7 + 3HNO_3 = 3NH_4NO_3 + BiC_6H_5O_7.$$

On adding the nitric acid to the solution of bismuth a gelatinous white precipitate is formed, which takes a few days to settle completely. As will be seen from the above equation, however, it is not subnitrate but citrate of bismuth that is precipitated in an exceedingly fine state of division. It remains suspended for a considerable time, and even after settling is easily diffused again by a gentle shake. The formula gives an excellent mixture of bismuth in suspension, without the addition of mucilage or any other suspending agent.

Note on a Manganese Ore.

BY WILLIAM DUNCAN.

During a summer holidaying in Banffshire Mr. Alexander Robertson sent me a sample of manganese ore, with a request that I should find out its composition. The ore was obtained from the Leicht Mines, situated in one of the Banffshire glens, about thirteen miles from the coast. This manganiferous iron ore was discovered in 1840, and the mines were wrought for about 6 years. Owing to their situation and the difficulty and cost of transit they were eventually abandoned. The analysis of the ore gave the following result:—

FeO	26·82
Al_2O_3	3·60
MnO	11·21
MgO	0·97
CaO	1·96
Na_2O	1·21
K_2O	0·96
H_2O	1·85
SiO_2 (soluble)	0·60
SiO_2 (insoluble)	50·10
P_2O_5	0·39
Cl	0·03

The entire absence of sulphur and carbonate points towards this ore being of volcanic origin, as is usually the case with manganese ores. It cannot be regarded as very rich or likely to repay the trouble of working, but from a second sample sent by Mr. Robertson it appears to vary a good deal, and a more thorough investigation might lead to the discovery of richer and remunerative deposits.

Commercial Putty Powder.

BY WILLIAM DUNCAN.

Putty powder is obtained as a bye-product in the preparation of metallic tin. The ore is exposed to a high temperature in a reverberatory furnace, and as the dross forms it is raked off, thoroughly calcined until it becomes of a yellowish-white colour, and is then known as putty powder. The finished product is a very fine and exceedingly hard powder, largely used for polishing purposes. Putty powder is very generally supposed to be oxide of tin among pharmacists, and indeed it is sent out, at least by some wholesale houses, labelled *stanni oxidum*, when oxide of tin is ordered. It has frequently been a stumbling block to both Major and Minor students and mistaken for oxide of lead. An examination of a commercial sample, which is fairly typical of the article usually found in commerce, gave the following result:—

SnO_2	26·74
PbO	64·03
Fe_2O_3	0·88
CaO	1·62
MgO	5·43
H_2O	0·30
CO_2	0·65
	99·65

Looking at the above it is easy to see how students get into difficulties. It is also plain that putty powder cannot be regarded as synonymous with *stanni oxidum* or oxide of tin. It would be more correctly described as oxide of lead contaminated with oxide of tin.

Solubility of Arsenic Trisulphide in Water.

BY WILLIAM DUNCAN.

When sulphuretted hydrogen is added to an aqueous solution of arsenious oxide the liquid becomes yellow from formation of arsenic trisulphide, but no precipitate is formed. This is explained by the fact, mentioned in 'Watt's Dictionary,' that the arsenic trisulphide is in the collodial condition, and may be present in that form, without precipitation, to the extent of 34·46 per cent. The addition of an acid immediately throws down the characteristic yellow precipitate. In testing orpiment or commercial arsenic trisulphide, it may be boiled with water and the clear liquid then gives all the reactions of arsenic but not those of a sulphide. This is due to the presence of a small percentage of arsenious oxide in the orpiment.

Note on Liquor Cocainæ Hydrochloratis B.P.

BY JOHN LOTHIAN

I had occasion a short time ago to prepare a quantity of this solution. Following the official directions, "Boil the water, add the salicylic acid, and then the hydrochlorate of cocaine; cool," I observed that a distinct aromatic odour of salicyl-methyl ester (oil of wintergreen) was given off. This would indicate that decomposition of the cocaine had taken place. Considering that hydrochlorate of cocaine is freely soluble in water it is difficult to see why it should be added to the boiling solution of salicylic acid. To obviate such a cause of decomposition I think it would be advantageous to have the directions amended as follows:—"Boil the water and add the salicylic acid, cool and add the hydrochlorate of cocaine."

Mr. Duncan also read a note by Mr. A. G. Hendry on Siebold's mercuric chloride test for arsenic, and gave a demonstration of its application and delicacy.

The reading of the papers was followed by a discussion taken part in by Messrs. Boa, Cowie, Duncan, Findlay, Hill, Lothian and T. Stephenson, F.C.S., Bombay, a former office-bearer of the Association.

On the motion of the Chairman a cordial vote of thanks was awarded to the authors of papers.

The next meeting will take place on January 6, 1892, when a paper will be read on "Volumetric Solution of Iodine," by J. H. Hoseason, and a "Note on Liquor Potassæ," by James Petrie.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

On Friday evening last, 18th inst., Mr. William Mair, dispenser to the Royal Infirmary, delivered a lecture in the Association's Rooms, illustrated with about fifty lantern slides, most of which had been prepared by himself. A large number of exotic orchids were described, and their manner of growth and peculiarities effectively illustrated. The botany of the orchidaceæ and the various mechanical contrivances which are found in that order for the purposes of cross-fertilization having been described, some details were given of the methods of collection in their native countries. Some notes were afterwards given on the principal British orchids. A number of interesting exhibits were also shown, including a number of orchid blooms.

Mr. Mair was indebted to Mr. E. M. Holmes, F.L.S., and to Mr. J. Rutherford Hill, for specimens of salep, prepared from the pseudo-bulbs of *Orchis maculata*, and other species from the Pharmaceutical Society's Museums in London and Edinburgh, Mr. Holmes having also kindly lent a large number of valuable coloured plates, which were also displayed. Mr. Charles Kerr, Honorary President of the Association, occupied the chair; and in proposing a vote of thanks recalled with pleasure the fact that Mr. Flockhart, of the original firm of Duncan, Flockhart and Co, was an ardent horticulturist, and used to invite his assistants in relays during the summer months, to partake of breakfast at his residence and to enjoy a ramble through his greenhouses. It was pleasing to note in this connection that Mr. Buchanan, of the pre-

sent firm, was one of the most successful orchid cultivators in Scotland, and he thought it very desirable that the members of the craft should indulge in the study of horticulture.

A vote of thanks to the Chairman terminated a successful meeting.

LIVERPOOL PHARMACEUTICAL STUDENTS' SOCIETY.

The usual fortnightly meeting of this Society was held on December 17, Mr. H. Wyatt, jun., President, in the chair.

Mr. Mitchell exhibited a copy of the Edinburgh Pharmacopœia, dated 1792, which created considerable interest. Mr. Mitchell read his "Miscellaneous Notes":—

℞.	Tr. ferri perchlor	℥iii.
	Tr. nucis vom....	℥iii.
	Sod. hypophosph	gr. 70
	Syr. limonis	℥i.
	Aquam ad	℥vi.

M.

On standing this mixture gives a light brown precipitate of ferrous hypophosphite, gradually changing to ferric hydrate. This is probably due to the alkalinity of the soda salt, as it is prevented when a dilute acid is present in the mixture. The precipitate occurs more readily if a stock solution of sod. hypophos. be used.

℞	Ammon. Benzoat	℥ij.
	Ext. Pareiræ Liq.	℥ss.
	Syr. Tolutan	℥ij.
	Aquam. ad....	℥ij.

M.

With some samples of Ext. Pareira Liq. this forms a most unsightly mixture, the extract adhering in a sticky mass to the sides of the bottle on adding the ammon. benz. in solution. A little mucilage remedies this.

℞	Aristol	℥j.
	Vaselin...	℥j.
	Ac. Carbolic	℥j.

Helbing states that heat should not be used in dispensing aristol, and that an ointment with 5 to 10 per cent. of lanoline or vaseline is a convenient form for use. If the foregoing ointment be prepared in the usual manner with a mortar and pestle, the aristol aggregates into a sticky mass or hard paste, which is extremely difficult to separate again, without the aid of a solvent, as ether. If made on a slab it is certainly better, but the aristol is very apt to remain in little patches in the vaseline. Mr. Mitchell found the best method of preparing it was by mixing the aristol and vaseline on a slab, transferring to an evaporating basin and warming very gently, on account of the instability of the aristol, then straining through muslin, and finally adding the carbolic acid, which must be stirred in gently, not rubbed. The aristol by this means seems to be partly soluble in the vaseline; at all events it can be all passed through the muslin, and forms a very elegant ointment.

Mr. Frank Walker proposed that as the Society possessed many excellent specimens, steps should be taken for securing their present rooms that the members, especially those studying for the Minor, might have the privilege of examining the specimens two or three evenings of each week.

Mr. C. F. Symes proposed as an amendment that the Society should endeavour to obtain more suitable premises.

Discussion on the proposition and amendment became general, and ultimately the matter was left in the hands of Mr. J. R. Johnson and the Secretary.

Messrs. Evans, Sons and Co. have just presented a splendid set of plants, numbering from 200 to 300, mounted by Mr. A. E. Lomax. For these, and also for several copies of Lescher's 'Recent Materia Medica,' a hearty vote of thanks was accorded.

Test for Bismuth. By H. Wyatt, jun., President.—Mr. Wyatt said that he had been using for some time a satisfactory test for bismuth, based on the bismuth iodid. test for the alkaloids or Thresh's reagent. In this there are liq. bism. pot. iodid. and acid hydroch., forming an acid solution of bismuth iodid. When a few drops of this solution are added to a highly dilute solution of an alkaloid a characteristic orange preparation is formed, probably consisting of a double salt of bismuth and the alkaloid. The test for bismuth is made by adding to the solution supposed to contain the metal a hydrochloric acid solution of quinine and pot. iodid., when an orange precipitate shows the presence of bismuth.

Oleates.—In making hyd. oleas. 20 per cent. by the B.P. process, if the mercuric oxide be rubbed with sufficient paraff. liquidum to form a cream and then added to the oleic acid, the time occupied in making this preparation is considerably shortened. The oleate may also be slightly heated over a water bath to make the operation more expeditious.

A supper and smoking concert is to be held at the Royal Restaurant, Old Hall Street, on January 14. Tickets may be obtained from any member of the Council and from the Secretary, 56, Hanover Street.

Parliamentary and Law Proceedings.

Prosecution under the Pharmacy Act.

Pharmaceutical Society of Great Britain *v.* Smith.

The case of Richard Bremridge, Registrar under the Pharmacy Acts, 1852 and 1868, *versus* Frederick Young Smith, residing at 76, Easter Road, Leith, touching an infringement of the 15th section of the Pharmacy Act, 1868, was heard before Sheriff Orphoot in the Sheriff Court House, George IV. Bridge, Edinburgh, on Tuesday, December 22.

Mr. P. Morison, S.S.C., agent for Pursuer; Mr. Wilson, counsel for defender, instructed by Messrs. Smith and Mason, S.S.C.

The accused was charged with two offences, in so far as, not being a duly qualified chemist and druggist, he sold a quantity of oxalic acid on November 25, 1891, and a quantity of arsenic and a quantity of strychnine on November 30, 1891, to Thomas Allan, in the shop at 115, Leith Walk, Leith.

On the complaint being read over, the accused pleaded guilty.

Mr. Morrison moved for the penalties.

Mr. Wilson stated in mitigation that the accused had served the full period of his apprenticeship, and although he had not passed his examinations he was quite ready to go up.

The Sheriff: His age is 24. Most young men have qualified at his age.

Mr. Wilson said that was so, but his client had not found it convenient to go up for examination. The learned Counsel further stated that although the accused had been guilty he was authorized to assure his lordship that arrangements had been made which would prevent all cause for complaint for the future, and that his client would not offend again.

The Sheriff said the accused, on his own confession, was guilty of an offence against the Acts, which the Legislature had passed for the safety of the public. The public must be protected against unqualified persons dealing in poisons. He was disposed to accept

the assurances given by the accused, through his counsel, that this practice (if it ever existed to any great extent) would be stopped, and on that account he would modify the penalty to 5*s.* for each offence. But he warned the accused that if ever he came up again he would be severely dealt with.

Reviews.

APPENDICE A LA SEGUNDA EDICION DE LA NUEVA FARMACOPEA MEXICANA DE LA SOUEDAD FARMACEUTICA DE MEXICO. Mexico. 1890. Pp. 67.

The second edition of the new Mexican Pharmacopœia was issued in 1884, and this appendix is therefore published after a lapse of six years. A permanent Pharmacopœia Commission is retained in Mexico, the existence of which will perhaps account for the fact that both the Pharmacopœia and the appendix include a very large number of modern "new remedies." The appendix is divided into three parts. The first part may be said to form a dictionary of materia medica on a small scale, and includes "natural vegetable products," or, in other words, organic materia medica; the second part, chemical products, and the third pharmaceutical preparations. In the first part the drugs are alphabetically arranged under their Mexican names and the natural orders, botanical names, and (where such exist) the French and English synonyms, as well as the part used, are mentioned, followed by a brief description of their physical characters, physiological action and therapeutical uses. In the second part methods for preparing the chemicals are given, and the physical characters of each enumerated, and their therapeutical properties and doses recorded. In the third part formulæ for the various preparations, and directions for their manufacture, are given.

It will thus be seen that the Mexican Pharmacopœia resembles the 'Extra Pharmacopœia' in forming a condensed encyclopœdia of materia medica and pharmacy. Besides the additions that have been made to the Pharmacopœia, notes supplementary to the information in the last edition of the Mexican Pharmacopœia are given, chiefly relating to recent discoveries of the active principles. These notes have been derived from the principal Mexican medical periodicals and from the *Journal de Pharmacie et Chemié*, *L'Union Pharmaceutique*, and the *American Journal of Pharmacy*. It is not surprising, therefore, to find that much information contained in English and German periodicals is wanting. Amongst the new additions to the Pharmacopœia appear some plants which are also natives of Great Britain, *e.g.*, *Anagallis arvensis* and *Melilotus parviflora*. The former is said to be used in the city of Mexico as a substitute for *Saponaria officinalis*, and to be employed in visceral obstruction, consumption, and epilepsy. The active principles are given as saponine and a volatile oil, four drops of the latter causing intense megrim with nausea.

Of new European remedies may be noticed Boldo, *Cascara sagrada*, Curari, Cedron seed, Hamamelis, Hydrastis, Convallaria, *Stigmata maidis*, Parthenium Hysterophorus, Quebracho, and Thapsia. A few are worthy of note as having well known names applied to local products, and therefore likely to cause confusion if at any time sent to this country, thus—"Arnica del Pais" is *Heterotheca inuloides*, Bais.; "Yerba Santa" is *Piper sanctum*, Mos and Sese; "Artemisa" is *Ambrosia artemisiæfolia*, L.; and "Belladonna del Pais" is *Nicandra physaloides*, Gaertn. Some of the Mexican products that seem more particularly worthy of notice on account of their probable medicinal activity are the following—*Ambrosia artemisiæfolia*, said to be a good anthelmintic; *Rhamnus Humboldtiana*, Rœm. et Schultz, the seeds of which are said to contain an active principle which paralyses the ends of the motor nerves, and the tincture of which has been employed in tetanus and hydrophobia; *Cecropia mexicana*, employed as an escarotic for corns and warts, and as an application to indolent ulcers; *Rourea oblongifolia*, Hook. et Arn., said to possess tetanizing properties and to be used in various skin diseases, the seeds as well as the roots being also used to poison coyotes; *Senecio Grayanus*, Hemsl., possessing an action like digitalis, but applied externally as a vulnerary and anti-rheumatic remedy; *Senecio tolucanus*, D.C., having similar properties and affording an alkaloid called toxisenecine; *Lœnnecia parvifolia*, D.C., used in the form of infusion like that of *Calea Zacatechichi* in the treatment of biliary calculi; *Helenium mexicanum*, employed as a sternutatory, and containing a poisonous alkaloid named andrealfonsine; *Baccharis conferta* and some allied species which have a great reputation in the treatment of coryza; and *Talauma mexicana*, Don., which suspends the respiratory and cardiac movements in frogs, but is used as an antiperiodic. It is a little surprising to find the "loco" weed (*Oxytropis Lamberti*) and the tanning material "Canaigre" (*Rumex hymenosepalum*, Torr.), in the list of materia medica, but the articles of materia medica in the Pharmacopœia are so numerous that it should not perhaps be judged by European standards. Some months since a remedy under the name of Pambotano was described in a contemporary as a febrifuge in malarial fever, and the drug was attributed to *Calliandra Houstoni*, but in this appendix it is referred to another species, viz., *C. grandiflora*. The second appendix includes a large number of new chemicals employed in medicine in Europe, such as adonidin, anemonin, arbutin, boldine, boldoglucin, cocaine, convallamarin, quassiin, sparteine, picrotoxin, and even such little-used active principles as colchicine, helleborin, strophanthin, tetano-cannabin and ulexine. Many remedies of proved value also find a place here, of which may be mentioned podophyllin, euonymin, citrate of lithia, diastase, peptones, menthol, oleate of mercury, paraldehyde, sulphonal and iodol. Under pharmaceutical preparations in like manner an attempt to include all recently introduced preparations is evident. The use of lanolin, vaselin, ichthyol, naphthol, and the large number of formulæ for subcutaneous injections and antiseptic cottons show that there exists an evident desire to keep pace with the times. The medical practitioner in Mexico has in the Mexican Pharmacopœia and its appendix probably a larger field to draw from than he would have in any other country in the world. If the pharmacist in Mexico finds it necessary to keep all the articles of materia medica and preparations described in these two works, his lot, as compared with his European brethren, cannot be an enviable one.

LES ARISTOLOCHES. PAR DR. L. PLANCHON.*

There is a kind of fascination about the Aristolochias which is almost sure to attract the attention of any real student of nature, and it is not surprising that Dr. Planchon, who is related to the late well known botanist, Dr. J. E. Planchon, as well as to the equally well-known authority on materia medica, Dr. G. Planchon, should have paid attention to a group of plants interesting alike from a botanical and materia medica point of view. Like the orchids, they are remarkable for the singular form and structure and odour of their flowers, and as in the Euphorbiaceæ, they present remarkable variation in the appearance of the drugs derived from them. Although in nearly every quarter of the world they yield supposed antidotes to snake bite, yet there is perhaps less known of the actual

* Montpellier: 1891. Large 8vo. Pp. 1-266.

physiological properties of this genus than that of the plants of any other genus so well marked by natural characters. With such a field before him, Dr. Planchon has had every chance of producing an interesting volume.

The author divides his subject into three parts, viz., the history, characters, and properties of the genus Aristolochia. In the first part he sketches the tribes into which the Aristolochiaceæ are divided, and shows that whilst the order is considered to be allied to Taceaceæ and Dioscoraceæ among the Monocotyledons, and to the Begoniaceæ, Datiscaceæ, Cucurbitaceæ, and even to the Menispermaceæ among the Dicotyledons, yet that it remains a well-marked and easily recognized group of plants. The general features of the different organs of the plants of the genus are pointed out, and the history of the genus briefly commented on. Thus, although some species were used in medicine from very early times, and their properties are described by Dioscorides, Avicenna, Rhazes, Pliny and others, yet in the time of Linnæus only thirteen species were known, and at the present time about two hundred species have been described.

In the second part details are given of the drugs derived from this genus, as met with in collections of materia medica, and the different kinds are arranged in three groups under the following heads:—First, fibrous; second, woody; third, tuberous aristolochias. Of the first group, serpentary root may be taken as the type; of the second, the Boiari of British Guiana, or the Milhomens of Brazil; and of the third, *Aristolochia longa* and *A. rotunda*. To the second group belong several of the kinds of "Guaco" or "Huaco" used as antidotes to snake-bite in Central and South America, although species of Mikania are certainly used in Guatemala and Mexico under the same name and for the same purpose. In this section anatomical descriptions of the roots and tubers used in medicine are given, as well as of such other species as the author has been able to obtain for examination. These descriptions are the outcome of actual work, as they refer only to those which have been subjected to histological examination by the author himself, who has evidently spared no pains to procure specimens for this purpose, the leading colleges, etc., of France, and even Algeria, having been laid under contribution.

The third part contains in greater detail what has been previously sketched in outline in the first part, but includes only the species (about 70 in number) which are or have been used in medicine. Under each species is given a reference to the original description and to illustrations of the species, a list of synonyms, the vernacular names, habitat, botanical characters, uses and doses. The author, in conclusion, shows that while a few species are poisonous, the majority possess diaphoretic, stimulant, emmenagogue and antiseptic properties. They appear to stimulate the action of the heart, glands and skin; and applied externally to act as antiseptics. As is often the case, the high estimation in which the plants were formerly held was followed by an undeserved neglect. The author thinks that they deserve a thorough scientific examination. Several of the species are common in the south of Europe, *A. longa*, *A. rotunda*, *A. Pistolochia*, *A. Clematitis*, etc., and others, such as *A. anguicida*, *A. grandiflora*, *A. cymbifera*, *A. maxima*, etc., are easily obtainable from Central and South America, and *A. recurvilabra* is largely exported from Ningpo under the name of Tu-ching-muhsiang (*Pharm. Journ.*, 1873, p. 725), whilst *A. Sipho* is common in English gardens. There would therefore be no difficulty in obtaining a better knowledge of the chemical constituents and physiological action of plants of this genus. A long list of the works consulted and an index concludes the volume. The index might have been made more complete, as it contains only a very few of the vernacular names, and these only when the botanical name of the plant or drug is unknown. The author may be congratulated on having published a very useful work of reference, which cannot fail to be of great service. Indeed, it is practically indispensable to anyone working on this very interesting genus. It will also, it may be hoped, serve to direct attention to a group of plants too long neglected, and which in the light of modern science may be found to possess unexpected uses in medicine.

WATTLES AND WATTLE-BARKS. By J. H. MAIDEN, F.L.S., F.C.S., etc.*

This pamphlet has been issued by the Department of Public Instruction in South Australia, and forms No. 6 of the Technical Education series.

In an introductory note preceding the preface it is recommended by Mr. J. Ednie-Brown, the Director General of Forests, as "an excellent treatise upon the subject of Wattle cultivation generally."

Mr. Maiden, who is the Curator of the Technological Museum in Sydney, is already known to the readers of this Journal as a valuable contributor concerning Australian gums, resins and kinos.

The subject treated of in the present pamphlet, although not of direct interest to pharmacists, is one of very considerable commercial importance in this country, and of still greater in Australia. The word wattle in that portion of the empire is applied to various species of acacia on account of their early use in making "dab and wattle" structures. The bark is now largely used both in Europe and America for tanning purposes, being known in this country as "mimosa" bark. Mr. Maiden points out that owing to the irregularity of supply, tanners in Europe and America have been compelled to fall back on articles, of which regular shipments are obtainable, such as valonia, etc.; and he recommends that the richest species, "*Acacia pyenantha*" and "*A. decurrens*," should be extensively cultivated in order to provide a regular supply of the bark. According to the consensus of the opinions of various authorities quoted by Mr. Maiden, the wattles trees form a very profitable crop, and can be grown on the poorest land where hardly anything else will grow. There appears to be some difficulty in procuring in Australian commerce perfectly pure seed of the species mentioned. Mr. Maiden does not, however, point out the characters by which the seed may be specifically recognized. This, we hope, may be done in a future edition. The pamphlet is divided into two parts. In the first the author describes the kind of soil and amount of moisture requisite, the precautions necessary in planting the seed, and the methods of collecting and preparing the bark for the market. The adulteration of the bark with that of other species is mentioned, but the means of distinguishing the silver wattle (*A. dealbata*) from the black wattle (*A. decurrens*) is not pointed out. Details as to the commercial working of the wattle cultivation are also given. Part II. is devoted to the description of various kinds of wattle trees, forty-five species being enumerated, and eight species illustrated by engravings. The more valuable species are *A. penninervis*, *A. vestita*, *A. pauciglandulosa*, *A. elata*, *A. binervata* and *A. saligna*, all of which average more than 30 per cent. of tannin.

There are three appendices, the first containing botanical notes explaining the curious phyllodes and other peculiarities met with in the growth of this genus of plants in Australia. The second gives in detail the varieties of *Acacia decurrens*, and the third gives a tabular statement of analyses of wattle bark, many of which are now published for the first time. These tables indicate at a glance the most valuable,

* Sydney: G. S. Chapman. 1891. Second Edition.

the inferior, and the worthless varieties. An excellent index completes a most useful work, which cannot fail to be acceptable in countries where the wattle trees can be grown, and will be certain to reflect great credit on the indefatigable and painstaking author. The Technological Museum may be congratulated on possessing so able and energetic a Curator.

PHOTOGRAPHY APPLIED TO THE MICROSCOPE. By F. W. MILLS. With a chapter on mounting objects, by T. CHARTERS WHITE, M.R.C.S.*

In the preface to this little work the author expresses his belief "that microscopists feel the want of a practical guide to instruct them in the application of photography to their science." It is doubtful whether he has done much to supply this want more than has already been done, but his book is extremely suggestive, and may well serve as an introduction to the subject. An essay rather than a treatise, it gives in brief space a comprehensive view of a branch of science which would require several bulky volumes to contain its details. As the writer adheres strictly to what is specified in the title of his book, the tyro requiring information regarding the manipulation of the microscope itself must seek elsewhere.

The first third of the book is occupied by Dr. White's essay on the special preparation, cutting, staining and mounting of objects to be photographed. A defect, from the pharmacist's point of view, is the scant attention devoted to vegetable sections and the crudity of the methods advocated for preparing the same. The best micro-botanical work is now conducted with as much care and attention to details as was formerly given to animal tissues alone. Passing to the description of necessary apparatus, we must demur to the statement that expensive apparatus is not needed for ordinary work.

It is only by the employment of first-class accessories that reliable results can be obtained, and we doubt the wisdom of shirking the fact. A workman's skill is mis-spent, unless he possesses trustworthy tools. Surely it is somewhat late in the day to suggest that the objectives need not of necessity be corrected for photography. If this be acted upon, specially corrected eye-pieces will be required. We fail to find any mention of the only perfectly corrected lenses for this work—the "apochromatic" objectives and "projection" eye-pieces which have already almost revolutionized the study. An achromatic substage condenser is an absolute necessity for high power and much low power work, and we incline to the opinion of those advanced workers who deprecate the introduction of any unachromatized lens into the system of apparatus.

The particulars regarding the optical properties of lenses are of value, as is also the full page illustration of Pringle's apparatus which gives a good idea of what is really needed. Makeshift camera attachments are worse than useless. One could wish a little more space had been spared to describe the process when a paraffin lamp is the source of illumination, as this is perforce what most students will employ, and is besides capable of first-class work if time be no object. The special photographic details are concisely arranged, and a very complete list of works for reference concludes a useful summary of photo-micrographic processes.

THE PRACTICE OF HYPNOTIC SUGGESTION. By GEORGE C. KINGSBURY, M.A., M.D.†

The subject of this book, hypnotic suggestion, has been very prominently before the medical profession during the last three years, and much interest has been manifested in regard to its value as a therapeutic agent. Everyone who desires to be informed on this subject should read Dr. Kingsbury's book. He traces in an interesting manner the history of hypnotism, and furnishes an able summary of the efforts of those who have endeavoured to make it useful in the legitimate practice of medicine.

It seems to have been the author's main endeavour to indicate the direction in which hypnotism may be beneficially employed and to point out the dangers which may follow if the hypnotic state be injudiciously induced, and he strongly insists that "hypnotic practice" and the investigation of hypnotic phenomena should rest with the medical profession.

It is to be regretted that the author of such a temperate and instructive work as this should believe that snakes can fascinate and render catalyptic the rabbits and pigeons supplied to them for food.

* London: Iliffe and Son. 8vo. Pp. 62. 1*s.* 6*d.*

† John Wright and Co., Bristol.

Obituary.

Notice has been received of the death of the following:—

On the 6th of December, Mr. William Edward Skirrow, Chemist and Druggist, Main Street, Bingley. Aged 67 years.

On the 7th of December, Mr. John Couper, Chemist and Druggist, Over Croy, N.B. Aged 58 years.

On the 15th of December, Mr. Robert Thomas Brown, Pharmaceutical Chemist, Essex Road, London. Aged 66 years. Mr. Brown had been a member of the Society since 1864.

On the 15th of December, Mr. Robert Michael Roberts, Chemist and Druggist, Foregate Street, Chester. Aged 48 years.

On the 16th of December, Mr. Paul Webster, Chemist and Druggist, Padiham. Aged 68 years.

On the 15th of December, Mr. William Robert Jones, Chemist and Druggist, Bank Place, Penrhyn. Aged 58 years.

On the 20th of December, Mr. William John Day, Chemist and Druggist, Upper Parliament Street, Nottingham. Aged 71 years.

On the 16th of December, Mr. Jacob Wyke, Chemist and Druggist, Cross Street, Abergavenny. Aged 85 years.

BOOKS RECEIVED.

THE WATER CURE IN THE BEDROOM, or Hydropathy at Home. By G. H. DOUDNEY, M.B. Bristol: John Wright and Co.

INDIGESTION CLEARLY EXPLAINED, TREATED, AND DIETED. By THOMAS DUTTON, M.D. London: Henry Kimpton.

PETIT FORMULAIRE DES ANTISEPTIQUES. By L. A. ADRIAN. Paris: Octave Doin. From the Author.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

LOCAL SECRETARIES AND THEIR DUTIES.

Sir,—For several weeks past communications have appeared in the Journal upon the subject of local secretaries and their duties, some of them deserving of the publicity given to them. I had thought some abler pen than mine would have been taken up in their defence, but few of them appear to heed the insinuations thrown out. Apathy is all very well in its way, but were these attacks to remain unanswered, it might be taken for granted that the other side had scored.

Small wonder that some of your correspondents have

been "left out" of the visiting lists, if they treat the gentlemen who take the trouble to call upon them in the temper they express in their letters. It is all very well to urge the appointment of "energetic, frank and honorable" gentlemen, but is it reasonable to suppose that these gentlemen—in an office entirely honorary—will put themselves to a large amount of inconvenience, to be exposed to insult and abuse? Mr. Wiggins, in the Journal of December 5, is a case in point.

Personally I have no reason to complain. I have made the personal acquaintance of every chemist in this town, and as a body they form a remarkable contrast to some of your correspondents' neighbours. I have been received in nearly all cases with respect, and though the Society's exchequer was not swelled to an alarming extent, yet I found perfect willingness on their part to hear the arguments for the Society. It is a difficult matter in a large town to see every chemist, and often it entails calling more than twice. Civility is not always met with, and we are prepared to receive an occasional rebuff; but this is largely discounted by a remembrance of Ovid's line:—

"Ex urticæ proxima sæpe Rosa est."

Grumbling is chronic. The greatest offenders in this respect are those who have never in any shape belonged to the Society. It is a common experience to be told, with a wide sweep of the arm, "that Tom, Dick and Harry sell poisons all over the shop," and "the Society has done nothing for us." There are more than 10,000 who expect the Society to protect them whilst they withhold from that work their own assistance.

According to my experience the Council is willing to undertake any case which is brought properly before it, and if the trade would but understand with what care and courtesy each report is received at Bloomsbury Square, they would be more ready to give the information which cannot otherwise be obtained.

It has been asserted that "local secretaries" are lazy and indifferent. In my district I have reported more than twenty rectifications of the register, and if those persons who so freely make the above assertion, will ask for and obtain an appointment in a town of 100,000 inhabitants and carry out the duties of the position as they ought to, they might then let your readers know where the laziness comes in.

It is a very difficult matter to obtain evidence of the retail sale of poisons by drysalters, photographic chemists and others, who are ready to assert that their transactions are wholesale. Moreover, the majority of offenders pay the penalty demanded by the solicitor. Consequently, their names do not appear in print. Delicacy, no doubt, has a large part to do with the apparent apathy, because local secretaries not unfrequently find that were they to act impartially (according to the law as expounded by some of your correspondents), their own fraternity would offer by far the largest supply of delinquents, and that the County Courts Case Book would be but a slightly abridged edition of the 'Register of Chemists and Druggists.'

There are one or two points in "Plebian's" letter which deserve a reply, but I do not encourage anonymity; it is the bane of modern life, the cause of more ill-feeling, broken friendships and blighted characters than almost any other form of attack. Surely a man ought not to be ashamed to own the child of his own brain. That letter, written no doubt in a good spirit, has hurt the feelings of more than one "genial, frank and honourable gentleman," besides leaving innocent men open to accusation, for instance, Mr. Hart. If a man's intentions are honest, his name ought to be appended to his writings.

A live donkey under its own hide is better than a dead lion in a classical skin.

I do not see that there is anything to be added to the series of excellent leaders which have appeared in the Journal, unless it be that the local secretaries throughout the country ought to be greatly indebted to you for your estimation of their position; as a body I am afraid we rather underrated our importance. As a rule there is not much chance to employ what small amount of oratory we may fortunately possess to urge the claims of the Society upon a man—who, when we happen to call upon him on behalf of widows and orphans—has just emerged from an unsuccessful tussle with a refractory tooth, and is now face to face with an infuriated victim. So, too, many of our fraternity have their tempers sorely tried by the daily increasing number of commercial travellers, which really leave them little time for the proper conduct of their own business and even less inclined to listen to our arguments.

Touching your reference to herbalists, etc., there is no doubt a great deal of evil connected with them, but persons of that class are very "fly;" they know their customers, and to detect them the "secret emissary" of the Society should dress up according to the class catered for; suspicion is soon aroused by anything out of the actual daily track. It would be no hardship for the majority of these places to be closed, for their principal business is notoriously one that will not bear careful inquiry.

Regarding "cheap" shops it is a little unreasonable for chemists to cry out when many of them are so ready to offend themselves. A 10 oz. bottle was handed in on Friday to be filled with "Tincture of Indian Bark;" it had a large wholesale label affixed, and over this a local retail chemist's address, and I was informed it was filled by this chemist for 1*s.*, and the dose was one teaspoonful.

As for the Benevolent Fund very little can be added to the letters upon this subject, especially the one in your issue of October 21 from Mr. McNaught. The chief objection I have had to meet has been "that it is not known how the money is distributed." Clear evidence that the objectors do not care to read the reports.

One man certainly asserted "he had paid his poor rates and supposed others did," then "why should he be called upon to help those who ought to go on the parish"—just so! A man with twelve children must be in a very comfortable position indeed to be safe from all the innumerable causes which have brought greater and more sanguine men than "chemists, dentists, and patent medicine vendors" to their knees, yet men like this, when adversity does come upon them, are equally eligible and as likely to be elected as the poor soul who paid his half-crown to the Fund while he could afford it.

In the general work of the Society, local secretaries can do but little without the support of the chemists in the districts—a certain responsibility upon them all is equally laid. Unless they assume that responsibility and make the Society's representatives acquainted with any information they are capable of giving him, his office cannot fail to be looked upon with the cynical want of appreciation which has shown itself in your correspondence columns.

Preston. CHARLES A. ARKLE.

THE EXAMINATION OF URINE FOR GRAPE SUGAR.

Sir,—One or two points in Mr. Hudson's letter of last week seem somewhat misleading.

In speaking of the specific gravity of urine as indicating whether or not it contains glucose, Mr. Hudson says: "To be on the safe side all specimens that are of high or low gravity ought to be tested for sugar chemically, and gravity not depended on solely." Now, I think that glucose is invariably tested for chemically, no matter what the specific gravity may be; and certainly no one would think of pronouncing a specimen of urine as diabetic, solely from a high specific gravity.

Though Fehling's is an exceedingly delicate test for glucose in watery solution, its behaviour with urine containing a small percentage of glucose is sometimes of doubtful significance. The reagent I much prefer is Nylander's modification of Boettger's bismuth test, as recommended by Mr. Saul.* For the estimation of glucose the Pavy-Fehling solution leaves nothing to be desired.

By the way, boiling urine in a test tube is sometimes rather difficult, on account of the "bumping" which takes place. With Fehling's solution this is of little account, as the contents of the tube merely require to be raised to the boiling point, but the bismuth reagent above referred to has to be boiled with the urine for a minute or two.

The "bumping" is sometimes very troublesome. I have found an efficient remedy in the addition of powdered pumice. A grain or two added to urine which is boiling in the above erratic fashion invariably facilitates the evolution of steam, and renders the operation at once safe and satisfactory.

Edinburgh. J. A. FORRET.

* *Pharm. Journ.*, [3], vol. xvii., p. 856.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, JANUARY 2, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

1891.

THOUGH the Jubilee of the Pharmaceutical Society has been reached during the past year without a full realization of the objects with which the institution was founded, the official celebration of that event was marked by such a splendid recognition of the value of its labours in the improvement of British pharmacy that this may be regarded as having been the most important occurrence of the year. It was a proof that the aims and work of the Society, as a representative organization, are highly appreciated and respected by the corporate bodies representing medicine and science, and that they have gained for it the esteem and goodwill of pharmaceutical associations in all parts of the civilised world. For every individual connected with British pharmacy that recognition has a distinct practical value. Such a manifestation of approval cannot fail to have an important effect in augmenting the credit and influence of the Society. To those who are connected with that body it should operate as an encouragement for the future as well as a reward for the past, and to those who are not it may serve at once as a complete answer to the question, What has the Society done for us? and as a reproach for their failure to take part in its work.

With this exception the past year has not been remarkably eventful. The constitution of the Society's executive body remains practically unaltered. Mr. WARREN, the only new member, was elected by the Council in February to fill the seat left vacant by the resignation of Mr. MARTIN. The election of members of Council in May resulted in the return of all those who had previously been in office. It must naturally be inferred that the policy of the Council meets with the approval of the great majority of those who take an interest in pharmacy. At the election of officers of the Society in June, Mr. CARTEIGHE was again chosen President, this being the tenth year that he has consecutively occupied that position. Mr. ALEXANDER BOTTLE was again elected Vice-President, and Mr. HAMPSON Treasurer.

The increase of the Society's official business has long since created a pressing necessity for more adequate accommodation, and the carrying out of the plans decided upon two years ago by the Council with that object, has involved some considerable change in the financial position. Broadly speaking, a portion of the invested capital has been converted from Government stock into premises which are suitable for the various kinds of business to be transacted, and are partly a source of income in the shape of rent. This investment of capital in premises necessarily reduces the immediate income from that source; but it is believed that indirectly a corresponding advantage will be gained by the more dignified character of the Society's establishment. As the PRESIDENT remarked at the annual meeting the power and influence of the Society is not to be measured by pounds, shillings, and pence; but by the credit and respect to be acquired by an efficient performance of its duties and by the prestige created by its promotion of knowledge and education. In those respects the Society has conferred great benefit upon the trade, which has been but very partially acknowledged and responded to. The establishment and maintenance during the last twenty years of a register of persons legally qualified to carry on the business of a chemist and druggist is another service for which the trade is indebted to the Society, and, in view of that fact, it is a striking anomaly that two-thirds of the trade should still remain unconnected with the Society.

Among other notable circumstances by which the past year has been marked, the failure of the attempt to obtain an amendment of the Pharmacy Acts is one of the chief. At the commencement of the year there seemed to be a fair prospect that the Draft Pharmacy Acts Amendment Bill then under consideration might receive sufficient support from chemists generally to have a chance of being passed when introduced into Parliament. As the Bill is now a thing of the past that may have been forgotten by some, it is necessary to say that it contained provisions for establishing an educational system under which the qualifying examination would be divided into two parts with an interval between them, during which apprentices would be required to attend specified courses of scientific instruction, either immediately after passing the Preliminary examination or after the completion of apprenticeship. That was to constitute the "curriculum" for pharmaceutical students. Other provisions relating to the constitution of the Society were intended to facilitate its consolidation as the effective political representative of the entire trade. Lastly, there was provision for restricting to legally qualified persons the dispensing of medicine, as being their especial business, and for making all registered persons exempt from jury service. Those provisions would have had the effect of protecting the interests of registered persons and

of extending the area of the restricted portion of the chemist's business.

The PRESIDENT, in continuation of his efforts during the previous year in attending meetings in London and the provinces, for the purpose of explaining the objects of the Bill and obtaining expressions of opinion in regard to them, visited Scotland with the same object. He was present at meetings held at Aberdeen, Dundee, Glasgow, and Edinburgh in the month of January. On his return journey further meetings were also held at Dumfries and Carlisle. All these meetings were well attended, not only by members and associates of the Society, but also by the chemists and druggists of the several localities. At all of them resolutions were passed expressing general approval of the Bill, and confidence in the Council as deserving the support of the entire trade in promoting further legislation in the interests of pharmacy. The long discussions which took place on those occasions were at the time fully reported in the Journal, and for the information of those unconnected with the Society the numbers containing the reports were sent to every registered chemist and druggist in Scotland. In view of the subsequent fate of the Bill it will, however, be desirable to refer to some of the views then expressed by different speakers.

But in the first place it may be mentioned that at the Council meeting in February the Law and Parliamentary Committee presented the draft Bill in the form recommended for adoption. The PRESIDENT then stated that the details of the Bill had been very fully discussed, and that although various suggested modifications and additions had been carefully considered by the Committee, it had not been found advisable to make any material alteration of the Bill. But he expressed a hope that all interested in pharmacy, and even those who assumed to represent the trade as being distinct from the Society, would be willing to make some sacrifice for the common good, since legislation devised for a body carrying on business in so many diversified ways must necessarily appear to press harshly on some individuals. The recommendation that the Committee should be authorized to ake steps for introducing the Bill into Parliament was thereupon unanimously adopted by the Council. Mr. HAMPSON expressed regret that the Bill could not have been made to include other things, though he was persuaded that could not be done. He instanced the dispensing clause as offering a distinct gain, and the provision for bringing into the Society every one interested in the calling of a chemist and druggist as a step that might eventually admit of something more being done in the future. He hoped, therefore, that the craft would rally round the Society, and, sinking minor differences, support the Bill as one that would be of substantial benefit to the trade and to the public. At the same time Mr. HARRISON and Mr. STORRAR, though agreeing that the Bill should be supported by the trade, as comprising all that could then be asked for, expressed their opinion that it did not meet the expectations of many members of the trade sufficiently to command general support. That opinion was afterwards fully justified. When the Bill was formally introduced by Sir H. ROSCOE, it met with immediate opposition and was blocked.

Hence the PRESIDENT had to report to the Council at the July meeting that it was impossible to proceed further that session, and that it was the recommendation of those who had charge of the Bill in the House of Commons not to continue it upon the notice paper. Of the nature of the opposition nothing special was disclosed, though the PRESIDENT said his late experience in the country had shown him there were a good many people interested in one way or another in preventing that unity of action among chemists and druggists which is so essential for obtaining legislation for the advancement of pharmacy. In the discussion following the announcement, it was stated by Mr. HARRISON that the want of real interest in the Bill on the part of the trade had been the main cause of its failure, since it left the opponents of the measure masters of the situation, and Mr. STORRAR remarked that, short of providing for pharmaceutical legislation by a Government measure, there was no prospect of success but by making the Bill so popular as to please the whole trade, and that he thought was impossible. Mr. SCHACHT gave expression to the feeling of irritation produced by these repeated failures. He spoke also of the disappointment experienced by pharmacists who recognize the necessity for the legislative provisions the Council has been endeavouring to obtain, and their importance for the protection of true pharmaceutical interests. He refused to believe that the task was so hopeless as had been represented, and upon his motion the question of reintroduction of the Bill was referred back to the Law and Parliamentary Committee for further consideration. Since that time nothing has been heard of the Bill, and at the present the prospects of pharmaceutical legislation are as unpromising as ever they were.

In the PRESIDENT'S address at Aberdeen he first directed attention to the fact that the Council can only suggest to the Legislature certain amendments of the law. In explaining the provisions of the Bill he commenced with the systematic education which the Council holds to be necessary, showing how the proposed division of the examination would have the effect of stimulating apprentices to take some trouble, during their apprenticeship, in acquiring the knowledge required for passing, instead of leaving study, as so many do, until after its completion.

He showed that this system would necessarily make candidates better able to pass and more efficient, at less expense and trouble than is now the case; that the need for differentiating the chemist from the average tradesman was the essential principle upon which that proposal was based, and that the chemist's better education is the only ground for claiming a professional rather than a mere trade price for drugs, medicines, or dispensing. In regard to the constitution of the Society he showed that the alterations contemplated were so essentially democratic as to afford opportunity for every member of the trade to be represented and to take part in the work of managing pharmaceutical affairs, instead of remaining in discontent outside. He further showed that the provisions of the clause for restricting the dispensing of medicine were based on the principle that chemists and druggists should exercise the power they possess in the interest of themselves and other registered persons. If an apprentice were allowed to do that which registered persons were supposed to have an exclusive right to do, the value of their legal protection would be destroyed. The mover of the resolution in support of the Bill at the Aberdeen meeting prefaced his remarks by stating that though he had never been connected with the Society and had never been able to see the use of being so, he would heartily support the Council in its endeavour to obtain legislation that would satisfy the just aspirations of the trade. He hoped all the chemists of the country would do the same. However, in proceeding to explain his views, he first remarked that the Bill did not contain all that was generally desired, and his suggestions for the remedy of that defect showed that he regarded the suppression of company trading as one of the just aspirations of the trade. His desire for information as to the nature of the bye-laws to be formulated by the Council in respect to the educational provisions in clause 2 of the Bill furnished a curious criticism of his previously declared inability to perceive the utility of belonging to the Society. Equally curious was his suggestion that Aberdeen and the north of Scotland should be exempted from the application of the educational provisions of the Bill. While admitting that the time had arrived for altering the methods of examination, he desired the alteration to be directed to conferring upon lads of eighteen a legal qualification to act as assistants of chemists and druggists, but not to carry on business on their own account. Another suggestion was that all Minor men should have the title of pharmaceutical chemist and be eligible as members of the Council. Here, again, was a marked illustration of the mistake made in thinking that it is of no use to be a member of the Society. To effect that change it was urged that power should be obtained to amend the constitution of the Society, and to adopt some means for giving all the chemists in the country a special interest in being members of it. This view appears to have given but little consideration to the claims of those who have already acquired the title of pharmaceutical chemists, or to their rights as members of the Society; but that, again, may have been a consequence of not perceiving the utility of belonging to the Society. For the rest it is the fact that almost all the above conditions have been within the reach of all the members of the trade for the last fifty years. The only thing that has been wanting for their realization has been the unreasonable reticence of chemists and druggists in not joining the Society and thus constituting it a fully representative power through which the attainment of their desires might be achieved or sought for. But for that deficiency the Society would have had greater power to protect the trade interests of chemists and druggists, and its educational ramifications might have been extended to a degree more in accordance with the requirements of the case. In seconding the motion, Mr. CLARK said he believed few seriously objected to the contents of the Bill, but they desired that clause 7 should be extended so as to prevent company trading, which was detrimental to the *bonâ fide* chemist. Though no one could doubt the advantage such an extension would be, he thought it would certainly be fatal to the Bill to insert a clause striking at stores, and that chemists would gain much by the passing of the Bill as it stood. It would free them from jury service. It would enable the Council to regulate education and amend the examination. In regard to the complaint that the Society does nothing for the trade, Mr. CLARK thought it was more to the point to ask what the trade had done or was doing for the Society. In his opinion the first duty of chemists was to join the Society and assert themselves by having a voice in its affairs. The expediency of the curriculum was questioned by one speaker on the ground of the expense he thought it would entail. Rather than divide the examination he would take a whole week to examine each candidate, and the extra expense of such a plan did not appear to strike him.

At the Dundee meeting the PRESIDENT again urged the fact that the Society has no power to legislate. Of its two important but essentially distinct functions, that of examining those who wish to become chemists and druggists and carrying out the law as to registration, being clearly defined by Act of Parliament, while its other function was that of a purely voluntary association of individuals. He pointed out that it was in this latter capacity the Council had suggested new legislation for the benefit of the trade, and if it were not carried through the responsibility would rest upon the whole trade: that in going to the House of Commons it was necessary

to avoid jeopardizing the reputation of the Society by asking for more than could be reasonably expected: that while the majority of the trade outside of the Society was calling upon the Council to obtain additional powers, the Society represented only a fraction of the trade, and that it was only reasonable to suggest combination among the members of the trade as an essential preliminary. Besides education, the Bill, then under the consideration of the trade, dealt with the consolidation of the trade with the Society. It asked for further privileges for all registered persons, but it did not deal with company trading, because it was deemed hopeless and inexpedient to do so. The discussion at this meeting was at first directed almost entirely to insisting upon the propriety of inserting a clause directed against company trading and urging objections to the curriculum. Mr. STORRAR then pointed out that the Council fully appreciated the evils of company trading, and that the real question was whether a remedy should be sought for by the increased qualification of the legitimate trader or by trying for legislative protection. If the latter was to be attempted it could only be by joining the Society and thus increasing its influence. In that respect he thought chemists in Scotland had not done their duty, and while that was the case there was no ground for saying they would join the Society after it had done them some good. They should take part in the Society's work as members, and help to carry on the work it had to conduct. Though a resolution was then carried without opposition, it was evident that there was a want of agreement as to supporting the Bill.

At the Glasgow meeting the PRESIDENT, after explaining the details of the Bill, said that for passing it the support of the whole trade would be required. Chemists must show some unity before there could be the slightest chance of the Bill passing, and if they did not support the Society there was an end to legislation, since the Society was the only body through which legislation could be obtained. But though the position was thus plainly put, the subsequent discussion proved that the state of opinion was utterly discordant. Even the mover and seconder of the resolution of approval that was passed seemed to regard the protection of unqualified assistants as of more importance than the intrinsic merits of the Bill, and evidently there was no real prospect of practical agreement to support the Bill.

At the meeting in Edinburgh the PRESIDENT went over the same ground, urging that, as a matter of business, the proposed educational scheme should be regarded as good for the trade, and that the consolidation of the Society as the effective political representative of the trade, more fully provided for by the Bill, must be the first step towards enabling the Council to approach Parliament for legislation. If the trade would not unite in that way, nothing could be done or expected. In regard to the restriction of dispensing by the provisions of the seventh clause, he pointed out the importance of having the privileges of legally qualified persons tied up as much as possible if they were to be worth anything, and that since the Society was to be the prosecuting body, chemists might reasonably have confidence in the discretionary exercise of that power by the Council. The reasons for not attempting to deal with company trading in the Bill were also fully explained. But even at that meeting the discussion diverged widely from the real question at issue. Almost all of the speakers who adopted the view that the Bill should be supported by the trade as the best measure that was then obtainable did so with more or less qualification.

The meetings at Dumfries and Carlisle manifested decidedly greater sympathy with the Bill. However, the general effect of the whole series was not more encouraging than that of the meetings which had previously been held in England and Wales. In some few instances there was evidence of loyal adhesion to the Society and of a desire to support the Bill by accepting it as the utmost that the Council could recommend in its capacity of the elected Executive of the Society. But in others this disposition was largely qualified by objection, either to the actual provisions of the Bill or to its not being more comprehensive. The dissatisfaction thus shown was supplemented by an evident preponderance of latent opposition, proving that there is no common ground upon which it can be expected that chemists and druggists will co-operate with the Society for the purpose of obtaining amended legislation.

This feeling was referred to by the PRESIDENT at the annual meeting of the Society as having been very apparent to him at the meetings he had attended. He also spoke of the tendency to waste time in the discussion of details instead of trusting to the executive body, which had been elected to deal with matters of legislation in the general interest, as being embarrassing to the Council and mischievous in its effects. He complained that chemists, instead of uniting to support the Council and, through it, to obtain the ear of Parliament, overlooked the benefits the Society had conferred upon the trade and, under the mistaken idea that it was unfriendly to them or sought for powers which would do them harm, bickered at the PRESIDENT for doing his best for their welfare. In regard to company trading he pointed out the strong disinclination of Parliament to entertain any proposition calculated to interfere with freedom of trade, and the absolute necessity of bearing in mind that in any attempt to obtain legislation the position of the Society, as the custodian of the public interest, must be maintained and the interests of the

trade treated as a secondary consideration wholly dependent upon their being conducive to the former. Speaking of the two main grounds for opposition to the Bill he showed that the desire to secure for unregistered persons in the position of assistants "of a certain standing" exemption from the clause which the Council regarded as being beneficial to the trade at large, was inconsistent in every way, though it influenced members of Parliament in supporting the opposition of the Bill. Assistants "of a certain standing" who are unregistered must either have neglected to take advantage of the provision specially made in the Act of 1868 for assistants who were then of age and had been engaged for three years in dispensing and compounding, or they must have come into the business after that period. In the latter case they can have no claim to be allowed to sell or dispense poisons until they are put upon the Register. In the former case their disability to perform those duties is solely due to their own neglect. The fact that they have been employed in duties that are held to be restricted by the law to registered persons cannot reasonably be urged as a reason for overriding the Act of Parliament. At the utmost it would only show that some chemists have not duly respected their obligations or protected their own rights. The reason for objecting to such assistants being now registered for certain purposes is that such a proceeding would be equivalent to making them registered chemists and druggists. It would have tended to aggravate the evil of branch shops, and in the interest of the trade it would have been better to abandon the dispensing clause than to have created the spurious qualification of a registered assistant. The other ground of objection to the Bill that its educational provisions would increase the expenses of apprentices to a greater extent than the trade is worth, and thus keep apprentices out of the trade, is altogether unreal and instigated only by the desire to obtain "cheap labour." Among other difficulties—more imaginary than real—which it has been assumed the curriculum would create, the idea that the Council seeks to bring every student to the Society's School is as absurd as it is erroneous, since the School is carried on chiefly for the sake of maintaining a typical school, and at a cost to the Society that is even now very considerable. But the tendency towards regard for the educated and qualified chemist and druggist offers the only prospect of successfully overcoming the competition of company trading and of combinations of individuals carrying on a business that can be properly carried on only by a qualified proprietor. The curriculum would therefore have been a substantial benefit to chemists throughout the country.

It seems for the time utterly hopeless to devise any feasible means of reconciling the expectations and demands of a large portion of the trade with the exigencies of the position which must be maintained by the Society in regard to the Government, the Legislature and the public. The advantages of a trade union are desired while there is a total absence of the unity by which they might be secured. Under these circumstances the prospect of improvement in pharmaceutical legislation is not promising. The only alternatives appear to be either to wait the course of events, or for those who heartily sympathize with the efforts of the Council to associate themselves together in the endeavour to overcome the misconceptions and the antagonism of their brother chemists, and to turn to account, as far as possible, the powers they possess under the existing Pharmacy Acts, as well as any other opportunities they may have for voluntary action, to promote their own interests and those of their craft.

As an official means by which influence may be exercised in this direction the action of the Society's local secretaries may be mentioned. There is evidently a growing feeling that more might be done in that way. The PRESIDENT has pointed out that in the course of his visits to the provinces during the last two years he had been much struck by the curious fact that many of those who were most opposed to the Society's Bill did not understand its objects and had not even read the Bill. He has, in some degree, succeeded in dissipating that sort of ignorance upon which distrust of the Council and the idea of the injustice of the Bill were based. But much still remains to be done for the removal of erroneous impressions, and if that work could be undertaken by local secretaries, it is probable much good would be done. This subject, however, is surrounded by difficulties. The expenditure of time and trouble entailed by the zealous performance of the duties of local secretary is often more than can be faced by those who are both able and willing to do what is requisite. Charges have lately been made that some local secretaries are indifferent to or negligent of their duties. In other instances the extent of the districts for which there are local secretaries is so considerable as to be beyond the capability of a single officer to attend to. The matter has been to some extent under consideration by the Council, and its discussion in regard to Scotland at the recent meeting of the Society's Executive there, as well as the correspondence on the subject in the Journal, will no doubt have the effect of directing further attention to the importance of readjusting the distribution of local secretaries, and securing as far as possible efficiency in the performance of the work entrusted to them. The good effect of the work done by the divisional secretaries for the metropolis is in favour of a further extension of the system.

Another means by which similar influence might be exercised is the holding of periodical meetings of the Society in provincial centres as proposed by Mr. SCHACHT. This project was referred to at the Council meeting in January as one deserving of consideration. The chief point would be to avoid interference with the meetings of the Pharmaceutical Conference. But it is very probable that an arrangement might be made which would be advantageous to the Conference as well as to the Society. One of the most urgent requirements of the present time is more intimate relation between the provinces and the central Executive of the Society. The beneficial effect of direct personal intercourse has already been proved by the visits of the PRESIDENT in connection with the Pharmacy Bill and in other instances, and there is reason for believing that the plan of holding periodical meetings in the provinces would lead to a more sound appreciation of the Society's work, towards which the Conference might well lend its aid.

The alterations of the bye-laws, which have now been under consideration for several years, constitute an important feature of the past year's work. The draft of the amended bye-laws was presented to the Council in March, and having been adopted and read at two subsequent meetings the alterations were confirmed at a special general meeting of the Society in May. The new bye-laws have now been finally approved by the Privy Council. The object of some of the alterations is to remove the obstacles that are said to have prevented chemists from becoming members of the Society. For those who were in business at the passing of the 1868 Act an entrance fee of two guineas was required. That is now abolished. The composition for a life membership or life associateship has also been reduced from twenty to ten guineas. The approximation thus made to the condition under which everyone passing the Major examination would become a life member of the Society is the utmost that can be effected without further legislation. Opportunity is thus offered for a large number of chemists to give practical effect to the generally expressed sense of need for union. The restoration fee to be paid by persons whose connection with the Society has been discontinued has also been practically abolished. Ample provision has therefore been made for that broader and better organization which is necessary for the welfare of the trade.

Important alterations have also been made in reference to the examinations. A knowledge of the law affecting the practice of pharmacy is to be added to the subjects of the Minor examination in accordance with the recommendation of the Privy Council. The fee for the Minor examination is in future to be five guineas for persons previously registered as apprentices or students. This alteration has been made partly in view of the necessity for a change in the mode of conducting the examination, which has long been thought desirable by the Government officers and others, and of the additional expense that would entail. A further reason for increasing the fee is the consideration that since registration is for the benefit of all engaged in the trade, everyone should contribute something towards the expense of this means of protecting his interests. On the other hand the fee for the Major examination has been reduced to three guineas, and thus the inducement to take the rank of pharmaceutical chemist has been increased.

As closely connected with the changes just referred to it may be mentioned that the new examination schedules adopted by the Council during the previous year came into operation in October, and that in November a special report on the new regulations made by the Boards of Examiners in reference to the mode of conducting the examinations was presented to the Council and received approval. By these new regulations greater effect has been given to the recommendations of the Government visitors that the practical portion of the Minor examination should be extended and have more time devoted to it. The details of the new arrangements have so recently been described that it is only necessary here to say that while they provide for more effectually testing the knowledge of candidates, they also furnish them greater facilities of showing that they really possess such a competent practical knowledge of their business as the Pharmacy Act requires.

The constitution of the Board of Examiners for England and Wales has remained unaltered. Mr. WILLIAM GILMOUR and Dr. INGLIS CLARK have retired from the Board of Examiners for Scotland, and their places have been filled by the appointment of Messrs. PETER BOA and JAMES JACK.

In the report presented to the Privy Council by Dr. STEVENSON for the year ending 31st of March, 1891, the defective training of candidates was pointed out as the object to which any apparent severity in his criticisms was directed. This remark applied to all three examinations; but more especially to the Minor and the Preliminary. In the former the failures amounted to 58·5 per cent. General want of knowledge and lack of systematic chemical training are the causes to which those failures were attributed. But special attention was directed to the fact that two-thirds of the unsuccessful candidates failed in the practical subjects of dispensing, pharmacy, and prescription reading, which are of most importance in the interests of the public. The Government visitors also mentioned that a considerable number of the failures were due to inexcusable mistakes as to quantities of potent drugs and poisons. So far, therefore, as persons thus incompetent are kept out of the business by means of the examination, it

cannot be doubted that a great service is rendered to the trade as well as to the public. In regard to the Preliminary examination Dr. STEVENSON again pointed to the continued inconsistency between the very large proportion of failures (56·2 per cent.) and the low standard of the examination, as sufficient evidence of inferior and defective education. The number of candidates for the Major qualification was less than in the previous year, but the proportion of those successful was rather higher. Here again one half of the failures were attributed by Dr. STEVENSON to deficiencies in practical work.

The statistics of the examinations conducted under the provisions of the Pharmacy Acts during the past year show that there has been a very large increase in the number of candidates. The Minor examination, which relates to the legal qualification of chemists and druggists and their registration, claims attention, in the first place, as it is the means of providing for the public safety and protecting the interests of the trade. For that the entries amounted to 1516. Of that number 835 candidates were rejected and 681 passed, the percentage of successful candidates being nearly the same as in the previous year, though still very low. In addition, two out of three candidates passed the Modified examination. Consequently, the total number of persons who, during the year, became entitled to registration as chemists and druggists was 683. For the Major qualification there were 157 entries, showing a large increase on the number in the previous year. But out of that number 66 failed and 91, or 58 per cent., passed. This smaller proportion of passes as compared with the previous year is probably due to an improvement in the practical part of the examination, and the better means thus afforded of testing the practical qualifications of the candidates to the deficiency of which the Government visitors have repeatedly called attention. The results of both these examinations continue to indicate very clearly the want of such systematic training as the curriculum was intended to provide.

For the first examination there were 1455 entries. Out of that number 755 candidates, or 51·8 per cent., failed to satisfy the requirements of the examiners, while 700, or 48·2 per cent., passed. Certificates of other examining bodies were accepted for passing 140 candidates, making the total number of persons who have succeeded in this initial step towards obtaining legal qualification 840 as against 701 in 1890. The proportion of passes shows some improvement upon the previous year. However, ordinary acquaintance with the English language and the rules of arithmetic, together with a knowledge of Latin, being all that is requisite for passing this examination, the proportion of failures furnishes evidence of sad deficiency in the education of those who contemplate becoming chemists and druggists. That aspect of the matter is rendered still more serious by the fact that many of the rejected candidates are of mature age and have probably been for some years engaged in the business.

The Museum shows a decided increase in the number of students and visitors who avail themselves of the advantages it presents, the attendance having risen from 5553 in the morning and 785 in the evening during 1890, to 6197 in the morning and 1146 in the evening during 1891. Many interesting donations have been received from abroad as well as from donors in this country. Contributions to the collection of Indian drugs have been received from Dr. DYMOCK, Mr. D. HOOPER, Messrs. GONNE, CROFT and Co., and others. Dr. A. HENRY, of Ichang, has presented specimens of Chinese drugs, and Mr. J. N. RIDLEY, of the Botanical Gardens at Singapore, has sent interesting donations from the Straits Settlements. New chemical remedies and rare alkaloids have been contributed by Dr. HESSE to the Museum of the Society in London, and by Messrs. RAINES, CLARK and Co. to the Museum in Edinburgh. Amongst the more interesting donations from residents in this country may be mentioned three cases of blistering insects, from Dr. M. C. COOKE, in illustration of his papers published some years ago in the Journal of this Society, this donation rendering the collection now in the Museum nearly as complete as it is possible to make it. Other additions of interest are Taita arrow poison, from the Rev. HORACE WALLER; the ordeal bean of Madagascar, from Mr. J. F. SCOTT ELLIOTT; and a handsome opium pipe, from Mr. W. LE FEVRE. Specimens of native drugs from the Niger Company have also reached the Museum through various channels, and afford an indication that the Museum of the Society is regarded as a valuable collection for purposes of reference by many besides those who enjoy the privileges that the Society affords to its members. Botanical specimens of plants from which the arrow poison of the dwarfs is prepared, and from which the antidotes are prepared, were presented to the Society by Surgeon PARKE. By the identification of the plants forming the poison, through the material in the Society's collections, it was shown that the action of the poison is due to the sassy bark and a species of strychnos.

The Society's Library in London has been as usual largely made use of for study and purposes of reference, the attendances in the evening having been considerably in excess of last year. The additions of books and pamphlets by purchase and donation have numbered 274. The Library in Edinburgh has also been well attended. It has received considerable additions by purchase and donation, and has been provided with further bookcases which will serve for some years to come.

The educational work of the Society has been promoted by the foundation of a new scholarship, for the endowment of which a Lancashire chemist has made a liberal donation. As the Manchester Pharmaceutical Association Scholarship, it is to be open to candidates who have been engaged for three years in the pharmacy of a registered chemist in Lancashire, Cheshire, or the High Peak division of Derbyshire. An alteration has been made in reference to the Redwood Scholarship, which will in future be awarded annually in July to pharmaceutical chemists desirous of obtaining advanced instruction in Chemistry and Chemical Pharmacology, for which purposes the Redwood scholar will be allowed to work in the Research Laboratory. Two provincial associations have received grants in aid of their educational work.

At the Evening Meetings of the Pharmaceutical Society in London papers have been read on "The Carbohydrates of Eucalyptus Manna and Honey," by Dr. F. W. PASSMORE; "Chaulmoogra Oil," by Mr. J. Moss; "The Nomenclature of Drugs," by Mr. E. M. HOLMES; "Flox Carolina," by Mr. H. G. GREENISH; "The Arrow Poison of the Pigmies," by Surgeon PARKE and Mr. E. M. HOLMES; "Citronella Oil," by Mr. J. C. UMNEY. In Edinburgh papers have been read on "Sesame Oil," by Mr. J. F. TOCHER; "Note on Iron Wine," by Mr. J. A. FORRET; "Liquor Bismuthi," by Mr. D. GORRIE. A discussion of the Additions to the Pharmacopœia were introduced at two meetings by Mr. P. BOA and Mr. C. A. MACPHERSON, Mr. G. COULL, Mr. RUTHERFORD HILL and Mr. ARTHUR. Both in London and Edinburgh the practice of having lectures delivered at the Evening Meetings has been resumed. In London Professor GREEN gave a lecture on "Evolution in the Flower," and Professor ARMSTRONG the first of a series of lectures on "Fermentation." In Edinburgh Professor I. BAYLEY BALFOUR gave a lecture on "Botanical Enterprise in Relation to Pharmacology." After the distribution of the prizes at the inaugural meeting of the Session in October an address was delivered by Mr. GAINSFORD BRUCE, member of Parliament for Holborn division.

Though the annual meeting of the Society was, to a great extent, eclipsed by the celebration of the Jubilee, and the discussion following the PRESIDENT'S review of the past year's proceedings was of a very discursive character, some points of interest were referred to. Dr. SYMES took advantage of the occasion to declare that he, like many others, did not look upon the Pharmacy Bill with much enthusiasm. He chiefly objected to the consolidation clause and desired to see more real provision for making every person on the register a member of the Society. For that purpose he would have preferred charging such a higher fee for the qualifying examination as would admit of making every one who passes that examination a life member of the Society. In reply, the PRESIDENT confessed his disappointment at hearing the ground for Dr. SYMES' want of enthusiasm, and reminded him that the Society, being a voluntary association, it would be inconsistent to compel persons to become members of it, but that the purpose of the Bill was to obtain powers by which every one who desired to become a member of the Society could do so. Mr. CAMPKIN spoke of the advantages that would accrue to the entire body if all registered chemists were united as members of the Society, and he thought that an effort should be made, through the personal influence of local secretaries and others, to bring about that result. The special general meeting for the confirmation of the bye-laws was almost entirely of a formal nature, but Mr. STARK took the opportunity of calling attention to the anomalous position of the Preliminary examination, and urging that it should be made a more adequate test of the education requisite for enabling students to grasp the subjects that a chemist has to become master of. The annual dinner, which was made one of the features of the Jubilee celebration, was attended by many distinguished guests, both English and foreign, and nearly three hundred members of the Society.

Among the other meetings having interest for pharmacists were those connected with the celebration of the jubilee of the Chemical Society, the meeting of the American Pharmaceutical Association at New Orleans, those of the Society of Chemical Industry at Dublin, the British Medical Association at Bournemouth, the International Congress of Hygiene and Demography, of the German Apotheker Verein at Magdeburg, of the British Association and the British Pharmaceutical Conference at Cardiff. The meeting of the Conference furnished unmistakeable evidence of the fact, noticeable also in other instances, that there is difficulty in obtaining an adequate supply of suitable papers dealing with scientific subjects of interest to pharmacists. Apart from the fact that the authors of several of the papers read at the meeting were not themselves pharmacists, it must be admitted that most of the papers were of a meagre character, though not without some practical value. The small attendance at the meeting may have been to a great extent due to the remote situation of Cardiff, but there was also a marked absence of many of the older members. These circumstances may be worth consideration, when the Committee appointed by the Council to discuss the project of holding meetings of the Society in the provinces deals with that subject in conjunction with the executive of the Conference. Mr. MARTINDALE'S presidential address at Cardiff fully justified the expectations that might naturally be formed in regard to so distinguished a

pharmacist. If the address be at all susceptible of criticism perhaps the wide extent of the subject matter would be its most vulnerable point.

At the election of members of the North British Executive two changes were made, Messrs. Boa and Jack being elected in the place of Messrs. Lawrence and MacKenzie, who had resigned in June. In the address at the annual meeting, Mr. Gilmour expressed satisfaction that there had been some increase in the number of chemists connected with the Society, and he hoped that it would go on until the Society could be said to represent the majority of the drug trade in Scotland. He thought that if the Society did not reflect the opinion of the trade it was because the trade did not make it do so. In that view he was supported by Mr. Storrar, who expressed his conviction that the only hope of securing such benefits as they desired lay in the whole trade joining the Society and supporting it more thoroughly. He regretted that from the want of such support the very thorough attempt made to obtain an amendment of the Pharmacy Act had been dropped. At the first meeting of the new Executive Mr. James Laidlaw Ewing was elected Chairman and Mr. Maben Vice-Chairman. Some conversation took place as to the best means of increasing the membership of the Society in Scotland, but as the new bye-laws were not then approved by the Privy Council the further consideration of the subject was remitted to the General Purposes Committee.

Provincial associations have been active in the discussion of pharmaceutical politics as well as technical and scientific matters at Birmingham, Brighton, Bristol, Exeter, Leicester, Liverpool, Manchester, Nottingham and Sheffield.

At Exeter Mr. Harris opened a discussion on the Pharmacy Act Amendment Bill by reading a useful paper on the subject, in which he expressed approval of the curriculum as the best means of improving the prospects of the trade. He also spoke in favour of the proposals to exempt chemists and druggists from jury service and of admitting to membership in the Society all who pass the qualifying examination, as being a beneficial and liberal concession on the part of pharmaceutical chemists. In regard to the omission of any provision for interfering with company trading, he admitted that however desirable such an attempt might appear it would probably be unsuccessful and greatly jeopardize the whole Bill. He urged that those who held a contrary opinion should not oppose the Bill, but provide for introducing an amendment to meet their views when it came before Parliament. This subject was also discussed in much the same spirit at a meeting of the Manchester Association. At Liverpool the Bill was discussed by Dr. Symes, with an opposite tendency, though he recognized the fact that union of the whole trade is indispensable, and that the Pharmaceutical Society is the only organization capable of facilitating progress and ameliorating the hardships and difficulties connected with the calling. Shortly afterwards Mr. Ward followed with a paper expressing similar views. At the October meeting of the Sheffield Society the session was opened with an address delivered by Mr. Hampson. The session of the Midland Counties Association was opened with an address by Sir James Sawyer, which has been specially referred to in the Journal.

Besides the Association meeting in London, assistants and apprentices' associations in the provinces have also made a good record at Aberdeen, Brighton, Dundee, Edinburgh, Glasgow, Liverpool and Newcastle. Many creditable communications on matters of practical and scientific interest have been brought before the meetings and discussed. Several very excellent addresses have also been delivered at these meetings. The Association, opened in the early part of the year at Southampton with an excellent address from Mr. W. B. Randall, has, we believe, failed to maintain its existence. At the Brighton Association Mr. Marshall Leigh read a paper on the Pharmacy Bill, and on a later occasion he read a very useful paper on the sale of poisons. At meetings of the Glasgow and Dundee Associations excellent papers were read by Mr. Rutherford Hill, giving very useful suggestions for methodical study. The session of the Newcastle association was opened with a very interesting address by Mr. B. S. Proctor, that of the Brighton Association with an address by the President, Mr. H. W. K. Pears. At the Edinburgh Association an inaugural address was delivered by Mr. John Lothian, the President, at Dundee by Mr. Maben, at Liverpool by Dr. Symes, and at Glasgow by Mr. Laing.

Prosecutions for breaches of the Pharmacy Acts have been undertaken in a large number of instances. Altogether 213 cases have been reported and dealt with. Owing to the useful precedent of the Wheeldon case, the prosecution of unqualified persons for acting as assistants of drug companies or as managers of branch shops has in every instance been successful. Ten penalties were inflicted in the Hanley County Court. In a case heard at Romford County Court two penalties were inflicted. In one at Southend a penalty was inflicted for the sale of vermin killer. In another at Bolton four penalties were inflicted. In many other cases penalties were paid into court without defence. An unregistered person was prosecuted for carrying on business as a chemist and druggist at Newton Abbot. No defence was offered and four penalties were inflicted. A recent case at Edinburgh illustrates the financial risk with which even successful prosecutions are attended. Though the action of

the Council had in view the joint protection of the public and the trade, the decision in that case practically amounted to fining the Society.

A prosecution instituted by the police authorities at Oldham raised a question as to the meaning of the provision that the purchaser of a poison, in the first part of the schedule, shall be known to the seller or introduced to him by a person whom he knows, but no definite conclusion was arrived at and the summons was dismissed.

The unguarded sale of an arsenical preparation under the designation of "weed-killer" has given rise to a number of fatal cases of poisoning. At the inquests opinions have been expressed that greater care should be taken in the sale of this preparation, and that the attention of the Pharmaceutical Society should be called to the matter. Several actions were raised in Glasgow for damage done to sugar by coming in contact with "weed killer" during railway transit. In two cases in which action was taken by the Council the penalty was paid into Court. Quite recently two further prosecutions have been instituted by the Council for the illegal sale of this article, but the cases have not yet been heard.

In the course of the year several striking illustrations have been afforded of the fact that coroners do not always understand the provisions of the Pharmacy Act in regard to the sale of poisons. In one instance the Act was declared to be an elaborate farce, because it permits the sale of twopennyworth of laudanum. In another the seller of nitric acid and mercury was censured, although those articles are not poisons within the meaning of the Act, and though extra precautions were taken by the seller to prevent their misuse.

In the neighbourhood of Wakefield a number of cases of poisoning by lead have occurred, two of them being fatal. Impregnation of the water supply by leaden pipes is alleged to be the cause. A remarkable case of alleged arsenical poisoning in Scotland gave rise to a criminal prosecution which failed from the want of evidence and in consequence of some analytical discrepancies. In a case of poisoning by morphine lozenges the jury expressed the opinion that such lozenges should not be sold without very definite precautions. A communication addressed to the Privy Council by the coroner for South-East Somerset, suggesting the addition of potassium bichromate and other substances to the poison schedule, was referred to the Council of the Society, and a reply was sent that though the Council has recommended further additions it was not thought expedient to add bichromate, having regard to its technical applications. In a fatal case of poisoning by "vermin killer" sold by an unregistered person at Southend, the jury expressed the opinion that the sale of such poison should be subject to greater restriction, and the Council gave effect to the Coroner's remarks by prosecuting. Carbolic acid has still continued to be the cause of numerous cases of accidental poisoning. In an obscure case of poisoning by strychnine it was suspected that the strychnine had been present in Epsom salts. In another case liquor strychniæ was supplied by an apprentice in place of liq. morphinæ. Three cases of fatal poisoning have occurred in consequence of mistakes in dispensing. In one case it appeared that liq. strychniæ was given by a medical man instead of bicarbonate of potash; in another that aconite liniment has been dispensed instead of tincture of nux vomica at the infirmary of the Shoreditch workhouse; and, in the third case, carbolic acid was given instead of black draught at the Glamorganshire county asylum.

On several occasions reference has been made to the conditions under which the sale of poisons takes place. In the House of Commons, Mr. S. Smith called attention to the sale of chlorodyne, and in reply to a question in regard to it the Home Secretary stated that he had forwarded to the Privy Council a representation that had been made to him on the subject by a coroner's jury. At the International Congress of Hygiene, Dr. Danford Thomas read a paper on the sale of poisons, in which he called especial attention to the danger arising from the indiscriminate sale of proprietary medicines containing poison without any of the precautions required by law. He recommended that these secret medicines should in all such cases be labelled with the word poison and a statement of their contents. He also advocated considerable additions to the poison schedule. At a meeting of the Parliamentary Bills Committee of the British Medical Association Mr. Ernest Hart drew attention to the fact that the Government had distinctly announced the intention of prosecuting sellers of secret proprietary medicines which contain poison but are not labelled as the law directs. A resolution was then passed to call upon the Solicitor to the Treasury and the Council of the Pharmaceutical Society to institute prosecutions with a view to stopping the improper sale of proprietary medicines containing poison. From articles which have recently appeared in the *British Medical Journal* there is reason to believe that this course of action is being vigourously followed up.

Prosecutions have been instituted by the Inland Revenue authorities for the sale of "Friar's Balsam" made with methylated spirit, the defendants being fined £25 with the alternative of three months' imprisonment. In some other cases, relating to the sale of wine, a settlement was arrived at by the voluntary payment of fines. A Glasgow doctor keeping an open shop was fined £5 for selling methylated spirit without a license. A chemist at Meltham was fined for selling methylated spirit

at a branch shop for which he had no license. According to a general order of the Board of Inland Revenue methylated spirit must in future contain an admixture of "mineral naphtha" amounting to 0·375 per cent. of its volume. The "mineral naphtha" is to be of at least 800 specific gravity, and it is to be approved by the Board before being used for mixing. Some inconvenience has been experienced as resulting from this new regulation, but we have reason to believe that measures have been taken which will remove all future difficulty.

Under the Food and Drugs Act a firm of grocers in Glasgow was prosecuted for the sale of seidlitz powders containing bisulphate of soda in place of tartaric acid. Another Glasgow grocer was prosecuted for the sale of tartaric acid containing 35 per cent. calcium sulphate and 0·607 per cent. of lead. No defence was offered beyond the statement that the acid had been bought of a respectable firm. The question as to the meaning of the term milk of sulphur has again been raised, at the instance of a public analyst, by the prosecution of an apothecary who supplied the article containing calcium sulphate. A great deal of unfounded prejudice was introduced into the case by the witnesses for the prosecution, with the object of showing that the decision in the Knutsford case was wrong. After an adjournment, to afford opportunity for considering the decision in that case, the magistrate declared his inability to state a question of law in regard to the matter, which he considered involved only the questions of fact whether there is such a thing as milk of sulphur known to the public, and whether that is different from the official precipitated sulphur. The case was therefore adjourned *sine die*, and the question left as much a matter of dispute as before. Professor Attfield has suggested that for the sake of doing away with this uncertainty the term "milk of sulphur" shall be made a synonym of the official preparation; but this proceeding is open to the objection that the thing differing from precipitated sulphur would still remain, as well as the preference for it on the part of many persons. Unless these could both be suppressed, it is difficult to see what advantage could be expected from making the term "milk of sulphur" a synonym of a thing which is quite distinct from that denoted by the term. In the course of the year much attention has been directed to the presence of traces of copper in articles of food, and there is still great difference of opinion as to the effect of the very minute proportion of copper which preserved peas often contain. But beyond very strong opinions on both sides, the only established facts are that the peas contain the copper in an insoluble condition, and that twenty million tins of such peas are consumed annually. In a case tried in Scotland the Sheriff therefore refused to convict, on the ground that the peas were not proved to be injurious to health, and on appeal to the High Court of Justiciary that decision was upheld. In another case at Glasgow, and in two cases tried at Leeds, a contrary result was arrived at, and penalties were inflicted on the strength of opinions, given in evidence, that peas are rendered injurious to health by the presence of copper. At Manchester a chemist was fined for the alleged sale of aniline dye by an unqualified assistant in mistake for syrup of violets. Another chemist at the East end of London was fined for selling spirit of nitrous ether of defective quality. For the defence it was stated that this preparation would gradually deteriorate to the extent of 40 per cent., though that is a very weak defence for a pharmacist to rely upon.

The general scientific progress of the year has been reflected in the monthly records of the results arrived at in the course of investigations coming within the range of the sciences that pharmacists require to be especially acquainted with. It will be unnecessary, therefore, to do more than refer to some of the most salient points. In the department of chemistry facts still continue to be accumulated without being subject to the revolutionizing influence of a novel point of view. From among the observations of the past year those relating to the allotropic forms of silver studied by Carey Lea, and to the compounds of carbon monoxide with metals made known by Berthelot and others, may be selected as especially interesting in various respects. Closely connected with the former are Engel's observations on sulphur and Vernon's on phosphorus. The study of the constitution of the sugars has been successfully continued by Fischer and others.

The identity of cytisine with ulexine has been ascertained by v. der Moer. The conversion of cupreine into quinine by methylation was reported by Grimaux and Arnaud, but the subsequent observations of Hesse show that the reaction is not a simple one, and that only a small proportion of quinine is thus produced. Kiliani has found the glucoside digitonin occurs in commercial digitalin to the extent of 53 per cent., and Professor Boehm has found that neither that nor any derivative of digitogenin exert an action on the heart. Hesse has arrived at the conclusion that the different kinds of saponin are chemically identical. Snow has described the conditions under which definite salts of caffeine are obtainable. Professor Schmidt has further described scopolamine, the base obtained from the root of *Scopolia atropoides*, and he stated that the hyoscine hydrobromate then met with consisted essentially of a salt of scopolamine. In a communication to the Chemical Society Dunstan and Ince have given the results of a preliminary study of the crystalline base of *Aconitum Napellus* carried out in the Research Laboratory. They essentially

co nfirm the observations of WRIGHT and LUFF. A ba se obtained by GIESEL from Java coca leaves has been recognized by LIEBERMANN as benzoyl tropeine. It bears some resemblance to dextrococaine, EINHORN, but is optically inactive. By hydrolysis it yields benzoic acid and a base isomeric and apparently identical with ψ-tropine but no alcohol. LIEBERMANN has suggested that the ψ-tropine, which is a bye-product of the manufacture of cocaine salts, may serve as a basis for the synthetic production of mydriatic bases. DUNSTAN and DYMOND have found that an oily substance, C_4H_9NO, formed in distilling nitroethane from potassium carbonate, originated from the reaction of those substances, a nitrite and acetonitrile being formed at the same time, and they have ascertained its constitution to be that of trimethyl isoxazole, one of a series of compounds chemically related to antipyrin. Other nitro-compounds of the paraffin series react in a similar manner with alkalies. New light has been thrown upon the constitution of cymene by WIDMAN'S observation that it is not methyl propyl benzene but an isopropyl derivative. By analogy thymol and carvacrol, as well as the natural terpenes and camphors, must be regarded as isopropyl derivatives.

Considerable additions have been made to the knowledge of alkaloids. Atropamine $C_{17}H_{21}NO_2$ obtained by Dr. HESSE from some kinds of belladonna root has been further examined. By warming with excess of mineral acid or with baryta water it is readily converted into belladonnine. HESSE considers that it stands in the same relation to hyoscine that apoatropine does to atropine. In cultivated belladonna herb HESSE found atropine almost exclusively. In the leaves of wild plants it is less pure and the roots of both kinds contain less atropine. Sabadine $C_{29}H_{51}NO_8$ and sabadinine $C_{27}H_{45}NO_8$ have been obtained by MERCK from sabadilla seeds and pseudoconhydrine $C_8H_{17}NO$ from conium fruit. GRESHOFF has obtained from several Lauraceæ a crystalline base to which he gave the name of laurotetanine, on account of its powerful action upon the spinal cord. ANTZE has obtained from *Lolium temulentum* a volatile base loliine, and temulentic acid $C_{12}H_{42}NO_{19}$, which by the action of lime yields a poisonous base temulentine. D. HOOPER has indicated the presence of a crystalline base in the leaves of *Zylophora Asthmatica*. SALZBERGER has obtained from the rhizome of white hellebore, in addition to the three bases examined by WRIGHT and LUFF, protoveratrine $C_{32}H_{51}N_{11}$, which he describes as the most active constituent, and protoveratridine, $C_{25}H_{45}NO_{10}$, a non-poisonous base.

In connection with the chemistry of drugs much work has been done. Further investigation of castor oil by HANS MEYER has shown that the purgative property belongs to the glyceride of which it consists and not to the presence of any other constituent. The creosote from birchwood tar has been found by PFRENGER to consist chiefly of guaiacol and cresol with smaller proportions of xylenol. From the examination of aloes and aloe juice obtained from South Africa HOLMES and BAINBRIDGE were led to the conclusion that Natal Aloes is the produce of *A. Succotrina* or some species the juice of which gives the same chemical reactions, and that its opaque character is to be ascribed to some peculiarity in the mode of manufacture.

The characters of English Rosemary oil and different kinds of the foreign oil have been studied by Mr. CRIPPS and Messrs. SCHIMMEL.

MAIDEN has studied the different kinds of red gum obtained from species of ceratopetalum and found that they contain tannic acid in unequal proportions, together with phlobaphenes and metarabin. The gum of *C. gummiferum* is distinguished by containing coumarin. RIDEAL and YOULE treated of the applicability of Indian gums in pharmacy in a paper read at the Conference, showing that for many purposes ghatti gum is equal to gum arabic. On the same occasion CRIPPS described an improved method of determining the volatile oil in copaiba and similar materials by the direct application of steam. In the discussion of the subject Mr. Moss suggested that the same method might be useful in preparing copaiba oil on the large scale.

The substance introduced at the end of 1890 as synthetic spermine LADENBURG'S ethyleneimine and piperazidine has been identified with diethylenediamine obtained some years ago by HOFMANN by the action of ammonia on ethylene chloride. Early in the year the nature of KOCH'S remedy for tuberculosis was made known, and later its beneficial therapeutic value was attributed to tuberculin, a constituent present in very small amount, while the disturbing influences were held to be due to albumoses or alkaloidal substances. In October KOCH published the results of his attempts to obtain the pure substance, and since then BOMBELON and KLEBS have pursued this inquiry, but without arriving at results that are fully satisfactory.

BRUNNER has called attention to the reaction between cocaine, hydrochloride, and calomel as being specially characteristic of that base and of some importance in regard to the use for ophthalmic purposes of an ointment containing the cocaine salt and mercuric oxide.

Of the numerous synthetic remedies that have been introduced during recent years, the three antipyretics now included in the British Pharmacopœia,—antifebrin (acetanilide), antipyrin (phenazone), and phenacetin have won a place in the foremost rank. Not only has antipyrin maintained its position as an antipyretic and anodyne since its official recognition, but the property possessed by

it of combining with many other bodies, especially phenols, probably owing to the CO group contained in it, has led to many experiments in the direction of grafting with it other remedies. Among the earliest of these combinations may be mentioned the compound or compounds of antipyrin with chloral hydrate, about the composition and properties of which some confusion existed for a time. The mono-chloral antipyrin, formed from equivalent proportions of each constituent, has now, however, taken its place in medicine under the name "hypnal," and M. DEMANDE has described how pharmacists may readily prepare it for themselves. Early in the year attention was called to a compound of antipyrin with resorcin, to which the name "resopyrin" was given, and this was followed by "phenolpyrin," formed from phenol and antipyrin; "naphthopyrin," formed from β-naphthol and antipyrin, as well as "pyrogallolpyrin" and "picropyrin," formed respectively from pyrogallol and picric acid and antipyrin. A compound of iodine with antipyrin has also been described as "iodpyrin," but like most of the other "pyrin" compounds mentioned has yet to make its reputation in medicine. "Iodantifebrin" has also been experimented with, but proved to be therapeutically inert. On the other hand, phenacetin is said to form an iodine compound, "iodphenin," containing 50 per cent. of iodine, two-thirds of which is very loosely combined, to which the extraordinary bactericidal properties attributed to the compound may possibly be due. But a still more interesting derivative from phenacetin is that which has been called "phenocoll," the evolution of which formed recently the subject of an interesting note. The compound may be described as a phenacetin, into the acetyl radicle of which an amido group has been introduced, and is said to be the result of a systematic attempt to obtain a soluble compound that should retain the therapeutic properties of phenacetin and be equally innocuous. The presence of unconverted phenetidin in phenacetin has been the subject of a paper by Herr REUTER, who states that traces of the impurity can be detected by the production of a violet colour within two or three minutes, when the compound is fused with chloral hydrate in a test tube. The oxidation products of phenacetin have also been studied by Herr KINZEL, who has thrown light upon the nature of the official test for its identification.

Among antiseptics, aristol, a loosely bound combination of iodine with thymol, has increased in reputation during the past twelve months, and has been the subject of a considerable amount of literature. This has included papers on its preparation and purification, although it would appear probable that a really pure and definite dithymol iodide would be too stable to be fully effective as ordinarily used. The acceptance accorded to aristol has led to suggestions of similar compounds, among which is one that has been named "europhen," which is represented as being a product of the action of iodine upon isobutyl-orthocresol. It is said to contain 27·6 per cent. of iodine and to present the advantage of being comparatively free from odour, non-toxic, and very light. Another addition to the same class is iodo-β-naphthol, described as odourless, tasteless, and insoluble. Benzoyl-β-naphthol has also been recommended as an advantageous intestinal antisceptic, and styracol, the cinnamic acid ester of guiacol, as well as benzoyl-eugenol and cinnamyl-eugenol are under trial as internal remedies in tuberculosis. Crystalline combinations of eucalyptol with resorcin, pyrogallol, naphthol, and tri-nitrophenol have been described, but although probably possessing antiseptic properties they do not seem to have been practically tested. In addition a process has been patented for the production from phenol-like bodies of a whole series of carbonic and carbamic acids, esters, and alkyl derivatives, enumeration of which may be deferred until more is known of their properties.

In addition to the papers, already referred to, a number of communications specially relating to practical pharmacy still remain to be mentioned. The subject of Pharmacopœia tinctures has been carefully studied by Messrs. E. H. FARR and R. WRIGHT, their published work relating to the tinctures of conium, colchicum, aconite, jaborandi, and henbane and belladonna. In reference to the important subject of standardizing galenical preparations methods of assay have been described or criticized by NAGELVOORT, J. A. LLOYD, M. CONROY, CRIPPS, and others. Mr. CONROY criticized the process given in the B.P. Addendum for making ext. euonymi. sicc. He has also pointed out the defects of the collodium belladonnæ B.P.C., and suggested a modification of the formula, which has led to further comments by Messrs. J. UMNEY, LINFORD, REYNOLDS, and MABEN. The variation in the strength of extract of belladonna has been pointed out by Mr. W. B. COWIE. Mr. CRIPPS has found that a tincture made from No. 20 powder of colchicum seed contained four times as much colchicine and colchiceine as that made from the whole seeds. Mr. A. J. DEY has ascertained that the amount of alkaloid in tincture of nux vomica is often considerably above the standard of the British Pharmacopœia. Mr. D. H. DAVIES has contributed a useful paper on "Pill Coating," and Dr. LE CEPPI has suggested the use of salol as coating for pills that are not intended to act until they reach the intestine. Some of the pharmaceutical uses of malt extract have been described by Mr. J. GORDON. Mr. Moss has discussed the relative advantages of different methods of preparing extracts of cascara. Mr. CRIPPS has suggested the addition of 10 per cent. acetic acid to solution of albumen as an efficient means of retarding decomposition. Mr. DAVIS has given the results of his analyses of medicated lozenges. TSCHEPPE has described the preparation of albuminate of iron. The prepara-

tion of ammoniated tincture of quinine has been discussed by Messrs. Adcock and Lunan. Seidlitz powders and other effervescent preparations have been dealt with by Messrs. H. Weir and H. Pattinson. Mr. Grierson has criticized the Addendum formula for castor oil emulsion and suggested that the production of a good emulsion by the official method depends upon the presence of free acid in the oil, and the consequent formation of some soap. Van Aspern has also recommended the use of soap in making emulsions. A paper on "The Galenical Preparations of the B.P. Addendum" was read by Mr. H. W. Jones at a meeting of the Midland Counties Chemists' Association. Dr. Mann has recommended the use of glucose in administering iodine, which is said to be taken up by glucose so as not to be recognizable by taste or odour. M. Anotta has shown that boracic acid increases the solubility of β-naphthol, and that such a solution has a high antiseptic action. Jaenicke has recommended the use of a compound of equal parts borax and boracic acid for antiseptic purposes. The use of a mixture of water, alcohol, and glycerine has been recommended by M. Petit for the preparation of standard solutions of the alkaloids. M. Lothian has dealt with "Ung. Hyd. Nit." Mr. W. Smith with "Pil. Asafœtidæ Co." Mr. Ellwood has, in a useful paper, reviewed some of the Pharmacopœia standards of purity. The method of preparing triturates was described by Mr. E. S. Anderson. A very interesting paper by Dr. Petersen treated of the introduction of drugs into the body by means of electricity, as originally suggested by the observations of Dr. B. W. Richardson in 1853 on anodal diffusion.

The Benevolent Fund has been better supported during the past year, the income, apart from interest on invested capital, having amounted to £2302 15*s.* 11*d.* The subscriptions have increased to £1606 15*s.* 11*d.*, and £696 has been received in the form of donations and legacies. The expenditure has been £2090 5*s.*, of which sum £1596 5*s.* has been paid as annuities and £494 in casual grants. The expenses during the year have amounted to only £40. We must again point to this circumstance as an unparalleled instance of inexpensive administration.

The award of the Hanbury Medal to Dr. Hesse must be mentioned, in the first place, among the honours conferred during the year. Brigade-Surgeon J. E. T. Aitchison, C.I.E., was elected an honorary member of the Society. Early in the year a number of the personal friends of Mr. Bottle formed the idea of presenting his portrait to the Pharmaceutical Society as a mark of their esteem and to perpetuate the remembrance of his services to the Society. The presentation took place in July and the portrait now hangs in the new Council room. On the occasion of the Jubilee celebration the President and Mr. Greenish were made honorary members of the German Apotheker Verein. In the course of the year the Davy Medal of the Royal Society has been awarded to Professor Victor Meyer, and a baronetcy was conferred upon Sir Richard Quain as one of the New Year honours.

The death roll of the year includes the names of several who have in their time contributed largely to the credit of British pharmacy, and been staunch promoters of the Society's objects. The positions respectively attained by H. B. Brady, Henry Groves, W. Scot-Brown, W. Lionel Bird, John Barnard, Thomas Hyde Hills, W. Manning Watts, furnish evidence in various ways of the possibilities of a pharmaceutical career for those who possess the requisite natural abilities, and enter upon it, equipped with the educational preparation that is above all things indispensable. It is not suggested that every member of the craft can expect to be equally successful with any of those above mentioned, but their records may at least serve the useful purpose of typical examples for the emulation and guidance of their successors, so that the good work they have done during their life may still be continued in the beneficial influence thus exercised. In addition to these more distinguished members of the craft, J. R. Battle, of Lincoln, one of the founders, T. Archer of Southam, T. Norwood of Hastings, D. Wallworth of Maldon, upwards of 20 years a local secretary, R. Raimes of Edinburgh, C. Gadd of Vauxhall, J. Greenwood of Harrogate, J. M. Horsfield of Rotherham, local secretary from 1886, G. Waterall of Nottingham, J. Wylde of Macclesfield, R. Dresser of York, one of the founders, J. C. Parkes of Woolwich, E. Pegg of Birmingham, A. Richardson of Didsbury, G. Thompson of Alston, J. Farmer of Putney, J. Sangster of Aberdeen, J. T. Tupholme, divisional secretary for South Kensington, John Allden of Kensington, Edward Harvey of Gitspur Street, Thos. Rowland, local secretary for Epping, W. B. Madgwick of Andover, J. H. Wagstaff of Westbourne Terrace, Wm. Smith, local secretary for Abingdon, have died during the year.

The Chemists' Assistants' Association has lost its Secretary, E. Richards. Among continental pharmacists who have died during the year, mention may be made of A. G. Forsmann, Director of the St. Petersburgh Pharmaceutical Society; Reichardt, formerly editor of the *Archiv. der Pharmacie*; J. L. Creuse, of New York and Paris.

Death has also removed several men who by their position or pursuits were indirectly connected with pharmacy. Of these we may name John Marshall, the former President of the General Medical Council; E. J. Waring, of the Indian Medical Department, editor of the Pharmacopœia of India, C. J. Maximowicz, the Russian botanist, K. W. v. Nägeli, Professor of Botany at Freiburg, and distinguished for his researches on protoplasm and cell structure; V. v. Richter, Professor of Chemistry at Breslau; Jean S. Stas, the Belgian chemist, an honorary member of the Society, and last, but not least, in connection with this Journal we have with profound sorrow to add F. Passmore, who has for nearly twenty-two years very worthily occupied the position of sub-Editor.

The Editor finds it necessary to take this means of returning thanks to the many kind friends who have written to him, expressing their regret at hearing of the death of Mr. Passmore, and their sympathy with his relatives.

* * *

The South German *Apotheker Zeitung* reports the death, at the age of 65, of C. H. Burk, manufacturer of pharmaceutical and dietetic preparations in Stuttgart.

Transactions of the Pharmaceutical Society.

EVENING MEETING IN EDINBURGH.

Wednesday, December 23, 1891.

MR. J. LAIDLAW EWING IN THE CHAIR.

The second Evening Meeting in Edinburgh of the present session was held in the Society's House, 36, York Place, on Wednesday, December 23, at 8.30, Mr. J. Laidlaw Ewing in the chair.

The minutes of the last meeting having been read and approved, apologies for absence were intimated from Messrs. D. B. Dott and Heron, Edinburgh; and Mr. Fisher, Dunfermline.

The following communications were read:—

Report on Commercial Goa Powders.

BY W. DUNCAN AND T. S. TWEEDIE.

Goa or Araroba powder, or poh'di bahia, or as it was called by Kemp "chrysarobine," made its appearance in British pharmacy about sixteen years ago, and at that time Professor Attfield read a paper on its composition at an evening meeting of the Pharmaceutical Society in Edinburgh. The sample of the drug on which he worked was presented to him by Mr. D. Kemp, of Bombay. In that paper Professor Attfield (*Pharmaceutical Journal*, [3], vol. v., p. 721) states that he obtained from 80 to 84 per cent. of an active principle which he identified as chrysophanic. In a subsequent research by Liebermann and Seidler (*Pharmaceutical Journal*, [3], vol. ix., p. 896) it was shown that the active principle consisted essentially of a substance which by oxidation readily yielded chrysophanic acid, and to this they gave the name "chrysarobin." This title, of which we heard so much in 1885, when the present Pharmacopœia came out, is now by common consent confined to the purified article or so-called "chrysophanic acid" of commerce. The doubts on this point have been cleared up by the insertion in later reprints of the Pharmacopœia of the words, "as purified by solvents." This purified article has almost entirely taken the place of the crude drug, but from our own experience we have reason to doubt if the purified article possesses the same activity as an equivalent quantity of the crude drug. This opinion is supported by the statement of Martindale ('Extra Pharmacopœia,' 6th edition, p. 108) that there remains in the mother liquor from which chrysarobin has crystallized a substance more active than pure chrysarobin.

As already pointed out, Attfield found that Goa powder yielded from 80 to 84 per cent. of chrysarobin. Liebermann and Seidler put it at 66 per cent. and the United States Pharmacopœia at 54 per cent. For the last four or five years statements have appeared to the effect that the drug of the present time was much weaker than formerly, and contained less chrysarobin. This has been attributed to the Brazilians hewing down the tree (*Andira Araroba*) before it has reached maturity. It was while testing the value of this statement that the experiments, of which we now give the results, were undertaken.

Chrysarobin is readily extracted by hot benzol, but the difficulties of using that solvent in a Soxhlet apparatus, decided us to use chloroform, checking our results by ether. In the 'Extra Pharmacopœia' (p. 109) chrysarobin is said to be insoluble in ether. This, we find, is erroneous. It is soluble in ether, but we cannot agree with the U. S. Dispensatory (16th edition, p. 433) that it is readily soluble.

Ten commercial samples of Goa powder were examined. These were obtained from different sources, in order that we might not have two of the same sample to examine. Four of these were in an unpowdered condition and mixed with pieces of wood. The others were in powder of various degrees of fineness. All were reduced to the same powdered condition, interfering in no other way by removing the wood or otherwise. As a rule those samples which were in broken lumps and appeared most inferior yielded the best results. We have brought the samples with us, and it will be seen that they vary very much in colour.

Sample.	Chrysarobin per cent.	Moisture per cent.	Insoluble matter p. c.
1 . . .	76·90	2·10	21·00
2 . . .	55·50	3·00	41·50
3 . . .	80·80	2·60	16·60
4 . . .	66·60	2·40	31·00
5 . . .	81·80	2·20	16·00
6 . . .	82·30	2·20	15·50
7 . . .	57·20	3·30	39·50
8 . . .	70·80	1·20	28·00
9 . . .	68·85	2·90	28·25
10 . , .	69·10	2·90	28·00
Average .	71·00	2·50	26·50

The insoluble matter was not examined, but it appeared to consist mainly of woody tissue, and left a little ash on burning. From the above results it is evident that the statements as to the deficiency of commercial Goa powder at the present time are not well founded, but that the present supply compares favourably with the drug originally imported.

The Chairman said they had the pleasure of having at the meeting two gentlemen acquainted with India, Dr. Aitchison and Mr. Stephenson, and as Goa powder was first introduced by an Indian physician, Sir Joseph Fayrer, they might be able to give them some information regarding it.

Mr. T. Stephenson, Bombay, said Goa powder was still used largely in India for ringworm, more especially by the natives, who always employed the crude drug. Their usual method of application was to cut a lemon, squeeze a little of the juice on to the affected skin, and then apply the powder. In this way it was said to be rendered more active. In his experience it was frequently applied in solution, a good plan being to make a solution in benzol or some other hydrocarbon. In this way a solution was obtained containing all the active principle and representing the full activity of the drug better than any other preparation he had seen. With regard to the word "chrysarobine" it was registered as a trade mark by Kemp, and was properly applied to Goa powder, whereas the very similar word "chrysarobin" represented the commercial purified substance described in the Pharmacopœia.

Mr. Nesbit thought the name chrysarobine was unfortunate and had given rise to much confusion. So much so that when official chrysarobin was ordered Goa powder had been supplied. With regard to the use of lemon juice, referred to by Mr. Stephenson, he had seen chrysarobin dispensed in the form of an ethereal solution and used along with acetic acid. This was done from a belief that the acetic acid rendered the chrysarobin more active.

Mr. Noble thought Mr. Stephenson was correct in saying that a solution of Goa powder was the most active preparation. He had seen a solution in chloroform used in the case of ringworm which disappeared in a very short time under that treatment. He had observed that when applied to ringworm on the scalp the hair was a very long time in growing again, and he had frequently had to caution people as to this result. He should like to ask Mr. Duncan if he could offer any explanation of this undesirable condition. From his

experience of the drug he was of opinion that a solution in chloroform was more active than an ointment.

Mr. LUNAN said he had found that a kind of collodion of chrysarobin made by dissolving the drug in chloroform to which 10 per cent. of guttapercha had been added gave a very efficient preparation.

Mr. HILL said there was one point raised in this communication which seemed to deserve a fuller investigation. The authors stated that in their experience Goa powder was more active than an equivalent weight of the official chrysarobin. This statement was borne out by Martindale's 'Extra Pharmacopœia,' and was supported also by what Mr. Stephenson had said, as to the activity of a solution in some hydrocarbon. It would be interesting to determine accurately the nature of the apparently very active substance remaining in the mother liquor, from which the official chrysarobin had been separated, as that might lead perhaps to a modification of the official process, which would yield a more active preparation.

Mr. DUNCAN in reply said he had been trying for the last seven or eight years to discover the cause of the slow growth of the hair on a spot to which Goa powder or chrysarobin had been applied. About eight years ago he was unfortunate enough to suffer from ringworm on the chin. He applied an ointment of Goa powder, with the result that the spot to which it was applied promised to remain for ever destitute of hair.

The next communication was on—

SOLUBILITY OF IODINE IN CHLOROFORM.

BY W. DUNCAN.

Some time ago I had occasion to prepare a solution of iodine in chloroform. The difficulty I had in getting the required amount into solution brought to my recollection a remark of one of my students, to the effect that he had found it impossible to make a solution stronger than about 1 grain of iodine in each drachm of chloroform.

On referring to standard works I found that, with one exception, those which refer to the point state that iodine is freely soluble in chloroform. The exception is Squire's 'Companion,' in which the solubility is given as 1 in 25. I have utterly failed to obtain a solution of this strength, and, for my own satisfaction, have lately made some experiments to clear up the point.

Commercial iodine was taken, mixed with a fourth of its weight of potassium iodide, and carefully sublimed. The sublimate was cooled, powdered and placed in a desiccator to remove any trace of moisture. This chemically pure iodine was then macerated in chloroform for four days, the temperature remaining nearly constant at 10° C., and the mixture being frequently shaken.

Iodine being very volatile the only methods of estimation possible were, either gravimetric, as argentic iodide, or volumetric. The latter method was chosen on account of the comparative ease and rapidity of the process, and if care be taken to have the thiosulphate of sodium solution correct it is quite as accurate as a gravimetric estimation. The result of a large number of estimations carefully made is to show that at 10° C. chloroform dissolves only 1·77 per cent. of its weight of iodine, or, to put it differently, the solubility of iodine in chloroform is 1 in 56·6. I may say that my results with a solution in which the two have been in contact for two months are practically the same as the foregoing.

While working at the subject I found it was absolutely necessary, to get good results, that after weighing, the chloroform solution should be diluted with a little alcohol before adding the water, as otherwise the iodine would be thrown out. I found it also necessary to use starch as an indicator, as the solution became apparently colourless before all the free iodine had been taken up.

The CHAIRMAN said they were well acquainted with solutions of iodine in alcohol and in ether, but he had never seen a solution of iodine in chloroform used in pharmacy. This scientific paper was very interesting, and indicated that the statements as to solubilities in standard books could not always be taken as gospel. In addition to the references given by Mr. Duncan he thought the French Codex gave the solubility of iodine in chloroform as 1 in 20.

Mr. HILL said in regard to the general question of solubilities no one who had frequently to refer to books for information could fail to be struck by the numerous discrepancies between different authors. Any one would find a field for useful work in collating and correcting the published statements as to the solubilities of substances used in pharmacy. These determinations required a great deal of time and care, but the publication of trustworthy data would be a very considerable practical advantage to the busy pharmacist.

The CHAIRMAN said he had now much pleasure in calling upon Mr. Stephenson, of Bombay, to read his communication, and in doing so he was sure he expressed the unanimous opinion of the meeting when he congratulated him upon his successful career in India. They cordially wished him continued success in that country to which he was soon again to return, and it was their hope that he might render as much service to the cause of pharmacy as his esteemed father had done.

NOTES ON SOME INDIAN DRUGS AND PRODUCTS.

BY T. STEPHENSON, F.C.S.

The materia medica of Hindustan is a subject which rarely, if ever, engrosses the attention of scientists at home, and if the truth must be told it cannot be said to receive a fair share of attention even in India. The few specimens to which I wish to call attention to-night are typical of all, inasmuch as their medicinal use is confined almost entirely to the native community, while the preparations in general use are unscientific in the extreme. It is true that this cannot be said of all, and it is satisfactory to see that many are being more fully recognized and used by Europeans than was formerly the case.

It is very interesting to note that many drugs which have been only recently introduced into this country, generally from the other side of the Atlantic, have been in use in another form in India from time immemorial. In fact, the natives of India, like the country people of our own land, seem to know the properties of every herb and tree. An interesting instance of this may be seen in *Viburnum primifolium*, a plant which has been recently introduced into European practice from America as a remedy in uterine complaints. An allied species, *Viburnum fœtidum*, has been used for centuries by the natives of India as a remedy for menorrhagia and post-partum hæmorrhage, and it is a custom among Hindoo women who have been confined to hang a sprig of this plant over their door as a charm. Mr. Stephenson then gave an interesting description of the general condition of the native drug shops in the bazaars and the methods of business adopted by the native druggists, after which the following drugs were exhibited and described :—

Agar Agar, *Bengal Isinglass*.—The well known vegetable gum obtained from *Eucheuma spinosum*, etc., which is used by the natives in place of isinglass, to which, being an animal substance, they have religious objections.

Areca Nuts, *Betel Nuts*, *Sapari*, from areca catechu.

—These were shown just as they had been removed from the tree. The nuts, unfortunately, had become detached from the stalk in transit. They are used for mastication along with lime and the leaves of *Piper Betel*, and the dried petioles are used by the natives as splints for fractures.

Andrographis paniculata, Kreat.—Nat. ord., Acanthaceæ. Dried and herbarium specimens of this plant were exhibited. The name kreat was also applied to *Ophelia chirata*, and it was interesting to note that the two are often confounded even in India. For instance, on sending an ordinary messenger to the bazaar to obtain a specimen of kreat he brought back chiretta, and it was only by communicating with an intelligent native druggist that the proper kreat was obtained. This plant is very common in India and possesses bitter, tonic and mild aperient properties. A compound infusion and a compound tincture are official in the Indian Pharmacopœia, and the expressed juice of the leaves is used by the natives in bowel complaints of children. The proprietary article known as Halviva, as to which so much has been said recently in connection with the influenza epidemic, is said to be derived from "Indian kreat," but if this be *Andrographis paniculata* it is difficult to account for the absence of colour in the preparation.

Incense Sticks.—These consist of strips of bamboo coated with a paste similar in composition to aromatic pastilles, and are used chiefly by Parsees for producing an aromatic odour in their houses.

Aloes Wood, Agar Wood.—The wood of *Aquilaria Agallocha*, nat. ord., Thymelaceæ. The wood, on keeping, becomes odoriferous, and when fully matured sinks in water. It is then very valuable, and is used for making walking sticks, cups, etc. An infusion of the wood is used as a carminative and tonic and to check vomiting.

Holarrhena antidysenterica, Kudasala (Bombay).—The bark of this tree is known as conessi or tellicherry bark. It is used for dysentery and many other complaints. A decoction known as decoction of Kuda is used by Europeans for dysentery. The bark has been mistaken for that of *Wrightia tinctoria*, and hence has arisen the mistaken name of *Wrightia antidysenterica.*

Andropogon laniger, Khâvi.—This is a grass containing a valuable essential oil possessing stimulant carminative and diuretic properties. It is also used as a perfume for the bath. There are many species of *Andropogon*, the *Andropogon citratus* being the well-known "lemon grass."

Withania coagulans.—Puneeria coagulans, Stocks. Nat. ord., Solonaceæ. This is a shrub growing in Sind., N. W. provinces, Afghanistan, and all over northern India. The fruit is used by the natives to coagulate milk in place of rennet, to which Hindoos object, on account of its animal origin. It contains a ferment, *withanin*, which has been extracted, but has not yet been successfully preserved.

The False Pellitory Root, to which a letter in this week's Journal refers, was also mentioned by Mr. Stephenson as having come into his possession about the same time as Mr. Holmes' paper appeared in the *Pharmaceutical Journal* ([3], vol. xxii., p. 405). From his description it would appear that his sample came from the same source. The pieces of root in this sample agree in size and structure with those figured in the *Pharmaceutical Journal.*

The CHAIRMAN said with reference to Halviva one was astonished how much influence a single communication to the newspapers by a medical man had in causing a demand for the preparation known as Kreat Halviva. A medical friend, of the same name as the gentleman who sent the communication, but resident in Edinburgh, had received inquiries from north and south Germany and Norway as to Halviva. The letter had been copied into the German and Norwegian papers, and it would appear that the information as to a remedy had spread almost as widely and as rapidly as the epidemic of influenza itself.

Dr. J. E. T. AITCHISON, C.I.E., said he had great pleasure in being present that night, as he had taken a deep interest in Indian drugs and other products during the last thirty years. When he first began there was no book on Indian plants, such as the 'Pharmacographia Indica' or Watts' 'Vegetable Products of India.' While still a junior he sent a registered letter to Dr. Jamieson, who, many of them would know, introduced the cultivation of tea in India. In that letter he asked Dr. Jamieson if any books could be got giving information as to the trees and shrubs of the Punjaub. But nothing could be got until Hooker's 'Flora Indica' appeared. They had also Royle's 'Plants of India,' which gave a good deal of information as to native names, but it was always difficult to know, for instance, whether it was an *Andrographis* or a *Gentiana* that the author referred to. As to *Andrographis paniculata*, the people of the Punjaub knew nothing of its properties except as an imported drug, and it was only men from the south, who had seen it used, that could give any information about it. In the Punjaub they used a nearly related plant called *Adhatoda vasica. Andrographis paniculata* was employed as a bitter tonic like chiretta, and was referred to by Roxburgh as the king of tonics. *Adhatoda vasica*, on the other hand, acted as a stimulant in chest affections. It was employed by the natives and believed by them to be a direct cure for phthisis. He had observed, while in the Riviera, a species of *Adhatoda* growing luxuriantly in cultivation. This might readily furnish a supply which could be tried as a remedy in this country. In connection with *Adhatoda vasica* some interesting information had come out recently. In the Kurrum valley, where there are extensive rice plantations, it is usual to mix the rice seed with *Adhatoda* leaves when planting. The object of this was supposed to be to aid germination. Watts, however, has shown that the leaves are an effectual means of killing the insects and destroying the green slime, both of which abound in the moist, warm soil of the rice fields and interfere with the growth of the crop. It has been observed that in fields where the leaves have been employed there is a marked absence of this green slimy vegetable matter. With regard to *Andropogon laniger*, he was well acquainted with it, and had seen it growing abundantly in the dry country throughout the Punjaub, Beloochistan, and Persia. Dr. J. L. Stewart recognized it first during the marching of the troops in the early morning whilst engaged in a frontier expedition. The morning air was filled with an exquisite aromatic aroma. It was at first difficult to ascertain what plant produced this fine aroma, as the aroma was produced by the crushing of the creeping root stems, and little or none upon pulling the herbage of the plant. It was chiefly used by the natives as an antispasmodic in nervous or hysterical affections of women, either as an infusion or decoction. Several of the genus *Andropogon* yielded essential oils, as, for instance, *Andropogon muricatum*, employed for making fans, which, on being moistened with water, gave forth a pleasant odour. It was also largely employed by Europeans in the manufacture of screens for doorways, applied during the hot season only. These were sprinkled with water, and the hot air passing through the screens brought down the temperature of the interior of the house, while the atmosphere was at the same time laden with a pleasing aroma. *Andropogon nardus* was a cultivated plant in Ceylon, and *Andropogon Martinii* of Roxburgh was stated by Royle to yield the grass oil of Nimar. Regarding *Withania coagulans*, it was a plant of ex-

treme interest to himself, inasmuch as on his return from his second expedition to Afghanistan in 1880, he was asked by the authorities at Kew if he knew of any vegetable substance capable of acting in lieu of rennet in coagulating milk and in the manufacture of cheese. He at once pointed out to Mr. Thistelton Dyer, Stocks' note upon *Puneeria coagulans* as a substance well known in the Punjaub, Southern Afghanistan, Beloochistan and Scinde, as fulfilling the requirements he wished. The generic name "Puneeria" was applied to this plant by Stocks, from the Persian word "Puneer," which means "cheese;" so that the generic as well as the specific name indicates the properties of this plant. This was at once taken up by the Kew authorities, and reported upon by them to the government of India, who placed the matter in the hands of the governor of Bombay. The result was a knowledge of a substance from the vegetable kingdom that could be employed in place of rennet and equal to it in all its requirements. To this plant, the *Puneeria coagulans* of Stocks, the name *Withania coagulans* is now applied. It was curious also to note that the *Solanum coagulans* of De Lisle, an Arabian plant, which was supposed to be synonymous with the *Solanum sanctum* of Linnæus, was also used in Arabia in lieu of rennet. In speaking of cheese as a product of the East it must be noted that all that was called cheese there by Europeans generally was not what an ordinary Englishman would understand under the term "cheese." The product "karut" of Afghanistan, Persia and Central Asia was made by boiling down butter-milk to one-half, adding to this old butter-milk or a piece of "karut," stirring well and allowing it to consolidate; then putting this into goat's-hair bags, between layers of bark, and applying pressure with stones. When the watery portion had been squeezed out the curd was taken out of the bags, squeezed into pieces the size of the fist with the hand, and allowed to dry in the sun. The result was pieces of extremely hard curd, looking very like sandstone with finger-mark impressions, and of such an extremely acid taste that any ordinary European trying to eat a piece would probably have the mucous membrane of his mouth at least blistered if not removed. This substance was chiefly employed for mixing with their various meat stews. It certainly dissolved and softened the otherwise extremely tough meat. There could be no doubt that ordinary fresh milk cheese was manufactured in the vicinity of large European encampments in the hill states, as at Peshawur. But that was only to supply European wants, and it could not be regarded as a native industry. In his opinion cheese, in the European sense, was otherwise quite unknown in the East. In conclusion, he was glad to see that Mr. Stephenson was turning his attention to so interesting a subject, and he wished him good health and prosperity for continuing his investigations. He had himself begun in a very small way, but the material soon increased in his hands, and at the present moment he had as much as would keep him busily employed for about four years to come.

The ASSISTANT SECRETARY then communicated short notes on some of the specimens recently added to the Museum, which have been already mentioned in the Journal.

The ASSISTANT SECRETARY also reported that a set of the 'Year-Book of Pharmacy' had been presented to the Library by Mr. Alexander Noble, 139, Princes Street, Edinburgh, and that now there would always be a complete set in the Library for reference as well as a set for lending.

On the motion of the CHAIRMAN, cordial votes of thanks were awarded to the authors of papers, to Dr. Aitchison for his interesting remarks, and to Mr. Noble for his donation to the Library.

The meeting then closed.

Proceedings of Societies in London.

BRITISH PHARMACEUTICAL CONFERENCE.

A meeting of the Executive Committee was held at 17, Bloomsbury Square, on Thursday, December 17. Present—Messrs. W. Martindale, M. Carteighe, C. Umney, T. B. Groves, A. W. Gerrard, R. H. Davies (Hon. Treasurer), Messrs. W. A. H. Naylor and F. Ransom (Hon. Sec.), Mr. M. Johnson (Assist. Sec.).

In the absence of the President the chair was taken by Mr. W. Martindale.

The minutes of the previous meeting were read and confirmed.

A letter was read from Mr. Peter Boa (Local Secretary), on behalf of the Edinburgh Committee, with reference to the time of holding the Conference meeting next year, and suggesting either August 9 or 23 as a suitable date. After some discussion it was resolved that the session should commence on Tuesday, August 23, the reception being held as usual on the previous evening.

A letter was read from the Secretary of the Pharmaceutical Society inviting the Executive of the Conference to confer with a Committee appointed by the Council of the Pharmaceutical Society on the question of the Society holding annual meetings at provincial centres.

The Executive expressed its appreciation of the friendly feeling which prompted the invitation, and responded by selecting eight of its members to act as a delegation on behalf of the Conference. There was also laid upon the table a communication from the editor of the 'Year-Book,' in which he notified his readiness to concur in any arrangements that the Executive might deem it desirable to make with the view of ensuring the issue of the annual volume at an earlier date than heretofore.

The Hon. General Secretary announced that the 1891 volume was ready for distribution immediately after Christmas.

Several gentlemen were duly nominated to membership.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The fourth general meeting of the forty-second session was held at the Royal Institution on Thursday evening, December 10. The President, Mr. C. Symes, Ph.D., in the chair.

The minutes of the previous meeting were read and confirmed and the donations announced.

Mr. T. H. Wardleworth was elected a member of the Association.

Mr. E. Davies showed the preparation of the new compound of nickel and carbon monoxide, discovered by Drs. Mond, Langer and Quincke. This body, having the composition Ni 4 CO, is made by reducing nickel oxide at a low temperature by hydrogen. When carbon monoxide is passed over the reduced metal at ordinary temperature combination takes place, with the formation of a very volatile liquid. This is shown by the flame of the escaping carbon monoxide becoming highly luminous, and by a tube through which the gas passes being coated with a mirror-like deposit of metallic nickel, when it is gently heated. The application of this discovery to the preparation of pure nickel and its extraction from the ore was also described.

A discussion ensued, in which the President, Messrs. A. C. Abraham, T. F. Abraham and J. S. Ward took part, and a hearty vote of thanks, proposed by Mr. A. C. Abraham, was accorded Mr. Davies for his interesting paper.

The Honorary Secretary exhibited one of "Green's Patent Pill Coaters," pointing out what advantages the makers say it possesses over other machines; the most noteworthy of which is a ball and socket joint at the top of the rumbler, which secures a very smooth, regular, eccentric motion. Some pills coated by the machine were shown; and after a discussion, in which many of those present took part, the Secretary was thanked for bringing the machine under the notice of the meeting.

The President now delivered his valedictory address.

Dr. Symes said the Association had now reached the conclusion of the forty-second session, and looking around at the work of the various provincial associations, he felt that Liverpool was holding its own so far as steady, continuous, useful work was concerned. He did not propose to go through the work of the session and so anticipate the annual report, but he would refer to three recent papers by Mr. Wyatt on "Pill Coating," Mr. Conroy on "Liquid Belladonna Plaster," and Mr. Wardleworth on "Spurious Drugs," as being of considerable interest to pharmacists and of practical value to them in their everyday work. At one time this Association was the only one before which purely chemical as well as pharmaceutical papers were read in Liverpool, but since the establishment of a branch of the Society of Chemical Industry here no doubt many of the former had gone to the College which would otherwise have come to the Royal Institution. This really meant that they wanted more workers amongst pharmacists to repair the loss. Much, very much remained to be done. Dr. Symes then spoke of the efforts which had been made in various provincial towns for starting and maintaining in a vigorous condition associations of pharmacists. He considered that the problem yet remained to be solved, how best to work provincial associations. The vital energy evolved from within seemed scarcely capable of maintaining them in a vigorous condition, and occasional help from Bloomsbury Square gave but a temporary stimulus. He had, as a member of the Pharmaceutical Council, about three years ago proposed that annual grants should be made, and that the Association should from time to time report progress to the parent Society, thus keeping them in touch with and stimulated by the governing body. His proposals were not accepted, but a resolution which he moved to the effect that local secretaries of the Society should be asked from time to time to report on the condition of pharmacy in their respective localities was carried. He did not think, however, that it had ever been acted on. He said Mr. Ward had given them on a previous occasion some excellent views on the consolidation of the Pharmaceutical Society, but he (Dr. Symes) had gone a step further and had suggested means by which not only the Society but the whole trade could be consolidated. He would have every man who passed the qualifying examination enrolled as a member of the Pharmaceutical Society without an annual subscription. The strength resulting from unity would enable them to accomplish much that was now impossible. He had been told that things were not ripe for such a step, but as it would take some time to accomplish he felt assured they would be justified in taking steps for commencing so desirable a work. This evening he would vacate the chair, but his interest in the work of the Association would still continue.

At the close Mr. R. Parkinson, in a highly eulogistic speech, proposed a vote of thanks to Dr. Symes both for his address and for the great services he had rendered to the Association for many years.

Mr. J. S. Ward seconded the motion, also referring to the indebtedness of the Association and of pharmacy at large to Dr. Symes.

Mr. A. C. Abraham supported the motion, and it was carried with acclamation.

Dr. Symes briefly responded, and heartily thanked the meeting for the expressions made, and the meeting terminated.

MEETING OF CHEMISTS AND DRUGGISTS AT PLYMOUTH.

On Tuesday evening, the 22nd inst., a meeting was held at 106, Old Town Street, Plymouth, having been called by the Local Secretary to carry out a suggestion made by the Vice-President (Mr. Bottle) at the November Council meeting, that chemists bestir themselves in the matter of local grants towards technical education.

Messrs. J. Allen, F. J. Allen, Breeze, Maurice, Park, Roper, J. D. Turney, E. G. Turney, Woods, Weary, and Hunt (Local Secretary) were present. Mr. J. Allen having been elected Chairman the Local Secretary made a few remarks upon the desirability of chemists as a body taking a special interest in the disposition of the education grants, and suggested that a letter be written to the Technical Education Committee of the Plymouth County Council, and read a draft letter urging the claims of the local chemists to participate in the grants, and asking that a class in materia medica be added to those about to be established; that specimens of materia medica be placed in the Museum if one is decided upon, or that standard works of reference in chemistry, botany, physic, and materia medica find a place upon the shelves of the Library if such is formed.

After many suggested alterations it was finally approved, and the Local Secretary instructed to forward the letter to the proper quarter.

Mr. R. J. Roper followed with a few remarks upon the difficulty in deciding upon the best method of storing and using the more potent poisons at the dispensing counter, notably liq. strychnia P.B., and asked whether it would be better to alter the strength so as to minimise the danger of giving a fatal dose in case of accidental substitution for another colourless liquid, such as liq. morphine or liq. hydr. perchlor.; whether a very distinctive bottle should be used or whether it should be coloured so as to be readily recognized at sight. Discussion followed, some being of opinion that careful labelling would be sufficient, others depended upon a special cupboard and upon classification as to the position of poisons of similar potency; one suggested an oblique label for liq. strych. only, and another that all bottles containing poisons should always be filled in the presence of a second person when possible; but the general opinion was that the distinctive bottle gave the most practical and best solution of the difficulty.

GLASGOW CHEMISTS AND DRUGGISTS' ASSISTANTS' ASSOCIATION.

At the meeting held on Wednesday evening, December 23, Mr. B. Cartwright in the chair, a lecture on "Discrepancies in Pharmacy" was delivered by Mr. Colvin Gates. The lecturer commenced by referring to the standardising of patent medicines as requiring to be greatly extended, as for instance to preparations of aconite and belladonna. The storing of drugs and chemicals left much to be desired. Deliquescent salts should be kept in a drawer with quicklime. Sulphurous acid could always be had fresh by keeping the gas in a syphon and mixing with water when required. The impurities in some of the more important preparations were then referred to. Mr. Gates concluded by giving demonstrations of Nessler's reagent as a test for ammonia, Meyer's reagent for alkaloids, the use of phenolphthalein and methyl-orange as indicators of neutrality, and the nitrometer tests for chlorinated lime and spirit of nitrous ether.

A discussion followed, and on the motion of the Chairman a vote of thanks was awarded Mr. Gates.

Parliamentary and Law Proceedings.

Poisoning by Morphine.

On December 24, Mr. A. W. Wyatt held an inquest at the Newington Coroner's Court, Manor Place, Walworth, on the body of Thomas Mann Dow, aged 67 years, a tailors' cutter, lately residing at 40, Westmoreland Road, Camberwell Gate, whose death resulted from an overdose of morphine.

Laura Arnold said deceased had been ailing for about twelve months. Last Friday he went to work as usual, and shortly after his return home in the evening retired to bed. The following morning witness went to call him, but could get no answer to repeated knocks at the door. Becoming alarmed, she called her husband, who burst the door open, when Dow was found lying on the bed in an unconscious state. A medical man was at once called in. She was aware that he was in the habit of taking chlorodyne in large quantities. He used to purchase it himself. Some time ago he told her that he used to take nine drops at a time, but how often he did not state. He was in the habit of always carrying a bottle about with him in his pocket, and would drink it at business. He had no reason to take it medicinally, it was simply a habit. She had taken apronsful of the empty bottles out of his room at a time.

Mr. Arnold corroborated his wife's evidence, and said he knew that Dow had been taking chlorodyne for the last twenty years.

Francis Fryer, the coroner's officer, stated that he searched deceased's room and found a large basket full of empty phials, as well as a bottle of laudanum. Dow was in receipt of good wages, and must have spent £2 per week in chlorodyne, in fact all his money went in morphine.

Dr. Frank Oldfield, of 174A, Boyson Road, Camberwell, deposed to being called in to see Dow, whom he found lying in a comatose state, and suffering from opium poisoning. Witness administered the usual antidotes, after which the man recovered consciousness, and was able to talk a little. Witness saw him on Sunday. He was again in a state of insensibility, and had no doubt been taking further doses of the narcotic. He remained in that state until his death, which took place on Monday last. He was in the habit of mixing laudanum with the chlorodyne, as the latter was not strong enough for him. The habit of taking chlorodyne was becoming very common, and witness considered more restriction should be put upon the sale of it. The 4-oz. bottle (produced) contained sufficient morphine to kill thirty or forty people. Some persons while under the influence of the narcotic would sleep thirty hours at a stretch, and during that time would enjoy what witness termed "a fool's paradise."

The jury eventually returned a verdict to the effect that death was due to an overdose of morphine taken in the shape of chlorodyne.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

False Pellitory Root.

Sir,—In reference to Mr. Holmes' paper in the last *Pharmaceutical Journal* to hand, it may be of interest to mention that a consignment of 3 tons of adulterated pellitory root has recently been imported into Bombay from London. The root was indented for by a firm of Parsee merchants, on behalf of a Mahommedan dealer, at the rate of £60 per ton. As the root was so largely adulterated, the dealer soon detected the fraud and objected to the drug as not according to his sample. On reference being made to the well-known firm of London drug brokers who shipped the root, a telegram was sent out to the effect that "a sample had been submitted to an experienced drug broker, who pronounced it genuine root." I was called upon on behalf of the firm of Messrs. Kemp and Co., Limited, with which I am connected, to report on the drug. I found the consignment to be largely adulterated with the root that has been described and determined by Mr. Holmes as *Corrigiola telephiifolia*, and I need hardly say that I advised the dealer to reject it.

Bombay. J. G. Prebble.

Pictet Chloroform.

Sir,—Having examined a sample of Messrs. Raoul Pictet and Co.'s patent chloroform, we think the readers of the Journal may be interested in the results, and therefore send them to you for publication. The sample was in original packages, and was found to answer all the P.B. tests, with the exception of sp. gr., which, instead of being 1497, is only 1485 at 60° F., pointing to the presence of a considerable quantity of something other than chloroform.

Subjected to fractional distillation it began to boil at 61·5° C., rising almost immediately to 62° C.

When 7·7 p.c. had distilled over, the temp. was 63° C.
,, 34·6 ,, ,, ,, ,, ,, 63·5° C.
,, 84·6 ,, ,, ,, ,, ,, 64° C.

The residue, which had a distinctly bad odour, was transferred to a clean dry bottle and evaporated at a temperature of from 80° to 90° F. A rancid-smelling residue was left, which we send for your inspection.

The low sp. gr. and varying boiling points, as well as the non-volatile bad-smelling residue, show unmistakeably that the chloroform is not pure.

It may be placed on an equality with some home-made brands, but must take an inferior position when compared with the best.

Results a little more favourable than the above were obtained some months ago from an examination of another German patent chloroform, prepared by "a very simple method, which enables the perfect purification of common chloroform into the quality which is sold in Germany (wholesale) at 15*s.* per 1 kilo." We refused to purchase this patent on the ground that we were able by our own process to produce a better article.

It is evident, therefore, that the introduction of Pictet's brand does not put consumers in a better position either as regards quality or price.

93, *Abbeyhill, Edinburgh.* J. F. Macfarlan and Co.

The Protection of Proprietary Medicine Prices.

Sir,—Will you allow me to add a word or two to your fair, though very brief, epitome of my paper on the above subject in last Saturday's Journal? I thank you for your kind remarks respecting the same, and I wish to take this opportunity of heartily thanking all those gentlemen in the various divisions of London and in many provincial towns who expended freely their time and energy in distributing the circulars and collecting the statistics desired. I can only regret that no better results have followed these efforts. Although it has been abundantly proved that we were in error in supposing that an appreciable number of manufacturers might be won over to protection, I feel as convinced as ever that the general adoption of the suggestion would have been a boon to both retail chemists and manufacturers. I frankly confess that the proposal is not so desirable in some respects as some of the protection plans already in operation, but it seemed to me possible that a sort of compromise between the various conflicting interests could be effected by it.

I shall be pleased to furnish additional particulars of the movement to those of your readers who take an interest in it, and to give some more extracts from the hundreds of very entertaining letters received. I see they have embodied one of the leading principles of the scheme in the latest American propaganda.

William Johnston.

Communications, Letters, etc., have been received from Messrs. D. Hooper, J. C. Stead, G. Foy, A. W. Bennett.

"PRIMARY" AND "SECONDARY" EDUCATION—THEIR RELATIVE IMPORTANCE IN THE TRAINING OF THE PHARMACIST.*

BY G. F. SCHACHT.

A few weeks ago I had the good fortune to be present at a small gathering at which the following subject was discussed—"Should Secondary Education be Technical or Liberal?"

The company consisted chiefly, though not exclusively, of professional men and teachers in art and science; and though I scarcely felt prepared at that moment to take part in the discussion, I found the occasion sufficient to stir some old thoughts within me and to make me wish once again to give them expression.

As might have been expected from the character of the assembly, the general opinion of those who took part in the debate appeared to be that the more "liberal" the scheme of education embraced by a student, the stronger would be the promise of its ultimate success, alike if the purpose of education be regarded as an effort to make a better man or a better workman. But the strongest advocates for "all round" culture were constrained to admit that the opportunities for this complete ideal training varied in almost every individual case, and that in many cases the needful time and money would be wanting.

So the practical question—What is best to be done with this or that young person's training between the ages of 14 and 20?—had to be left open for individual answer.

And I think it must ever continue to be an open question. Authority cannot at this particular moment of the story interpose to screen the individual. Authority can at a much earlier period declare that the child shall be sent to school, and shall be required to fulfil a certain curriculum of instruction, and in so far authority usurps the place for a time of a supposed ignorant or incapable parent, but the ultimate responsibility lies with those who begat the child, and that responsibility must be fulfilled until the child is mature. When the period of "secondary" education is reached authority can only suggest and help.

Speaking generally, then, I think we may say that the "time and money" consideration forbids the indulgence of a very extended curriculum, except among the favoured few; and the question mooted at our meeting, "Should Secondary Education be Technical or Liberal?" may be shortly answered thus: technical firstly and essentially, and liberal if possible. Let me illustrate this with a few simple cases. When my own son's schoolmaster (a high wrangler in his own year) heard that the lad was to go to Cambridge, his instant advice was "from this moment let him live in an atmosphere of mathematics." Professor Michael Foster has given his opinion that a young man proposing to adopt medicine had better begin as a pupil to a master about the age of 17, so as to grow in an atmosphere of medicine. An employer of skilled labour at our meeting said that if a lad was aiming to use a light hammer dexterously he had better begin directly he left school. All these opinions are pronouncements in favour of secondary education being essentially technical. No one would wish to deny that the wrangler and the doctor would be more agreeable and perhaps happier men if they knew their Homer and their violin in addition to their special knowledge, or that the maker of penknives would be a pleasanter man to talk with if he could tell you something about flowers, but the thing that should chiefly concern them all is, that they learn their respective arts thoroughly. All the rest is accessory—valuable, no doubt, very valuable, but accessory and of secondary import.

But of far greater importance (in my opinion) than all these considerations about "secondary" education is the matter of "primary" education, for I shall venture to invest "primary education" with the high duty of the manufacture of mind.

No "little stranger" is born into the world equipped with the commodity we call "mind." He is supplied with the materials out of which "mind" may be evolved, even as the ore and the coal from which may ultimately be formed a steam-engine are given us in the bowels of the earth. But the appearance of the engine depends upon the labours of the chemist and the engineer, and the evolution of the said stranger's mind depends upon his parents and friends, a responsibility to which I have already referred. This process of manufacture begins, or should begin, at the cradle and the mother's knee, and, all going well, should in due time land the young bud of dawning intelligence in the curriculum of the three "R's" and the accompanying matters of the early school.

This is a critical moment in the young being's history. There are those who act as though they regarded this first step in systematic training as of slight importance, and that its management may with propriety be left to the first respectable party that offers. I regard it, on the contrary, as of the highest importance and as demanding in the selection of proper agents very great discretion.

Let us think of the matter thus:—Reading, writing and arithmetic. Are these such small fields for intellectual exercise that they can be carelessly handed over to the management of the first object that appeals to our sympathies—whose father or husband has died or failed in trade.

Reading is perhaps the most constant and continuous process of education that we experience through life. On what subjects do we not read? Religion, morals, history, poetry, science, etc. Surely to guide a dawning mind in its mere exercise in this first "R" demands special knowledge and discretion.

For writing can it not be fairly claimed that it is the process by which the young eye is helped to observe and realize the importance of minute differences in form, and the delicate muscles of the young hand trained to reproduce what the eye sees. The steps that lead from the pothooks of the schoolboy to the statue of the artist or the balance of the analyst may be numerous, but they may be traced.

And in the cultivation of the comprehension of number (our third "R") lies the basis of all the reasoning of mature intelligence. The young brain does not easily realize an abstraction. Even the simple proposition that twice 3 are 6 is much enforced as a truth by the aid of nuts and oranges,

* Paper read at a meeting of the Bristol Pharmaceutical Association, January 1.

and the comprehension of the statement that division consists in ascertaining how many times a certain number is contained in another number demands progressive training.

Let us then admit that though, on the one hand, there is nothing of miraculous power in these three "R's," out of which must necessarily flow a perfect result, yet that, on the other hand, if dexterously utilized, they may be made the happy factors in a new creation ; and further, that what may then be fairly recognized as "mind" has been so prepared, that upon it may be reared almost any intellectual structure that may be desired. For the soil is fit, and everything that is cast upon it, whether as information that shall add to its strength or as problems for thought and elucidation, which might be compared to the seed of the sower, finds its proper place and receives its proper welcome.

The comparison is inevitable, the *un*cultivated or wrongly cultivated faculties are as the "wayside" upon which even good seed perishes.

These are general and, I fear, but desultory observations ; let me try to apply them to our own case. I will repeat my text in the form of a question. Does our system of secondary education, as applied to the pharmacist, succeed in making him an efficient workman ? If we turn to our Boards of Examiners and ask *them*, what will, of necessity, their answer be ? "No ; in more than 60 per cent. of cases it fails." Over and over again during my pharmaceutical life has this question been asked, and it has always been similarly answered.

How often and how earnestly have some of us sought for a satisfactory explanation of this deplorable fact. Some of us have thought that opportunities for gaining adequate professional knowledge were insufficient, and have directed their efforts to the supply of libraries, museums, etc., etc. Others have urged compulsory attendance at courses of scientific lectures ; and, again, many have considered that we admit too easily to our ranks youths who should have been kept longer at school, and that such as these should be excluded by a more rigid and more extended Preliminary examination.

Well, I have, in a measure, to approve all these suggestions. The provision of libraries, museums, and courses of lectures throughout the country is an excellent work, and I sincerely hope that all such efforts will be continued and extended, *provided* we do not allow ourselves to fancy that having supplied these opportunities for culture our duty is there and then fulfilled. The digging of the well and the filling of the trough fall clearly to our side of the task, but before those can be nourished for whose benefit the water is displayed, there must be produced within them a healthy desire to drink.

It would seem that we have no more right to expect that healthy desire to exist naturally than that the thing we have agreed to call "mind" should exist naturally, but if there be any truth in the position I have endeavoured to indicate, that the mind is mainly the result of the training of certain possibilities placed in the trainer's hands, it must rest largely with the trainers to present the mind they have thus helped to produce with a healthy desire to grow. I think that desire might be expected to appear early in the story of their mutual relation and to become more and more manifest—*if the training were judicious.*

It would be easy to see that it would never appear—if, for instance, each step were viewed by the parties concerned simply as a task to be accomplished somehow, anyhow, so as to escape punishment on the one side or scandal on the other. But it is equally easy to imagine an opposite kind of process by which each step in the pupil's knowledge might be attended by a corresponding advance in his intelligence ; and as consciousness of capacity increased, so might the desire to fill the void be expected to increase also.

All such considerations point with more and more directness to the care required in the selection of the proper agents for this initiatory work.

My arguments then bring me to this : that from the day the young pharmacist enters his master's shop his education ("secondary education") should be essentially technical—chemistry, botany, materia medica, pharmacy, shop-work—but that it is by no means a hopeful business to enter upon such a curriculum of secondary education, unless his primary education has been fairly satisfactorily accomplished, unless, in fact, he can be proved to possess a mind capable of absorbing this new pabulum.

But how can a master be assured of the competency of his pupil ? An answer, though not perhaps an entirely satisfactory one, is conveyed by a reference to our Preliminary examination. It is the only available test we have, so it would be well that all should adopt it, and that no master should allow himself to receive a pupil until he had passed the Preliminary examination. Could we succeed in making this rule general we should gain for ourselves the best right to hope that the secondary education of the young pharmacist would result in real success ; the soil having been duly prepared to receive the seed, the seed might be expected to live and develope. And perhaps then the percentage of failures in our examination rooms would be smaller.

I must say a few words about the test itself. There are amongst us some who would make it more rigid and extend its scope. I do not incline to this opinion. It is probably better, as a rule, that the connection between the master and his apprentice should begin whilst the latter is young enough to be fairly malleable, say about fifteen years of age. He will take to the small duties of the shop more kindly, and will more easily drop into his proper subordinate place in the establishment *then* than if he be two years older ; and if a lad of fifteen pass a good examination in the subjects of our present Preliminary it ought to prove, as far as examinations can, a previous fair primary training ; the introduction of other subjects might tend to delay the date of entry and to encourage variety rather than thoroughness in his earlier school work.

I have thus far spoken of two sections of the education of the pharmacist ; the "primary," which includes the parental and the school training, and the "secondary," which may be supposed to begin with apprenticeship and to end with the acquisition of the title "pharmaceutical chemist."

Education, of course, does not cease at that achievement. It is a mere platitude to remark that it should continue to the last day of a man's active life. But up to the present day we, the

authorities in pharmacy, have failed to offer much inducement for further professional culture after our pupils have achieved the title of pharmaceutical chemists.

I think this is matter for regret, and I indulge the hope that some day we may add to our titles of honour some distinction to which our best qualified members may aspire, one that shall characterize and dignify those who have not only mastered what is known by others, but have also through their own labours enhanced knowledge itself.

The establishment of the Research Laboratory of the Pharmaceutical Society affords full opportunity for the requisite training, and the present seems to me an appropriate moment to consider whether the encouragement of a distinction such as I have indicated may not be legitimately offered by the Council, that has so wisely founded that most excellent scheme.

ARISTOLOCHIA ARGENTINA.

BY DR. O. HESSE.

Amongst a number of Argentine drugs for which I am indebted to the kindness of Mr. Stuckert, of Cordoba, are the roots of the above-named plant. They are used in the Argentine provinces as a diuretic and diaphoretic as well as internally and externally for paralysis and rheumatism. The root has a peculiar sharp odour, and under the microscope presents large masses of round starch granules destitute of striæ. The powdered root gives a dark brown yellow colour to ether, and when gaseous ammonia is added to the ethereal solution a red flocculent precipitate is separated. The ether solution separated from this precipitate gives on evaporation a yellowish brown residue, in which clear, colourless crystals are formed after some time. The dark coloured mass separated from these crystals and again dissolved in ether gives, on shaking with dilute sulphuric acid, a small quantity of a base. The greater part of it, however, remains in the root that has been treated with ether and can be extracted with alcohol. On evaporating the alcoholic extract a brownish yellow resinous residue is obtained that is partly dissolved by caustic soda solution and gives up the base to ether.

I propose to apply the name Aristin to the substance contained in the above mentioned red ammoniacal compound. When that compound is dissolved in hot glacial acetic acid the aristin crystallizes out on cooling, and it can easily be obtained in a pure state by recrystallizing from hot glacial acetic acid. Aristin forms shining gold-coloured laminæ and flat needles sparingly soluble in hot glacial acetic acid and scarcely at all soluble in the cold. It is sparingly soluble in hot alcohol, more so in ether, chloroform, or benzene. At about 260° C. it blackens, but does not melt until the temperature reaches 270° C. and then undergoes decomposition. It dissolves in concentrated nitric acid on boiling for a short time, and separates again unaltered on cooling; but when the boiling is long continued decomposition takes place with evolution of red vapour. Aristin dissolves in acetic anhydride with a yellow colour, and when concentrated sulphuric acid is dropped into the solution it becomes at first intensely blue and then permanently greenish-blue. The alcoholic solution of aristin has a perfectly neutral reaction, but the substance combines with ammonia and with soda. These compounds have a fine red colour, and the ammonia compound can be crystallized from alcohol in delicate needles. Both compounds are dissolved by water or alcohol with deep orange-red coloration. On addition of acids to these solutions a flocculent yellow precipitate is thrown down which soon becomes crystalline.

The second of the above-mentioned compounds is a fat acid ester that can be easily purified by recrystallization from alcohol. It takes the form of small white laminæ which melt at 84° C., and are very soluble in hot alcohol but sparingly in cold alcohol, very soluble in ether, petroleum spirit or chloroform, and insoluble in water. The substance dissolves in hot glacial acetic acid, and on cooling crystallizes out again unaltered. In the alcoholic solution this substance can be easily saponified, the products being phytosterin and palmitic acid.

The third substance mentioned above is a base, to which I propose giving the name aristolochine. That name has already been applied by Chevallier to a bitter substance obtained from *Aristolochia serpentaria*, but it was obviously a mixture the bitter taste of which was probably due to the presence of the base now described. Therefore the name seems to me to have been inappropriate in that instance, and I have transferred it to the pure substance.

Aristolochine is precipitated from its colourless solutions in sulphuric or acetic acid on the addition of ammonia or caustic soda in the form of white amorphous flocks. It is freely soluble in alcohol, ether, chloroform, or benzene. On evaporating the ether solution it remains as a colourless resinous mass. When the ether solution is mixed with an equal volume of petroleum spirit and the mixture very slowly evaporated warty masses are deposited that are distinctly crystalline. The base has a bitter taste and neutralizes acid perfectly. The hydiodide and sulphocyanide are amorphous oily precipitates which present no tendency to crystallize. The platinochloride is a dark yellow and the aurochloride a pale yellow amorphous precipitate; both are almost insoluble in water.

The behaviour of the base with concentrated sulphuric acid is remarkable. It forms a fine green solution, which becomes bright blueish green on the addition of a trace of ferric chloride. Similar reactions are given by aricine, cusconine, and some of the bases of the bark of *Remigia Purdieana*.

Aristolochine appears to have been already observed by Dymock and Warden in their examination of *Aristolochia indica*, and I am of opinion that the differences of their statements in regard to the base are solely due to their having failed to separate it completely from colouring material. I am also of opinion that Aristin partakes of the nature of the yellow substance* obtained by previous observers, and that, according to some remarks of Dymock and Warden, it is probably present in the root of *Aristolochia indica*.

---

* See *Pharm. Journ.*, li., 245.

SHUKAI.

BY W. DYMOCK AND C. J. H. WARDEN.

Shukai* is a Persian drug which is sold in all Indian bazaars. Haji Zein el-attar, the author of the *Ikhtiárát*, states that it is useful in palsy and other diseases caused by cold humors. He quotes Galen as recommending its use in melancholia, and Paulus as saying that it is useful in leprosy. In Persia it is said to have a reputation as a remedy for ague. In Shiraz it is known as Khár-i-mehak. Ibn Sina (Avicenna) notices it, and says it is the same as Bázaward (Bádaward, *Pers.*). Mir Muhammad Husain, the author of the *Makhzan el adwiya*, very truly denies this, and says that it is the Akrániki† or Afsharniki of the Greeks, and that the Arabs call it Shaukat-el-baida, Shaukat-el-Arabiya and Kathir-el-rakab, and the Persians charchah and kangarkhár. He describes two varieties, one with a white flower and more slender stems than the other, which has purple flowers and is the kind generally used. The latter, he remarks, has angular stems the size of a man's finger, or less, and thick, small, triangular downy leaves, terminating in thorns; the seeds are small, triangular, and of a greyish colour; the drug has a sweetish taste; it is attenuant and deobstruent. As met with in India the drug consists of all parts of the plant broken up. The portions of the stem are of a greenish yellow colour, crooked, channelled, with numerous branches springing from the axils of the leaves. Externally they are siliceous, hard and pubescent, internally full of soft pith. The petioles of the leaves are stem-clasping, the lower ones completely so. The lower leaves are of considerable size, with a triangular midrib, channelled on the upper surface, and short, thick, spinous lobes, which vary much in shape. The fruit is occasionally found mixed with the drug in considerable quantity; it is a woody nut ¼ inch long, formed by the fusing together of the different parts of the perianth and ovary, somewhat triangular in form; at the base are spines formed by the calycine segments, at the apex the perianth forms a number of tooth-like processes. The seed is ovoid, horny, and has a terebinthinate odour.

Chemical Composition.—The chopped plant, air-dried, was treated for several days with warm 80 per cent. spirit, the resulting tincture distilled to remove alcohol, and the residue finally deprived of the last traces of alcohol by spontaneous evaporation. The extract was then mixed with water acidulated with sulphuric acid and agitated with petroleum ether. The petroleum ether extract was greenish, soft, with a camphoraceous and peppermint odour and taste. Treated with warm proof spirit a portion dissolved, forming a clear yellowish liquid while warm, but from which resinoid matter separated on cooling. The solution had a strongly acid reaction and gave a greenish coloration with ferric chloride. After the addition of sulphuric acid, it afforded a very marked precipitate with Mayer's and other alkaloidal reagents. With alkalies the solution was coloured of a bright yellow hue; basic acetate of lead gave a bright yellow precipitate, a similar precipitate, but smaller in amount, being also afforded by lead acetate. The soft resinous residue insoluble in proof spirit, after standing deposited a small amount of bright yellow matter, which was seen to be destitute of crystalline structure on microscopic examination. In ammonia the residue was insoluble.

During agitation of the extract with petroleum ether a considerable amount of dark, soft resin separated; this resin had a marked peppermint odour and was only partly soluble in ether. After repeated washing with ether, it was left as a dark, soft mass which could be kneaded by the fingers; on drying at 100° C. a nearly black brittle mass was left, easily pulverised and forming a dark olive-brown coloured powder, odourless and tasteless, but bitter in an alcoholic solution, soluble in ammonia, forming a deep yellowish brown solution, from which it was reprecipitated by acids in dirty yellowish-white flocks. In alcohol the resin was easily soluble with acid reaction; with ferric chloride the alcoholic solution was slightly darkened in tint.

After agitation with petroleum ether the acid aqueous solution was agitated with ether: the ether extract was small in quantity, and though some small points separated on the sides of the dish which appeared crystalline on naked-eye inspection, on microscopic examination no crystalline forms were visible. In water the extract was partly soluble with strong acid reaction; the aqueous solution gave with ferric chloride a dirty bluish-green precipitate, changing almost instantly to dirty whitish-brown. With alkalies a bright yellow coloration was afforded; the solution did not precipitate gelatine and gave no reaction with cyanide of potassium. The ether extract was treated with ammonia, in which, with the exception of some flocks, it appeared to be wholly soluble. The solution exhibited a marked greenish fluorescence; it was agitated with ether. The ether extractive formed a non-crystalline yellow varnish, soluble in alcohol without fluorescence, with a very bitter taste and neutral reaction; treated with dilute sulphuric acid a small portion dissolved, and the solution afforded marked reactions with all alkaloidal reagents. The alkaline aqueous solution was acidulated, which caused whitish flocks to separate and agitated with ether. The ether extract was a non-crystalline yellow varnish, partly soluble in water with strong acid reaction, the solution affording similar reactions to the original aqueous solution of the ether extract. The ammoniacal solution exhibited a greenish fluorescence.

The original aqueous acid solution was now rendered alkaline and reagitated with ether; a yellow varnish was obtained after spontaneous evaporation of the ether. The extract was treated with dilute sulphuric acid and agitated with ether, the ether separated, the aqueous solution rendered alkaline, and again agitated with ether, in order to purify any alkaloidal principle which might be present. The purified ether extract dried to a yellow varnish; the solution in sulphuric acid gave a very marked yellowish precipitate with Mayer's reagent; a white precipitate with alkalies; with Fröhde's reagent, first yellowish, rapidly changing to pale blue, and darkening on standing or warming to deep prussian blue; chromate of potash gave a yellow precipitate; bichromate of potash and concentrated sulphuric acid a dirty orange-red; ferric chloride no reaction; the solution was destitute of any bitter taste. Considerable loss of alkaloid occurred during its

* *Noea Spinosissima*, Moq.?

† Possibly from ἀκρώνυψος.

purification, as the sulphate was somewhat soluble in ether.

Finally, the original alkaline aqueous solution was acidulated with sulphuric acid and agitated with amylic alcohol. On evaporating off the amylic alcohol a deep orange-red varnish was left, partly soluble in water with strong acid reaction, the solution giving an olive-brown coloration with ferric chloride; no precipitate with gelatin; a bright yellow coloration with alkalies; a bright yellow precipitate with basic acetate of lead; and it reduced Fehling's solution on boiling. The residue, insoluble in water, was dissolved by ammonia, forming a deep orange-yellow solution, from which acids afforded a whitish precipitate, the yellow colour being destroyed.

NOTE ON CATECHU.

BY G. CLARIDGE DRUCE.

In the Library of the Botanic Garden at Oxford I recently came across a book which apparently escaped the observation of the indefatigable authors of 'Pharmacographia,' entitled "Ehrenfridi Hagendornii Medicinæ D. et Pract. Gorl. Tractatus Physico-Medicus de Catechu sive Terra Japonica in vulgus, sic dicta ad normam Academiæ Naturæ-Curiosorum. Jenæ, 1679." This gives very interesting particulars respecting the history, nomenclature and physical characters of Catechu.

"De patria Catechu." The author writes:—"Si Catechu agnomen respicias, quod Japonica etiam indigitetur, facilis esset decisio, quem agnoscat *locum natalem*. In ambiguo tamen usque est, an in Japonica vel præparetur, vel aliunde ad Japonenses transportetur. Ex aliis finitimis locis in *Malaccam* et Sinam exportari." The italics are mine.

"De differentiis Catechu," "Duplicis generis quod sciam, innotuit Catechu hactenus. Una magisque communis Catechu species apparuit rubicundior, ad nigredinem veluti quandam inclinans, cum striis albicantibus, instar linearum per totum Catechu subjectum excurrentibus, itemque ponderosior compacturque. *Altera* a me visa fuit compacta, nec ita colorata, colore potius ad albedinem inclinante, porosior item, levioris ponderis, digitis quoque frangi facile terrique sustinens, nec Rae rubicundioris, ceu altera, adeo ferax."

Other differences are noted. Whether the pale variety alluded to be the cutch of North India I am unable to say. May it not be the Gambier cutch? If so, this will be a very early notice of that drug.

In another chapter of "De Electione Catechu" the writer says:—"Usus obtinuit, ut si de notis bonitatis indijudicandis medicinalibus certiores esse velimus, ad manus asservemus exemplum quoddam, ad quod tanquam ad Lydium lapidem pensiculanda pensiculemus eaque si bonitate cum examplo conveniant, retineamus sin minus, aversemur. Hinc cum duæ hactenus Catechu species sese mihi obtulerint, illam putaverim alteri preferendam, quæ saturatiori se commendat rubedine, quæ compactior, quæ ponderosior, quaquè minus participat de lapillis, seminibus, lignis aliisque inibi interdum repiriri solitis. Quâ fini etiam apud aromatarios jam receptum est, ut integros Catechu globos prius malleo contundant, visuri, quænam sit species, ne pallidiore et viliore ob metum adulterationis, qua Japonenses ut plurimum malè audiunt, emptores defraudent.

Sec. 2. Notari tamen expedit, suggerente id qualicunque experientiâ meâ utramque suam mavere posse laudem: *Rubicundiorem* cum opus est peculiari multaque adstrictione; *Pallidiorem* vero, ubi magis præcipitandi et absorbendi, humores vitosos intentio est, modo prius probe à lapillis et depuretur.

Section 3 is devoted to the 'Pharmaceutica'; section 4 to 'Therapeutica.'

One prescription may be quoted, for it gives an example of the early use of the word chocolat.

℞	Conserv. rosar-antiq.	℥j.
	Flor borrag.	℥ss.
	Chocolat	℥ij.
	Catechu	℥j.

Vin. Malvat. q. s. cum ₀°₀ cinnam, rosar. ā. g. j. M. sic viro cuidam primario in eructatione ventriculi, quâ præmodum constictabatur.

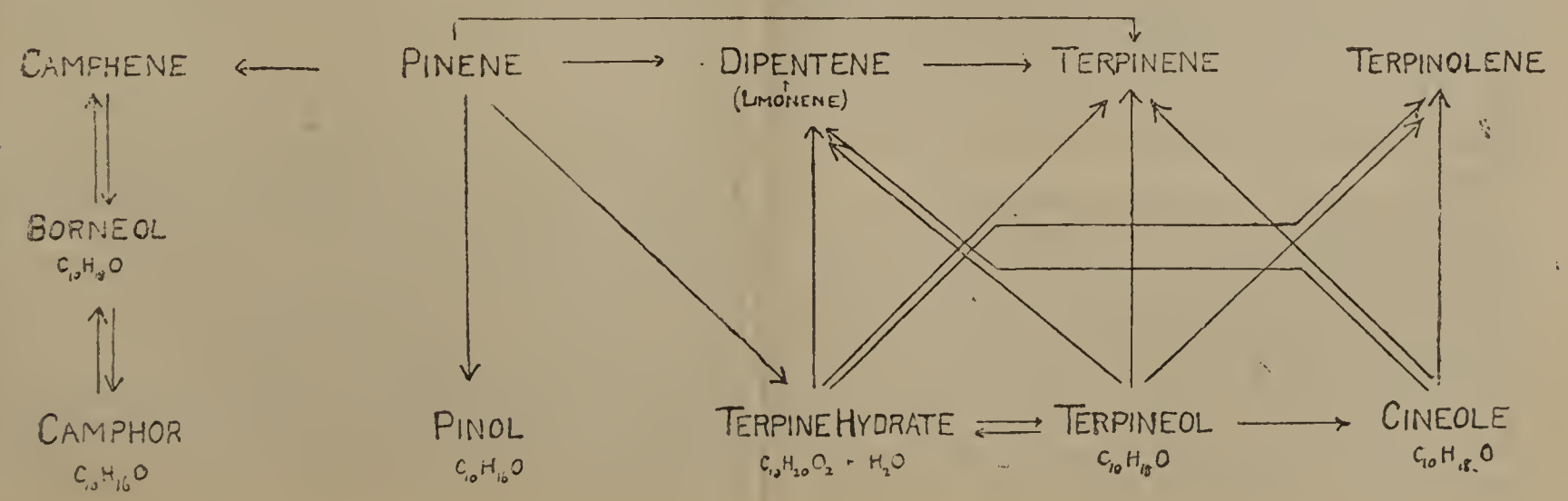
TERPENES AND CAMPHORS.*

BY O. WALLACH.

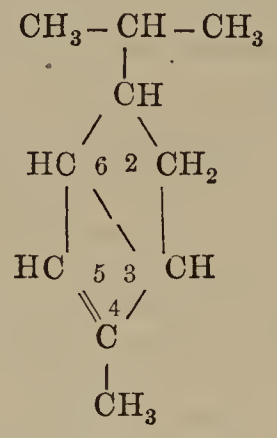
(*Continued from page* 351.)

The partial accomplishment of the first task proposed at the commencement has cost much time and labour, but without such definite means of identifying the terpenes it would have been impossible to have advanced to the second and most difficult part of the work, the study of the changes that occur within the terpene group, and of the mutual relations of individual members. It is impossible to attempt a detailed review of this difficult subject in this short space, but a consideration of the general features of the nature and cause of some of the observed changes will illustrate the nature of the research.

* Abstract from a lecture delivered before the Chemical Society at Berlin on February 23, 1891, and published in *Berichte*, xxiv., 1525.



Pinene is the most ready to change into other terpenes, and the cause of this behaviour must evidently be sought in the arrangement of the atoms peculiar to pinene. A completely satisfactory explanation of all recorded observations is attained by the assumption of a ring-like arrangement of six carbon atoms in pinene, which also contains an ethylene and a diagonal bond in the positions indicated in the following graphical formula :—

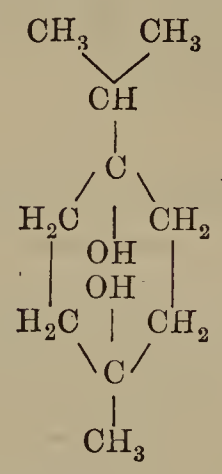


Without assuming a diagonal bond several phenomena observed among the terpenes remains unexplained, and the admissibility of such an assumption can now no longer be doubted, for v. Baeyer in the course of his important researches on the hydrated phthalic and terephthalic acids proved that component atoms in the para position to one another can leave the molecule together, that is to say, at least a temporary diagonal bond exists. Also a similar connection has been long thought probable in the anthracene molecule. The behaviour of pinene hydrochloride upon removal of hydrochloric acid is, as previously mentioned, direct evidence for the probability of the existence of a para bond. If in this decomposition chlorine and hydrogen in the ortho position were split off from the pinene hydrochloride molecule, there is apparently no reason why the resulting hydrocarbon should not be reconvertible into pinene hydrochloride by addition of hydrochloric acid. More incomprehensible still would be the superior stability of pinene hydrochloride to the isomeric monohydrochlorides of camphene, limonene, and dipentene. On the other hand, if the existence of a diagonal bond in pinene is admitted, the ready conversion of terpene into other isomerides is easily understood, since it may be expected that under favourable conditions a para-bond can become an ethylene bond. Simply an increase of temperature suffices to convert pinene, which possesses one ethylene bond, into dipentene, which possesses two, a fact that may be illustrated in the above diagram by shifting the diagonal bond between C_6 and C_3 to the, in this instance more stable, position between C_1 and C_6 or C_3 and C_5.

A para-bond must therefore be regarded as dissoluble, a conclusion to which v. Baeyer was also led by his experiments. The rupture of the para-bond in pinene is probably accompanied by other changes, as already indicated, and it is demonstrated by experiment that in contact with dilute acids pinene is converted into bodies that must undoubtedly be regarded as dipentene derivatives and can be prepared direct from dipentene, such as dipentene dihydrochloride with a melting point of 50° C. and terpine hydrate.

Pinene heated with moist hydrochloric acid yields dipentene dihydrochloride $C_{10}H_{16}+2HCl$, not pinene hydrochloride, and with nitric acid terpine $C_{10}H_{16}+2H_2O$. It is therefore apparent that in the presence of water not only the ethylene bond but also the para-bond is ruptured, and a rearrangement is effected whereby 2 mol. HCl or 2 mol. H_2O can be taken up and a derivative of a terpene with two ethylene bonds thus formed. Dry reagents appear on the contrary only capable of effecting the rupture of an ethylene bond, the diagonal bond being undisturbed. Pinene hydrochloride, the so-called artificial camphor, is thus formed, and probably the removal of hydrochloric acid and formation of camphene is accompanied by the momentary establishment of a second diagonal bond.

Under the influence of aqueous acid solutions pinene, however, not only yields dipentene and dipentene derivatives, but the occurrence of terpinene, terpinolene, terpineol and cineole among the products of reaction has also been observed. These compounds are derived from terpine, $C_{10}H_{20}O_2$ or terpine hydrate, $C_{10}H_{20}O_2+H_2O$, which are nearly related to dipentene by a secondary reaction, as an accurate study of the behaviour of terpine hydrate towards acids has shown. If the formula



be accepted for terpine, it is at once apparent that by the abstraction of a molecule of water and establishment of an ethylene bond, an *unsaturated alcohol* like *terpineol* can result, but that if the molecule of water be derived from the interaction of the two hydroxyl groups, then a *saturated ether* like *cineole* would be formed. Moreover, if both hydroxyl groups were removed as water, dipentene, or other isomeric hydrocarbons would obtain.

The further pursuit of these speculations, as indulged in by Brühl, would occupy much time and space, and this illustration of the facility with which the complicated changes occurring amongst the terpenes admit of explanation must therefore suffice, for a few other general points still demand attention. Though the mobile character of the atomic valencies in terpenes is characteristic of the group, yet analogous instances may be found amongst other classes of organic compounds, as recorded in v. Baeyer's researches on the hydrated dicarboxylic acids of benzene and in Fittig's work on unsaturated fatty acids. The pronounced tendency of some compounds to break old connections and create new ones indicates the possession of great freedom of movement in the hydrogen atoms, and in the terpenes this property does not appear confined to the hydrogen atoms, but is also accredited to the "side chains." Amongst the product of the action of heat upon pinene, m-xylene, mesitylene and durene, respectively di-, tri-, and tetramethyl derivatives of benzene, have been detected, hydrocarbons that can only have resulted from secondary reactions in which hydrogen is eliminated from the molecule and the character and position of the alkyl groups modified. The acquirement of this knowledge aids in the establishment and explanation of the relations existing between the components of essential oils derived from different plants, whilst the simultaneous occurrence of pinene and limonene in the needles of the Coniferæ, and the wide diffusion of cineole in aromatic vegetable products are no longer mysteries. The dissipation of the confusion respecting the character of the atomic bonds in terpenes is a still more important result. For instance there can be no longer any doubt that pinene contains only one ethylene bond, although it yields a dihydrochloride and the property of combining with four atoms of bromine has been ascribed to it. The latter statements are explained by the fact that the bonds in the pinene

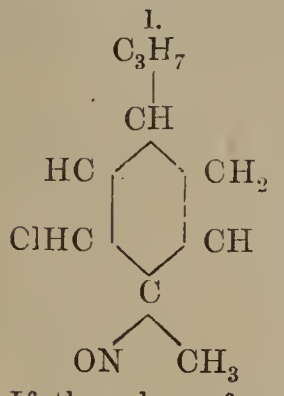
molecule are labile, and therefore in the presence of water and acids the formation of isomeric hydrocarbons can readily take place.

From the present standpoint, therefore, the chemist is able to attack the third part of his task and endeavour to throw light upon the constitution of the terpenes, the principal facts concerning the more important of which will now receive consideration.

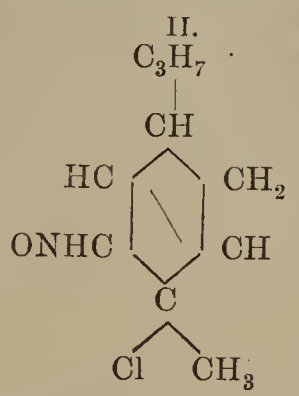
Pinene.

The formula for pinene, already referred to as in accordance with all the facts at present known regarding the constitution of this hydrocarbon, assumes the existence of a ring of six carbon atoms, of which two are connected by an ethylene bond and a second pair by a diagonal bond. By the aid of this formula the most important reactions of pinene, the formation of dipentene, terpineol, terpine hydrate, cineole and also isoprene can be easily demonstrated, and the correctness of the conclusion drawn from the saturated character of the hydrochloride, hydrobromide and dibromide that only one ethylene bond is present, is further confirmed by the determination of the molecular refraction.

I.

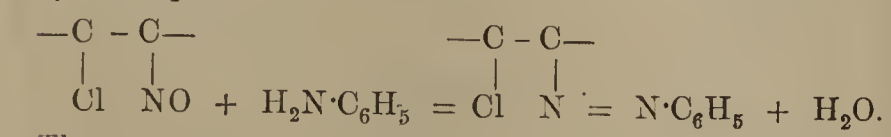


II.



If the above formula be accepted for pinene, two formulæ appear at first possible for pinene nitrosochloride $C_{10}H_{16}NOCl$, but the following considerations lead to the rejection of the second formula. Pinene nitrosochloride has only been obtained as yet in an inactive modification, and consequently only yields inactive derivatives. The pure pinene compound is distinguished from its isomerides by its greater stability, as it only reddens slightly after several years' storage. The difference in its behaviour towards fatty and aromatic bases is peculiar, although quite capable of explanation. It combines with bodies of the character of fatty bases to form *nitrolamines*, amongst which the piperide melting at 119-120° and the benzylamide melting at 122-123° are distinguished by their extraordinary crystalline properties. With aromatic bases the reaction is quite different, for no nitrolamines result, but inactive pinene is regenerated from intermediate amidoazo compounds. This difference is occasioned by the presence of the group NO in pinene nitrosochloride and not the NOH group, as in analogous compounds.

A NO group attached directly to carbon readily parts with its oxygen to the hydrogen of an aromatic amido group. With aniline the reaction is represented by the equation—



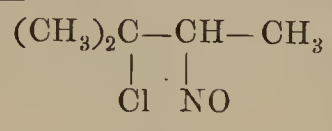
The azo group thus formed combines with the adjacent chlorine atom and diazobenzene chloride is separated, which combines with excess of aniline to amidoazobenzene. The liberated affinities of the two carbon atoms at the same time reunite to form an ethylene bond, and thus pinene is regenerated. This reaction may be employed both to prepare chemically pure inactive pinene and also as a lecture experiment to show the formation of amidoazo compounds, an operation that usually requires times and care. Amidoazonaphthalene is prepared in a few moments by warming an alcoholic solution of naphthylamine with pinene nitrosochloride.

The reaction of pinene nitrosochloride with inorganic bases differs from both the preceding, alcoholic potash, for instance, removing hydrochloric acid from the molecule and yielding nitrosopinene, $C_{10}H_{15}NO$. The latter compound, a fine crystalline body melting at 132° C., differs in its behaviour from the isomeric nitroso-compounds of the terpene series. For instance, whilst nitrosolimonene, $C_{10}H_{15}NO$, splits off hydroxylamine on warming with dilute acids and yields the compound $C_{10}H_{14}O$ (carvol), according to the equation—

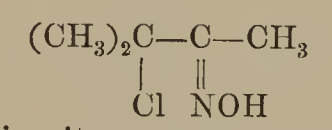
$$C_{10}H_{15}NO + H_2ONH_2OH + C_{10}H = {}_{14}O,$$

nitrosopinene is not attacked by acids. Even when slightly warmed with concentrated sulphuric acid, nitrosopinene is precipitated unaltered by addition of water. This divergence in character is no doubt due to the fact that whilst nitrosopinene contains the group —NO, isomeric nitroso bodies contain the group =NOH. An important inference is to be drawn from this difference in constitution of two bodies of absolutely analogous formation.

In all cases hitherto observed the group –NO united with a carbon atom already in combination with a hydrogen atom exhibits tautomerism, and behaves like an isonitroso group, as may be concisely illustrated with trimethylethylene $(CH_3)_2{:}C{:}CH{\cdot}CH_3$. This hydrocarbon combines with NOCl, but the resulting product does not behave as a compound with the constitution—

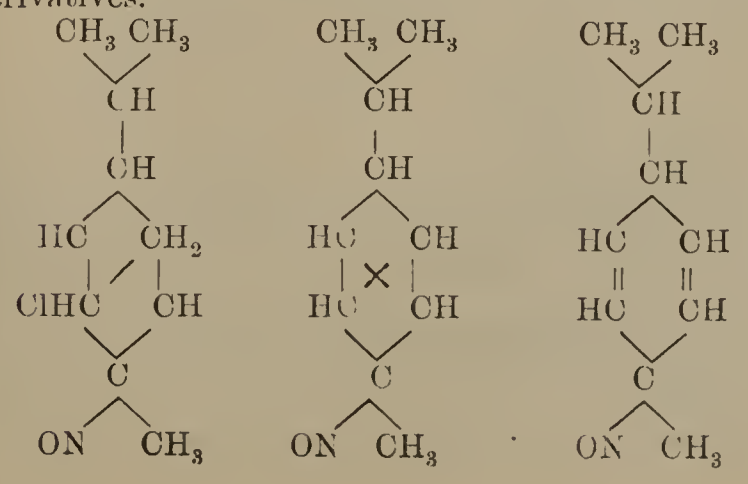


but as—



in which the isonitroso group can be as readily replaced by oxygen as in nitrosolimonene. But if in pinene nitrosochloride the nitroso group is attached to a carbon atom not directly combined with any hydrogen atom, its transition into =NOH is impossible, and this is probably the explanation of the characteristic behaviour of pinene nitrosochloride towards aromatic bases, and the anomalous nature of nitrosopinene. All the facts may be explained by formula I. for pinene nitrosochloride, but remain unintelligible if formula II. be assumed correct.

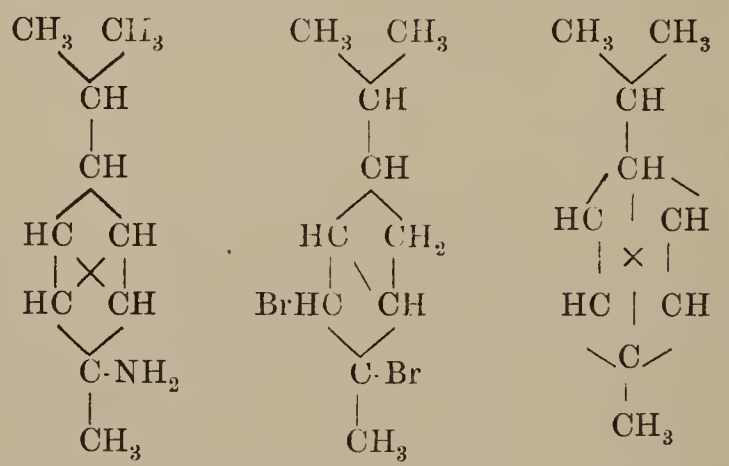
If formula I. be accepted for pinene nitrosochloride then the hydrochloric acid eliminated in the formation of nitrosopinene must result from the combination of the chlorine atom with a hydrogen atom in the *p*-position, and nitrosopinene may therefore possibly have two diagonal bonds in its molecule, though the possibility of another symmetrical position being assumed by the bonds, in which the diagonal arrangement is replaced by ethylene groups, should not be lost sight of, though it cannot be discussed here. In either case the distribution of the hydrogen atoms in nitrosopinene is very symmetrical and is perhaps the explanation of the extraordinary stability of this compound as compared with other terpene derivatives.



By the action of zinc and acetic acid nitrosopinene is reduced to a base $C_{10}H_{15}NH_2$, pinylamine, a result in accordance with the assumed presence of a normal nitroso group in nitrosopinene. Pinylamine is liquid, boils at 207–208°, yields well defined crystalline salts, condensation products with aldehydes, and other derivatives. One characteristic of pinylamine is of very great interest. If the hydrochloride of the base is heated above its melting point, decomposition into a hydrocarbon and ammonium chloride takes place. The hydrocarbon obtained from several hundred grams of the base possessed the physical characters of cymene (boiling point 176–180° C., sp. gr. 0·861 at 20°, $n_D = 1{\cdot}49032$), and its identity was proved by the recognition of terephthalic acid and oxypropylbenzoic acid $C_6H_4{<}^{C(OH)(CH_3)_2}_{COOH}$ (m.p. 176°) as oxidation products with potassium permanganate. The formation of cymene from pinylamine is represented by the equation :—

$$C_{10}H_{15}NH_2 = NH_3 + C_{10}H_{14},$$

and in accordance with the assumed structural formula it is probable that the amido group combines with hydrogen in the *p*-position. The accuracy of these experimental results and theoretical deductions was established by the further observation that pinene dibromide yields p-isopropylmethylbenzene when heated. Both facts are admirably expressed by the accepted pinene formula, as a comparison of the following graphic formulæ shows :—



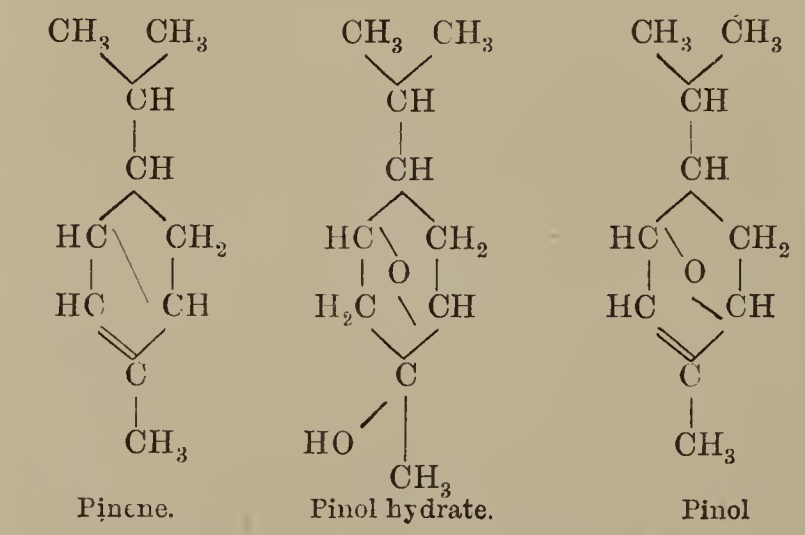
Pinylamine. Pinene dibromide Cymene.

An entirely different class of reactions also indicate the correctness of the formula advanced for pinene. Amongst the bye-products in the preparation of pinene nitrosochloride, a substance has been observed that apparently owes its origin to the oxidizing action of free nitrous acid present. This substance, pinole, has the formula $C_{10}H_{16}O$ and is the first oxidation product of pinene. It retains the ethylene linkage present in pinene, and consequently the property of combining with bromine, nitrosylchloride and hydrochloric and hydrobromic acids. From these derivatives numerous others may be prepared by double decomposition, as a glycol from the dibromide, a nitrolamine from the nitrosochloride, an alcohol from the hydrochloride and hydrobromide. The most important of these compounds are given in the following table:

$C_{10}H_{16}O$, Pinole, b.p. 183°-184° C.
$C_{10}H_{16}OBr_2$, Pinole dibromide, m.p. 94° C.
$C_{10}H_{16}O(OH)_2$, Pinole glycol, m.p. 125° C.
$C_{10}H_{16}O{<}^{OCOCH_3}_{OCOCH_3}$, Pinole glycol acetate, m.p. 97°-98° C.
$C_{10}H_{16}O{<}^{OC_2H_5}_{OC_2H_5}$, Pinole ethyl ether, m.p. 55°-53° C.
$C_{10}H_{16}O{\cdot}NOCl$, Pinole nitrosochloride, m.p. 103° C.
$C_{10}H_{16}O{\cdot}NO{\cdot}NC_5H_{10}$, Pinole nitrol-piperide, m.p. 159°.
$C_{10}H_{16}O \cdot NO \cdot NHCH_2C_6H_5$, nitrol-benzylamide, m.p 133° C.
$C_{10}H_{16}O{\cdot}NO{\cdot}NHC_6H_5$, Pinole nitrol-anilide, m.p. 174°.
$C_{10}H_{16}O{\cdot}NO{\cdot}NHC_{10}H_7$, nitrol-β-naphthylamide, m.p. 194° C.
$C_{10}H_{16}O{\cdot}ClH$, Pinole hydrochloride, fluid.
$C_{10}H_{16}O{\cdot}HOH$, Pinole hydrate (alcohol), m.p. 131° C.

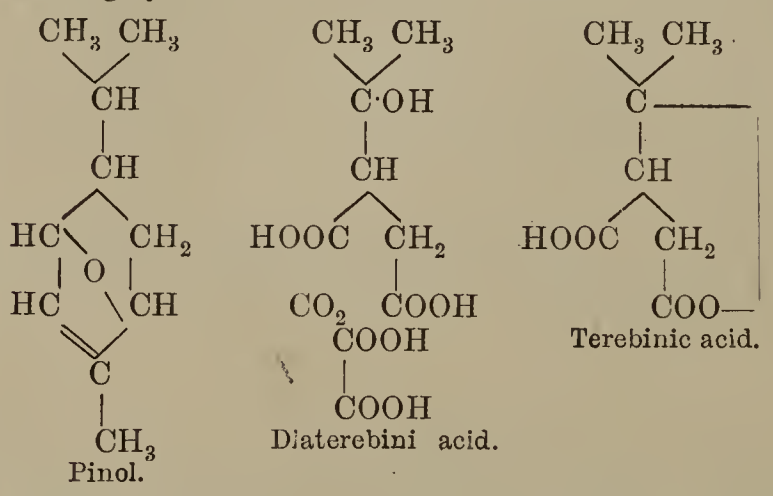
Of these substances pinol hydrate stands next in interest to pinole itself, into which it is reconverted by the action of dilute mineral acids. It is important not only on account of its formation from the hydrochloride or hydrobromide, but on account of its identity with the well-known crystalline body resulting from the exposure of moist turpentine oil to sunlight in an atmosphere of oxygen.

Upon oxidation with potassium permanganate pinole readily yields terebinic acid, $C_7H_{10}O_4$; pinole hydrate and pinole-glycol, on the other hand, yield terpenylic acid, $C_8H_{12}O_4$. Both of these acids are also obtained by direct oxidation of pinene. It is remarkable that the acid from pinole, which contains an ethylene bond, contains one atom of carbon less than the acid obtained from the rived from pinol, but in which the ethylene bond is ruptvred. The addition of a molecule of water therefore appears to protect one atom of carbon from oxidation. It therefore appears probable that in the formation of pinol from pinene by very gentle oxidation, water is taken up at the expense of the ethylene bond, and this position is thus protected from further oxidation. In the next stage the diagonal bond is ruptured and an atom of oxygen introduced, forming pinol hydrate, which loses water again in acid liquors and pinol obtains.



Pinene. Pinol hydrate. Pinol

The possibility of an entire rearrangement at the rupture of the diagonal bond must not be overlooked, so that the position of the oxygen atom in pinol is not definitely determined. But it is important to remember that the conversion of pinene into terebinic acid may be most satisfactorily demonstrated if one assumes an intermediary product with the formula ascribed to pinol. This is evident from a glance at the following symbols—



Pinol. Diaterebini acid. Terebinic acid.

The products of the principal reactions of pinene may be thus summarized :—

A. By the action of heat: Dipentene, polyterpene, isoprene (C_5H_8).

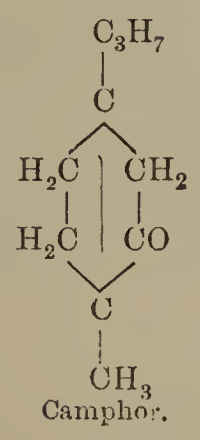
B. By the action of acids: Terpineol ($C_{10}H_{18}O$), Terpine hydrate ($C_{10}H_{20}O_2 + H_2O$), Cineol ($C_{10}H_{18}O$), Dipentene, Terpinene, Camphene.

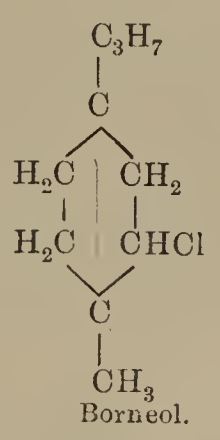
C. By oxidation: Pinol ($C_{10}H_{16}O$), Pinolhydrate ($C_{10}H_{18}O_2$), Terebinic acid ($C_7H_{10}O_4$), Terpenylic acid ($C_8H_{12}O_4$).

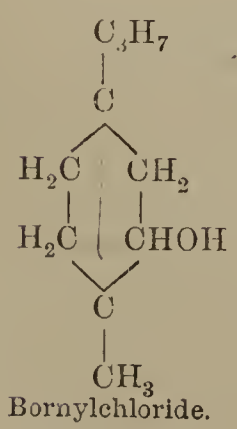
The above formula for pinene is in accordance with these reactions, and as it contains an asymmetrical carbon atom, it also satisfies the theoretical requirements of an optically active compound. It also explains why pinene can be converted into cymene, and that all attempts to effect the reverse synthesis by simple reduction of cymene have failed. Pinene is no ordinary hydrocymene. It is equally impossible to prepare pinylamine from amido-cymene, since in pinylamine a methyl and an amido group are attached to the same carbon atom, a condition that can never obtain in a benzene derivative. In spite of this pinylamine possesses the formula of a dihydroamidocymene and is readily convertible into cymene. Oil of turpentine and its derivatives are therefore hydrated compounds of the benzene series of very peculiar character, the constitution of which may be expressed by the formula here advocated until someone finds another in better accordance with all the facts. A simply negative criticism can no longer receive consideration.

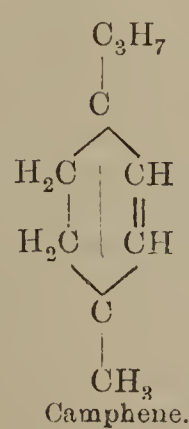
Camphene and Fenchene.

The inquiry into the constitution of camphene is intimately connected with the study of camphor, since camphor can be easily converted into camphene. For this purpose camphor is reduced to borneol, and camphene is either prepared direct from this by withdrawal of water, or borneol is converted into bromyl chloride and hydrochloric acid removed from this by means of anilin. The chemical behaviour of camphor is expressed most satisfactorily by Bredl's formula, according to which the above reactions may be thus represented: —


Camphor.


Borneol.


Bornylchloride.


Camphene.

This conception of the constitution of camphene agrees with experimental evidence, though the formation of camphene from pinene hydrochloride is difficult to explain on this basis. But as doubtlessly intricate intramolecular changes are here encountered, it is much safer to speculate as to the molecular structure of camphene from knowledge of the constitution of camphor, than to deduce the formula of camphene from the constitution of pinene. From this point of view, therefore, all observations that throw fresh light on the nature of camphor are of fundamental importance.

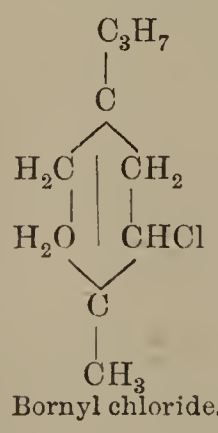
Until lately camphor was regarded as a body *sui generis*, as no compounds of analogous behaviour were known, but recently attention was called by the firm Schimmel and Co. to the occurrence of a camphor-like compound in many essential oils of fennel, and its investigation has proved of great interest in relation to the present question. The compound, now called fenchon, is not only isomeric with camphor but answers to nearly all the characteristic tests for camphor.

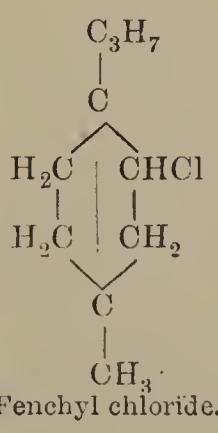
Fenchon yields a finely crystalline oxime $C_{10}H_6$: NOH, that agrees completely with camphor oxime in its peculiar behaviour towards dilute acids. Thus it is convertible into a nitrile C_9H_{15} CN, from which an isoamide C_9H_{15} $CONH_2$, a base $C_9H_{15}\cdot CH_2\cdot NH_2$ and an acid $C_9H_{15}\cdot COOH$ can be prepared that might be readily mistaken for the corresponding camphor compounds, with which they are isomeric.

Leuckart has shown that when camphor is heated with ammonium formiate the formyl compound of a base $C_{10}H_{17}NH_2$, bornylamine results. By means of the same reaction the quantitative yield of an isomeric base, fenchylamine, can be prepared from fenchon. Camphor yields borneol by reduction, and the latter, as already mentioned, can be converted into bornyl chloride and camphene. By similar treatment fenchon yields with equal readiness fenchyl alcohol, fenchyl chloride and fenchene. A glance at the following table indicates the analogy of the two compounds and their derivatives in chemical behaviour and the differences in physical properties :—

Fenchon Series.		*Camphor Series.*	
$C_{10}H_{16}O$. . Fenchon	m.p. 6°, b.p. 192°	Camphor	m.p. 175°, b.p. 204°
$C_{10}H_{16}H\cdot OH$. Alcohol	m.p. 40°, b.p. 201°	Borneol	m.p. 206°, b.p. 212°
$C_{10}H_{16}H\cdot Cl$·. Fenchyl chloride.	Liquid.	Bornyl chloride.	Solid.
$C_{10}H_{16}$. . Fenchene	Liquid s.p. gr. 0·864 at 20° b.p. 158–160°		Camphene solid m.p. 50° b.p. 160°.
$C_{10}H_{16}\cdot H\cdot NH_2$ .Fenchylamine	Liquid b.p. 195°	Bornylamine	m.p. 159°, b.p. 199–200°
$C_{10}H_{16}\cdot NOH$ .Oxime	mp. above 150°, b.p. about 240.	Oxime	m.p. 118°.
$C_9H_{15}\cdot CN$ . . .	b.p. 217–218°		b.p. 216–217°.
$C_9H_{15}\cdot CONH_2$ . .	m.p. 113–114°		m.p. 124–125°.
$C_9H_{15}\cdot CH_2\cdot NH_9$.	b.p. about 240°		b.p. 194–196°.
$C_9H_{15}\cdot COOH_{15}$ . .	b.p. 257–260°		b.p. 254–255°.
C_9H_{16}			b.p. 130–140°.

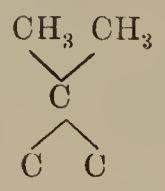
The great similarity in the whole character of both substances suggests that they are stereoisomerides in the sense that in camphor the oxygen atom is in the ortho-, and in fenchon in the meta position to the methyl group. Assuming a similar difference in the position of the chlorine atom in fenchyl and bornyl chlorides, the two latter compounds would be represented by the formulæ—


Bornyl chloride.

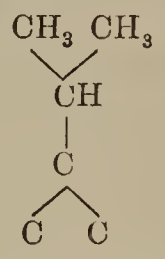

Fenchyl chloride.

But if one molecule of hydrochloric acid was split off from each of these compounds, the resulting hydrocarbons would theoretically be identical, whereas, although fenchene agree in odour, high specific gravity, molecular refraction equivalent, and boiling point, they are only isomeric bodies, for camphene is the only solid terpene known, fenchene is liquid. It is therefore necessary either to abandon Bredt's formula for camphor or to seek another explanation of the isomerism between camphor and fenchon. As the out-

come of the adoption of the latter course it has been suggested that the position of the atoms within the ring are the same in both fenchon and camphor, but that the arrangement of the side chains is different. In support of this explanation it has been shown by oxidation with permanganate of potash fenchon does not yield camphoric acid ($C_{10}H_{16}O_4$), but dimethylmalonic acid $(CH_3)_2C(COOH)_2$ and acetic acid. The formation of dimethylmalonic acid definitely proves the presence of the group—



in fenchon, whiist it is not less certain that an isopropyl radicle and the groups



exists in camphor. It is to be hoped that further investigation of the constitution of fenchon will not only indicate the true formula of fenchon and fenchene, but also enable conclusions to be drawn concerning the constitution of camphor and camphene.

(*To be continued.*)

FRENCH TRUFFLES.*

The *Board of Trade Journal* gives the following particulars respecting the production of truffles, which is extracted from a report of the United States Consul at Bordeaux:—

There are three species of truffles found in France—the black and most common, the white (highly prized), and the *truffe à l'ail*, which has a flavour of garlic. They are found in all soils, but chiefly in oak forests, or where the earth is damp and calcareous, thriving best in an almost sterile soil. The best that the country affords come from Périgueux and about Angoulême.

In appearance the ordinary truffle is about the size of a walnut, with a rough, brown warty surface, closely akin to the potato, which it likewise resembles in consistency, though not in colour. Not yielding to cultivation, they must be sought for in chance places, nor is the method of obtaining them the less interesting.

Recently it has been found that dogs could be trained to perform the duties that are instinctive to the pig, and so great is the demand in France for the truffle that many of the canine species are now, in certain districts, possessed of this estimable talent. Finely cut or sliced truffles are mixed daily with their food, until at length they develop a liking for the flavour. Afterwards their owners conceal, in some portion of a field where truffles are supposed to exist, a little tin dish of *filet aux truffes*, covering the same with a few handfuls of earth. The dog is then brought out and urged to hunt for the dish, goaded by an empty stomach. When he at length finds it, he is caressed by his master, and thus, in the space of a few weeks he will readily learn to hunt for the vegetable itself.

Truffles are seldom found twice in the same place. A field that may yield a great quantity this year will be quite fruitless the next. Though Alexander Bornholz, a German scientist, claims to have transplanted and raised the article in question, repeated experiments to that end have proved but failures. The Count de Noá, a Frenchman, and a certain M. Rousseau, made like claims, but they have in each case been discredited.

The very fact that the truffle is a rarity, and that it grows only in certain districts, has been enough to make it an object sought after clandestinely by peasants or those who carry them to market. There are poachers for truffles as well as for game, who hunt by night with their dog or pig, a plague to land-owners and a *bête noire* to local gendarmes.

Scarcely is there a canning establishment at this moment in France that does not, among other alimentary products, preserve this dainty. It has become as indispensable to the dinner table of the *noblesse* as the aromatic sprig of garlic to the frugal repast of the peasant.

The annual production is valued at about 3,000,000 dollars. The article is sold in the departments where found at 1 dollar per pound and at almost double that price at the principal markets of the larger cities. Not alone does the truffle thrive in France; they are found in quantities in Italy, Spain, and Holland, but are of indifferent quality compared with the French, lacking the delicate and incomparable flavour of the native product.

In the United States, especially in California, some attention has been given, within the past few years, to the gathering and preserving of truffles, and a number of Western packers have come to Bordeaux in order to inform themselves regarding the canning process. It is a very simple one, the truffles being partially boiled, as tomatoes, asparagus, and other vegetables, and then jarred and sealed in their own diluted juice. All meat and game products are also "truffled," the vegetable being cut into small squares, and inserted into the substance of the article preserved.

In 1889 the imports of truffles into France were 22,585 lbs., and the exports therefrom 452,361 lbs. Of the latter quantity, 204,633 lbs. went to England, 107,276 lbs. to Germany, 38,990 lbs. to Belgium, and 24,387 lbs. to the United States.

* From the *Journal of the Society of Arts*, January 1.

SALE OF POISONS.

The following article on the subject of the sale of poisons in the form of secret remedies appeared in the *Daily Telegraph* of the 7th inst:—

Mythology has long since fixed the number of labours attempted and achieved by Hercules at twelve, but were the conqueror of the Nemæan lion and the cleanser of the stables of Augeas to revisit earth again the Council of the British Medical Association might well ask the demigod to assist them in a task which in danger and difficulty would, if thoroughly accomplished, be entitled to be recognised as the thirteenth of the Herculean labours. The Association, it is announced on apparently trustworthy authority, contemplate a crusade against the unrestricted sale of so-called patent medicines containing active poison. It is alleged that, as a matter of fact, there is scarcely such an article known in the pharmaceutical trade as a really patented medicine; and the conventional term is, as a rule, only intended to denote those proprietary compounds which are sold with an inland revenue stamp attached; but which stamp, as the inscription on its face clearly states, offers no Government guarantee whatever for the innocuousness of the medicine. The advocates of interference with the immunity so long enjoyed by patent medicine vendors point as a crucial test to the admitted fact that a solution of morphia proclaimed to be such cannot be sold by a chemist and druggist without the observance of rigid precautions; but the same morphia, or even a

stronger preparation of the drug, if it be contained in a compound called by some arbitrary name, and with a Government stamp affixed, is purchasable without the slightest restriction. Now, it is one thing to contemplate a "crusade," but it is quite another, and an extremely difficult, matter to organise a movement having for its object the most searching and exhaustive scrutiny into the thousand and one nostrums for which the British public are continually calling, and the number of which increases every day. It is not only by home-made pills, potions, powders, plasters, tinctures, lozenges, extracts, syrups, and oils that John Bull is continually beset. The patent medicine market is additionally flooded by importations from the United States; and it is only doing justice to our American kinsmen to admit that they are the most prolific, the most inventive, and the most energetic concoctors and purveyors of quack medicines in the whole world. In England their multitudinous medicaments have to compete with very many old-established English cures for the ills to which flesh is heir; but they have a freer hand in Australia, and whole fleets of ships are annually despatched from San Francisco to Auckland and Sydney laden with what are discourteously known as "quack" medicines, but which, in more polite parlance, may be classed as patent ones. It will thus be seen that the task which the British Medical Association are said to be anxious to impose upon themselves must necessarily comprise the thorough cognisance and minute analysis of the literally enormous number of preparations with "arbitrary names" which are offered without stint to the really suffering or the hypochondriacal public.

Such an analysis might yield, perhaps, the most astounding results. It would be impossible in equity to confine the inquiry to medicines pure and simple; the investigation would have to be extended to soaps, to perfumery, to cosmetics, to pomades, and to washes. In fact, there is scarcely an article used in the toilette which would not have to be strictly examined in order to ascertain whether it contained poisonous ingredients in any perilous proportion to the more innocent components of the preparation sold. Quite appropriately, it must be granted, is the agitation said to be contemplated by the British Medical Association defined as a "crusade"; but we are bound to remember that between the eleventh and thirteenth centuries there were no fewer than eight Crusades, carried on with varied success, but that the Holy Land is still in possession of the Infidels. The presence of morphia and other preparations of opium in many medicinal compounds having a large sale is notorious and scandalous; but supposing that the provisions of the Sale of Poisons Act were so sagaciously and adroitly manipulated as to bring the manufacturers and vendors of flagrantly poisonous compounds under the ban of the law, might it not be naturally expected that the convicted persons would protest, and to some extent justifiably, against their being singled out for prosecution, when the makers of and dealers in other patent commodities, paying the Inland Revenue duty, were allowed to pass unrebuked of justice? "All or none" would probably be the cry of the quack-salvers when the official analyst made his appearance on the scene, and the "all" would assuredly constitute a prodigious and most alarming "totum." Prussic acid might be suspected in a specific for the gout; dark innuendos of arsenic might attach to a powder for the face; strychnine might be spoken of in connection with a nerve-strengthener; opium in excess might be attributed to an ointment, cantharides to a tincture for restoring the hair. It would be, indeed, a blessed thing if the strong arm of the law could be uplifted to protect the public from vendors of poisons disguised as medicines; and an energetic "crusade" against practices so plainly deleterious to the general health would deserve, and indeed demands, encouragement and support from the organs of public opinion. Thus in no wise do we ignore the necessity for imposing severe restrictions on the sale of poisons, nor do we undervalue the benefits which would accrue to the community at large, if the law took care by rigidly enforced regulations—hedged in by heavy penalties, in the case of those regulations being violated—to prevent people from quacking themselves with capriciously named medicaments, pretending to be health-giving, but in reality death-dealing. We should heartily rejoice in such a consummation, but it is, nevertheless, our duty to point to the serious difficulties with which the entire subject bristles. The field of inquiry is almost immeasurably vast, and a considerable time would necessarily elapse before all the articles bearing the Inland Revenue stamp could be subjected to a thoroughly searching examination. The secrets of the laboratory which have been preserved in many cases from generation to generation would be thrown open to universal scrutiny; and, although it is extremely possible that every popular antibilious pill or tonic or powder or tincture extant has long since been privately analysed by duly qualified chemists, such experiments—"solitary," as Bacon calls them—differ very widely from an unsparing public inquisition, for the exhaustive carrying out of which it would be necessary, perhaps, to create a new State Department.

The earliest patent medicines advertised will be found in the *London Gazette* for the year 1662, and there are some very well-known elixirs and cordials which date from the days of the Stuarts or the early Georgian era, and have made fortunes for many generations of the same families. It would certainly seem somewhat of a hardship upon the proprietors of old-established compounds if their recipes were rudely exposed to the gaze of an inquisitive public, and if they were classed with more unscrupulous purveyors, native or American, who vended deadly poisons under the shelter of a Government stamp and with the factitious attraction of a fancy name. It is impossible, we repeat, to be indifferent to the cogency of the allegation touching morphia. That it should be sold as a patent medicine is a direct danger to the public, and a grave scandal to our scheme of social polity; still, there is a host of poisons not less destructive, and even more so than morphia, and the greatest difficulty to surmount is to ascertain how many heterodox medicines, besides those notoriously known to contain morphia, are actively or indirectly poisonous. It is, in truth, a somewhat knotty question to decide as to where poison in some shape or another is not either prominent or latent. Some years ago there was a scare about red-dyed socks; then followed another alarm about arsenicated wall-papers, confectionery, and penny ices; and only recently the public have been warned not to eat American apples, because the Transatlantic farmers have been in the habit of sprinkling the apple-tree with diluted arsenic in order to check the inroads of noxious insects. The morphia scare is one of a more tangible and definite nature than mere vague assertions, often founded only on rumour, as to the poisonous properties of particular dyes, or wall papers, or lollipops; and, if the crusade contemplated by the British Medical Association really assumes a practical form, its promoters will do well to remember that there is one remedy—undeniably an heroic one—the application of which would at once prevent the sale of poisonous medicines. The French Government sternly refuses to grant a "patente" or licence to the compounder of any empirical medicament unless the fabricator distinctly specifies each and every one of the ingredients of which the nostrum is composed.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, JANUARY 9, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE COUNCIL MEETING.

AT the Council meeting last Wednesday the PRESIDENT mentioned the receipt of a letter from Mr. WALTER HILLS, in which he expressed, on behalf of the family of the late Mr. THOMAS HYDE HILLS, their thanks for the resolution passed by the Council at the last meeting, and for the warm appreciation it conveyed of his services to the Society. Reference was also made to the loss the Society has sustained by the death of Mr. W. M. WATTS, who has held the office of an Auditor for the last twelve years, and has throughout his life taken a warm interest in the work of the Society. A resolution was passed expressing sympathy with his family. The PRESIDENT also spoke in feeling terms of the death of Mr. PASSMORE, and of the loss thus sustained by the Society. In regard to his services as the Sub-Editor of the Society's Journal for upwards of twenty years he passed a well-merited eulogium on the zeal and ability with which they were discharged, and moved that the Council should place on record its appreciation of Mr. PASSMORE'S services, and express to his family the warmest sympathy with them in the loss they have sustained. This was seconded by the VICE-PRESIDENT, who personally expressed his high appreciation of Mr. PASSMORE'S services and his great regret that his useful connection with the Society should have been terminated by death. Messrs. ATKINS, GREENISH and HAMPSON spoke in similar terms, and the resolution was passed unanimously. It was also resolved that for the purpose of considering the necessary steps to be taken for filling the vacancy in the office of sub-editor, a sub-committee should be appointed to draw up the conditions of the appointment and report to the General Purposes Committee. Reference was also made to the deaths of the Belgian chemist STAS, who was an honorary member of the Society, and of Mr. TUPHOLME, the divisional secretary for South Kensington.

The receipt of the official approval of the new bye-laws by the Privy Council was announced and also the receipt of the Privy Council's approval of the appointments of Examiners. The additions to the Society comprised eleven pharmaceutical chemists, elected members, and sixteen chemists and druggists elected members. Thirty-two persons who have passed the qualifying examination and one who has passed the Modified examination were elected associates. Seventy-six persons were elected Students of the Society.

The report of the Finance Committee did not present any unusual feature. In connection with the Benevolent Fund some legacies and donations have been received together with income from ground rents. As the balance now standing on the donation account amounts to £154 16s., it was recommended that another investment should be made.

On the recommendation of the Benevolent Fund Committee, one grant of twenty pounds, one of fifteen pounds, and three of ten pounds each were ordered to be paid. The somewhat unusual amount of one of these grants was explained by the VICE-PRESIDENT as having been recommended in consideration of special circumstances. Satisfaction was expressed by the VICE-PRESIDENT at the improved position of the Fund, though he felt there was still a want of support from many who are connected with the Society, and even more from those outside it who appear to take no interest in the Fund, notwithstanding the fact that its benefits are from time to time received by members of the trade who are in the same position. The PRESIDENT again drew attention to the desirability of being able to increase the amount of annuities, if possible, to fifty pounds a year, or, at least, to some amount approaching that. He suggested that if this object were brought under the notice of those who do not at present subscribe to the Fund it might be the means of inducing them to contribute towards its realization. He thought that due provision should certainly be made to enable distressed chemists and druggists or their widows to live in something like comfort upon the annuities granted from the Benevolent Fund, since that is the best form in which useful assistance can be rendered.

The report of the Library, etc., Committee gave details of the attendances in the Library and Museum and of the books added by donation or purchase. The consideration of the subject of local secretaries in Scotland suggested by a resolution of the Executive of the North British Branch has been adjourned, as being of such importance as to require further deliberation. The PRESIDENT drew attention to the fact that the donations to the Society's Library are increasing, both societies and governmental departments at home and abroad

being liberal contributors of transactions, reports, etc.

The report of the General Purposes Committee stated that while several cases of prosecution for infringement of the Pharmacy Act are still standing for trial, there have been several penalties paid into court since the last report was presented. In other cases the Committee has recommended proceedings to be taken.

The report on the examinations for December showed that out of 157 candidates for the Minor examination 95 failed to pass, and that only 62, or less than 40 per cent., satisfied the requirements of the examiners.

For the Major examination there were 24 candidates, of whom 13 passed and 11 failed.

METHYLATED SPIRIT.

A GENERAL order has been issued by the Board of Inland Revenue in reference to methylated spirit which will probably do away with all the difficulties experienced since the introduction of the new regulation requiring methylated spirit to be mixed with mineral naphtha. The spirit so mixed for ordinary purposes is in future to be distinguished as "mineralized methylated spirit," and it will continue to be the only kind that can be sold retail. However, to meet the requirements of those who may have occasion to use methylated spirit without the admixture of mineral naphtha the Board of Inland Revenue has instructed its officers that any person requiring to use ordinary methylated spirit may, on satisfying the Board as to the purpose for which it is to be used, obtain authority from the Board to receive such spirit upon undertaking to use it solely for the purposes which the Board shall have sanctioned.

In such cases of the use of ordinary methylated spirit in hospitals or in other public institutions or by professors of colleges bond will not be required; but the application for permission to use the spirit must be sent to the Board of Inland Revenue by the governing body of such institution through its Secretary.

Any person using ordinary methylated spirit for purposes sanctioned by the Board will not be required to give bond so long as the quantity of spirit used in a year does not exceed fifty gallons and provided there is no still upon the premises or other means for the recovery of the spirit, but in all cases where more than fifty gallons is used in a year bond will be required. Retailers of methylated spirit may, with the Board's permission, use mineralized methylated spirit in any art or manufacture without entering into bond so long as they do not keep a stock exceeding fifty gallons, but when a retailer of methylated spirit is authorized to use ordinary methylated spirit the two kinds of the spirit must be stored apart from each other.

ELECTROLYTIC PRODUCTION OF CAUSTIC SODA AND CHLORINE.

A HIGHLY interesting experimental illustration of the method of producing caustic soda and chlorine by electrolysis has been exhibited during the last week, which is confidently asserted to be capable of bringing about a complete revolution in the manufacture of these chemicals. The material operated upon is a solution of common salt, flowing through a series of decomposing cells, in which it is subjected to the influence of an electric current. The cathode of this arrangement is an iron plate, and the anode is formed of carbon plates with a metal core. Between the two is a screen, formed of strips of slate like a Venetian blind and packed with asbestos. The construction of these anodes constitutes an important feature of the invention, and the object of them is to facilitate the collection of the chlorine gas evolved by the decomposed sodium chloride, while the sodium by a secondary action is converted into caustic soda, which accumulates in the salt solution. The whole operation is conducted in such a manner as to be automatic, and the decomposition of the sodium chloride is stated to amount to at least 75 per cent. of the material operated upon. As the chlorine is evolved it is led away through tubes to an absorption vessel containing milk of lime kept in agitation, and thus bleaching solution is produced.

One of the most important points connected with this invention, so far as practicability for manufacturing purposes is concerned, is the cost of the power required for the purpose. Indeed, this is so important that it may almost be said to be the one question upon which success depends. And the statements in regard to that point are very remarkable. It is said that the entire cost of the power requisite for decomposing a ton of sodium chloride into chlorine and caustic soda is only £3 7*s.* 8*d.* This statement is made upon the authority of Mr. W. H. PREECE, the electrical engineer to the General Post Office, and it may therefore be accepted as having been based upon careful and competent inquiry. If that result is practically borne out there is reason for believing that this invention will prove to be of a great importance in relation to several manufacturing industries.

We understand that Professor F. A. Flückiger is about to retire from the chair of pharmacognosy

and pharmaceutical chemistry which he has so long filled in the University of Strasburg. Some of his colleagues consider that occasion to be an appropriate opportunity for an expression of the esteem in which Professor Flückiger is held by them and by others engaged in pursuits similar to those which he has followed for many years. They have therefore made inquiries whether the project would also be supported so as to admit of the formation of an international committee to decide whether the testimonial shall take the form of a Flückiger scholarship or otherwise. We have learnt that among others the President of the Pharmaceutical Society has been applied to on this subject, and has authorised the addition of his name to the proposed international committee. It may be mentioned that Professor Flückiger is an honorary member of the Pharmaceutical Society. He was long intimately associated with Daniel Hanbury in his pharmacognostic work, and he was the first recipient of the Hanbury Medal. In other respects the value of Professor Flückiger's services in the promotion of pharmacognosy is so well known and thoroughly appreciated that it is unnecessary to refer to them more particularly, but it may be expected that many who learn of the contemplated testimonial through this Journal will be glad to have an opportunity of giving expression to their respect and esteem for an earnest and laborious investigator.

* * *

Hesse has shown that the treatment of the four most important cinchona bases with concentrated sulphuric acid does not yield quinicine and cinchonicine, but isomers of the four bases, isoquinine, isoquinidine, etc. But in operating upon the hydrides of these bases with the exception of hydrocinchonine, well-defined crystalline sulphonic acids are obtained. When quinine, quinidine, cinchonidine or cinchonine is dissolved in fuming sulphuric acid, the presence of the isobase can be detected in the solution, but it soon disappears and the solution contains the sulphonic acid. As the formation of the isobases precedes that of the sulphonic acids it may be inferred that these latter are sulphonic acids of the isobases. These compounds have been obtained by Hesse by treating the bases with fuming sulphuric acid. They are all very soluble in water, and the isoquinine sulphonic acid has the formula $C_{20}H_{23}N_2O_2.SO_3H$. To obtain the direct sulphuric acid derivatives the well dried tetrasulphates were moistened with acetic anhydride, in which they swell up and form sulphates of the sulphonic acids. To obtain the sulphonic acids the mass is then dissolved in hot water neutralized with ammonia. By recrystallizing from hot dilute alcohol they may be obtained pure. Quinine sulphonic acid $C_{20}H_{23}N_2O_2.SO_3H + H_2O$ crystallizes in small colourless prisms very sparingly soluble in hot water, rather more soluble in hot alcohol. The crystals appear to contain two molecules of water and the above formula represents the substance after exposure to the air and having become dull. When dried at 120° C., the acid melts at 209° C., decomposing and apparently passing into isosulphonic acid. The platinum salt $(C_{20}H_{23}N_2O_2SO_3H)_2PtCl_6H_2 + 8H_2O$ forms concentric groups of needles Cinchonidinesulphonic acid $C_{19}H_{21}N_2O.SO_3H + H_2O$ crystallizes in small needles, sparingly soluble in hot water and alcohol, insoluble in ether, and when dry melts at 225° C. It forms with several acids well defined crystalline compounds. The platinum salt $(C_{19}H_{21}N_2O.SO_3H)_2PtCl_6H_2 + 3H_2O$ has the form of orange coloured needles.

* * *

On Wednesday evening next, the 13th inst., Professor Armstrong will deliver the second of the series of lectures on "The Phenomena of Fermentation." The lecture will be illustrated by experiments, and considering the great importance of the subject matter it ought to command a numerous audience.

* * *

An Evening Meeting of the Pharmaceutical Society will be held on Wednesday next, the 13th inst., at the Society's House, 36, York Place, Edinburgh. The chair will be taken by Mr. J. Laidlaw Ewing at 8.30 p.m. precisely. On that occasion papers will be read on "Pepsin Wine," by Mr. James Clark, of Aberdeen; "A Standard for Aërated Waters," by Mr. George Lunan; "Note on Official Iodine Preparations," by Mr. W. G. Mackenzie; "Notes on Some Additions to the Museum," by Mr. J. Rutherford Hill.

* * *

Among the new year honours conferred by Her Majesty, it is announced that Sir William Thomson will be raised to the peerage. This is the first occasion upon which a scientific investigator has received such a distinguished honour, and it may be hoped that it is a symptom of an awakening appreciation of science as being a matter of national importance.

* * *

It is pleasing to record an additional legacy to the Benevolent Fund. The late John Henry Wagstaff—who was a founder of the Society and a life member—has bequeathed the sum of twenty-five pounds to the Pharmaceutical Benevolent Fund, and this sum, less the legacy duty, has been handed over to the Treasurer of the Fund.

* * *

At the meeting of the Manchester Pharmaceutical Association, to be held in the rooms of the Chemical Club, Victoria Hotel, on Wednesday evening, the 13th inst., a lecture will be delivered by Mr. Louis Siebold.

* * *

At the meeting of the Chemists' Assistants' Association to be held on Thursday evening, the 14th inst., a paper will be read by Mr. A. H. Allen on "Neutrality."

* * *

We regret to notice in the *Times* of Thursday a record of the death, at the age of 68, of Dr. A. J. Bernays, Professor of Chemistry at St. Thomas's Hospital Medical School.

* * *

We have received intimation of the death, on January 1, at the age of 61, of Mary E. Spendelow, one of the Benevolent Fund annuitants. Mrs. Spendelow was elected as recently as December, 1890.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, January 6, 1892.

Present—

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Messrs. Abraham, Allen, Atkins, Cross, Gostling, Greenish, Hampson, Hills, Leigh, Martindale, Newsholme, Schacht, Southall and Warren.

The minutes of the last meeting were read and confirmed.

The Late Mr. Thos. Hyde Hills.

The PRESIDENT said he had received a letter from Mr. Walter Hills, in which he desired, on behalf of the family of the late Mr. Thomas Hyde Hills, to tender their grateful thanks to the Council for the resolution passed at the last meeting, and for the warm appreciation of his services to the Society, to which expression was given on that occasion.

The PRESIDENT regretted to say that Mr. Harrison was laid up with a cold, and that several other members were also unable to be present.

The Late Mr. William Manning Watts.

The PRESIDENT said he had to announce that since the last meeting, the Society had lost by death Mr. William Manning Watts, one of its auditors, who had held that office for twelve years, and had taken a very warm interest in all its doings for a much longer period. In his early days he was associated with Mr. Battley, who might be called the father of elegant pharmacy, he having first put forward preparations which were the forerunners of those elegant preparations of barks, fluid extracts, etc., which were now so largely used both here and in America. Mr. Battley was associated with the Society in very early days, and Mr. Watts joined it later on, and during his whole life took a warm interest in its welfare. If he did not appear so actively in its affairs as some others, it was because he felt that, being composed mainly of retail men, those in the wholesale trade should meddle as little as possible. At the same time his sympathy with the Society in the early days of its organization was as keen as that of anyone. He would therefore move—

> "That this Council has learned with regret of the death of Mr. Wm. Manning Watts, who for twelve years was an auditor of the Society, and desires to express its sympathy with the family of the deceased."

The VICE-PRESIDENT, in seconding the resolution, expressed his concurrence with the remarks of the President, and the resolution was unanimously agreed to.

The Late Mr. F. Passmore.

The PRESIDENT said he had the painful duty to announce, though his colleagues would be aware of the fact from the columns of the Journal, that Mr. Passmore, the Sub-Editor, died on December 22. The Council had from time to time to express regret at the loss of colleagues, but it was somewhat different in dealing with those who had been officers of the Society. Mr. Passmore came into that house as an officer an absolutely untried man in many ways, not possessing certain technical knowledge in connection with pharmacy, but possessing other qualifications which were deemed of very considerable importance. He came at a time when the Council had decided to try the experiment of carrying on a weekly journal, and his career had certainly justified the Council in its selection; for although he had come there with a comparatively small knowledge of pharmacy, one of his friends had written to say that he regarded Mr. Passmore in his later days as almost a typical pharmacist. He took the pains in his leisure hours to master the details of many things connected with pharmacy, besides foreign languages, and threw his heart and soul into the work; and underneath a comparatively mild and somewhat reticent manner there was a feeling of manly independence which gained the respect and admiration of all those who came in contact with him. Speaking personally, he felt very great regret at his comparatively early death; and being one of those who were instrumental in the establishment of the weekly Journal, it was only natural that he should regard with particular interest the success with which the Editor and Mr. Passmore were able to carry it on in its early days. A large part of the success of much of the detailed work in early days was due to Mr. Passmore's continuous and entire devotion to his duties. He was a model officer, whose inclination was, if anything, to overwork himself. He begged to move—

> "That this Council has heard with deep regret of the death of Mr. F. R. Passmore, who for twenty years acted as assistant editor of the *Pharmaceutical Journal*. The Council also desire to place on record their appreciation of the services he rendered to the Society, and the ability with which he discharged his duties. They offer their warmest sympathy to the family of the deceased in the loss which they have sustained."

He had only to add that in saying what he had, he had the full concurrence of the Editor.

The VICE-PRESIDENT, in seconding the resolution, said he personally regretted very much the death of their friend, Mr. Passmore. He was peculiarly fitted for the position he held, not only in association with his Journal work, but also in the knowledge of things connected with the Society and pharmacy generally. He looked upon himself as a pretty fair encyclopædia of the business of the Society, but he used from time to time to go to Mr. Passmore for information, and always found in him an admirable supplement. He wished to record his high appreciation of Mr. Passmore's services to the Society.

Mr. ATKINS desired to add a few words. He had the pleasure, and he did not hesitate to say the honour of the friendship of the late Mr. Passmore, and whilst heartily endorsing every word which had fallen from the President, he wished to add this further contribution to his memory, that he was an extremely good man, and did a very large amount of philanthropic work. It came to his knowledge some years ago that he was doing this kind of work, and asked to be allowed to come and see it. Mr. Passmore told him to name the evening, and his son should meet him at Waterloo Station. He came up one winter night, and was taken to one of the darkest scenes in London life, where he found Mr. Passmore, his wife, and two children all engaged in this admirable work. It was to him the most interesting incident in his life in connection with that form of work; there were 600 or 700 of the lowest characters in London, who all seemed to be under the control of Mr. Passmore, and after taking part in the engagements of that evening he came away with memories which he should never forget. This was a side of his work which Mr. Passmore never obtruded, and of which he only heard accidentally, and he wished to make this brief expression of his intense appreciation of Mr. Passmore, not only as an able officer, but as a thoroughly and intensely good man, who did what he could to alleviate the sins and sorrows of humanity.

Mr. GREENISH said he also wished to pay his respect to the memory of Mr. Passmore, with whom he had been on intimate terms for some twenty years. He

had constantly met him at the Conferences, and had more than once travelled with him on the continent; and it was not only as an officer of the Society that he regarded him, but he also looked upon him as a personal friend. He seemed to have a thorough grasp of the Society's affairs, and whenever his opinion was asked his criticism was generally very sound. He was somewhat reticent, but when you did elicit his opinion he was exceedingly frank in expressing it, and he had learned to appreciate him very highly indeed. As a man he possessed most excellent qualities, and he really could not express in words how deeply he felt his loss.

Mr. HAMPSON said he had not had the same opportunities as Mr. Greenish of associating very closely with Mr. Passmore, but he had sufficient knowledge of him as Sub-Editor to be always absolutely sure that whatever he did, he did to his utmost ability. He continually, ungrudgingly and unobtrusively, spent himself for the benefit of the Society. He represented a most important type of man—the one who would always do his duty; not only cheerfully and without any parade, but duty seemed to be his constant standard. The Council must deeply sympathize with those whom he had left behind; and he could only hope that the worthy appreciation of his many friends, and the knowledge of the good which he had done, would be some comfort to his family.

The resolution was then passed unanimously.

It was also resolved that the President, Vice-President, Treasurer, Mr. Greenish, and Mr. Martindale be appointed a sub-committee to take the necessary steps for recommending a suitable man to fill the vacancy in the office of Sub-Editor, and to draw up the terms of the appointment, this Committee to report to the General Purposes Committee, who would report the result to the Council.

DEATH OF AN HONORARY MEMBER.

The PRESIDENT said he had also to report the loss by death since the last meeting of one of the most distinguished honorary members of the Society, the great Belgian chemist, Stas, known to all interested in chemical work as the man who devoted many years of laborious work to the re-determination of a large number of the atomic weights.

He had also to announce the death of Mr. Tupholme, the Divisional Secretary for South Kensington, and a personal friend of many members of the Council.

THE NEW BYE-LAWS.

The PRESIDENT reported that a communication had been received from the Privy Council conveying the official approval of the new Bye-laws confirmed at the special general meeting of the Society on May 27, 1891.

APPOINTMENT OF EXAMINERS.

There was also a communication stating that on December 23 the Privy Council had approved the appointment of Examiners recently made by the Council.

DIPLOMAS.

The undermentioned, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Bertulès, Prosper.
Holt, Herbert Collins.
Matthew, Edwin.
Melhuish, Andrew Ralph.
Morgan, William Ellis.
Naylor, John.
Smith, Richard Sidney.
Softly, Alfred Ernest.
Sturton, Frederick.
Willsher, Charles Garrett.
Woodcock, Herbert Henry Addis.

ELECTIONS.

MEMBERS.

Pharmaceutical Chemists.

The following, who have passed the Major examination, having tendered their subscriptions for the current year were elected "Members" of the Society.

Anthony, Thomas .....St. Austell.
Bertulès, Prosper .....Mauritius.
Durno, Alexander Emslie ...Ipswich, Queensland.
Fisher, Ernest Hunter .....Blackheath.
Linstead, Edward Flatman ...Southsea.
Melhuish, Andrew Ralph .....London.
Minett, Edward Pigott .....London.
Shepherd, Alexander Moir ...Aberdeen.
Smith, Richard Sidney .....Tonbridge.
Willsher, Charles Garrett .....London.
Woodcock, Herbert Henry A...Walthamstow.

Chemists and Druggists.

The following registered Chemists and Druggists who were in business on their own account before August 1, 1868, having tendered their subscriptions for the current year, were elected "Members" of the Society:—

Arblaster, Charles James .....Birmingham.
Baldock, Edward Charles .....London.
Carter, Thomas .....Blackpool.
Clark, Charles .....Cardiff.
Higgins, Alfred ... .London.
Johnson, Thomas Jacob .....Stockport.
Maizey, Ebenezer ....London.
Owen, George .....Birmingham.
Parker, Edward Joshua.....Carlisle.
Parker, William ....Carlisle.
Powell, Arthur John .....Stanningley.
Pratt, George William .....Manchester,
Smith, William Finch .....Abingdon.
Tonking, Charles Harvey .....Camborne.
Upton, Eustace James .....Wallingford.
Wales, Joseph Chapman .....Hemsworth Grange.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Aukland, William Henry .....London.
Dewing, Charles .....Great Grimsby.
Jewell, John Ernest .....London.
Jones, Jonah .....London.
Neale, Matthew Henry .....Arundel.
Noble, James .....Boscombe.
Thornton, Leonard Booker ...London.
Truman, Frank Wilton .....London.
Wakefield, John Henry .....Aston.
Walker, James.....Saltcoats.
Winfield, George Frederick ...Solihull.

Modified.

Madgwick, Rufus .....Andover.

ASSOCIATES.

The following, having passed the Minor examination, and tendered their subscriptions for the current year, were elected "Associates" of the Society:—

Barnes, Frederick Walter .....London.
Briggs, Sam .....Halifax.
Cobb, Herbert Ernest .....Bury St. Edmunds.
Dwelly, Hedley Egbert .....Maidstone.
Eldred, Charles William .....Shrewsbury.
Gibson, Mary .....London.

Hall, Samuel William .....Lichfield.
Hawthorne, Archibald .....Stafford.
Hornby, Frederick William ...Cottingham.
Jones, Ernest Harry .....Manchester.
Jones, Hugh..... .....Milnsbridge.
Keall, Allan Adolphus .....Swansea.
Kennard, John.....Denbigh.
Landor, William Ernest .....Weymouth.
Marris, Frederick Lake ....Grimsby.
Morris, Thomas James .....Jersey.
Postlethwaite, Thomas .....Kirkby-in-Furness.
Sandford, Harry Moile .....Manchester.
Smale, Frederick Thomas.....Plymouth.
Toohig, Albert William.....Narberth.
Tulley, Frederick Rudrum.....London.

STUDENTS.

The following, having passed the First examination, and tendered their subscriptions for the current year, were elected "Students" of the Society:—

Allan, William F. .....Airdrie.
Athey, George Hedley .....Morpeth.
Badman, William Robert .....Red Hill.
Baker, John James.....Jersey.
Barnes, Christopher Herbert...Wymondham.
Bennett, Charles Thomas .....Leicester.
Berry, Alfred .....Hitchin.
Bignall, Rowland.....Dartford.
Bosustow, Frederick Samuel M.Penzance.
Bowen, Isaac .....Llangammarch.
Boyes, William Cotnam.....Bradford.
Brett, Thoroton Pocklington...York.
Broughton, Edgar Goldthorp...Brighouse.
Burnett, William.....Oldham.
Catchpole, Arthur William ...Ipswich.
Chaston, George Hunt .....Alresford.
Chaundy, John Henry .....Oxford.
Curry, Frank ....Dorking.
Davies, Henry John .....New Quay.
Davis, Sidney .....Gloucester.
Dennis, Tom Hawksley .....Nottingham.
Duffield, Henry David .....Colchester.
Duncan, Robert .....Leeds.
Duncan, Samuel John .....Greenock.
Durant, Henry Thomas.....Hampstead.
Ellington, Charles Sampson...Rochester.
Elvin, George William Oliver...Louth.
Flint, Walter .....Stratford-on-Avon.
Griffiths, Frederic Grey.....Manchester.
Hale, Vincent .....London.
Harrison, Robert Fairbrother...Liverpool.
Hewitt, Charles Herbert .....Sheffield.
Holliday, Solomon .....Maryport.
Horner, Robert..... ...Budleigh Salterton.
Jones, Richard Robinson .....Holyhead.
Jones, Samuel .....Maidstone.
Jones, Sidney Clifford .....Camberwell.
Kerr, Hugh .....Dalbeattie.
Kidd, Andrew .....Dundee.
Lawson, Robert Murray.....Dumfries.
Lee, James Arthur Richard ...Mexborough.
Lee, John Cuthbert.....Wainfleet.
Maynard, George Henry .....Exmouth.
Metcalfe, William Edward ...Levenshulme.
Milburn, Thomas Henry .....Maryport.
Mitchell, Benjamin Arthur ...London.
Monaghan, John E.....Glasgow.
Osborne, Harry Edward.....Spalding.
Owen, John George .....Kennington.
Parsons, Alfred Clive.....London.
Perkins, Phillip ....St. Clears.
Perrédès, Pierre Elie Felix ...Jersey.
Picken, Charles Reynolds.....Newport (Salop).
Ramsay, Alexander Robertson..Manchester.
Roberts, Walter John.....Bath.
Robertson, James Ambrose ...Portobello.
Robertson, James George .....Stirling.
Rolfe, John Thurlow Twaites..Diss.
St. Cyr, Etienne Laurent N. ...London.
Sargent, Joseph Albert .....Louth.
Smart, Gordon.....Huntly.
Smith, William Lloyd .....Carmarthen.
Snell, William Kennard .....Okehampton.
Stamp, Francis Underwood ...Hampstead.
Stearn, Ralph Marmaduke ...Cambridge.
Stone, Ernest Frederick .....Exeter.
Symington, James Martin.....Maryport.
Thomas, Hugh William.....Carnarvon.
Thorne, Alfred John .....Tunbridge Wells.
Tilson, Annie Elizabeth.....Long Sutton.
Tremeer, Arthur John ... .Barnstaple.
Umney, Ernest Albert .....Sydenham.
Walkington, Richard..... .....Church Fenton.
Wallace, Hugh Gray .....Lancaster.
Watkins, Harry Baskeville ...Darlington.
Williams, Arthur John Berry..Wolverhampton.
Williams, George Frederick . Tregarth.
Winterbottom, Arthur .....Batley.
Wood, Charles.....Stourbridge.
Wood, William Arthur .....Boston.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and fine.

REPORT OF THE FINANCE COMMITTEE.

The report of this Committee was read, which included the recommendation that the usuaal accounts be paid, and the investment on behalf of the Benevolent Fund of £1000 in 2¾ consols.

The PRESIDENT (as Chairman of the Committee), in moving the adoption of the report and recommendations, said the receipts during the month were about what was usual in December. On the Benevolent Fund account there had been a few donations received and some ground rents and legacies. The balance now standing to the donation account was £154 16*s.*, and it was recommended that this sum, which of course had to be invested, together with the balance from the current account, should be invested in consols. It was very satisfactory that they were able in this way to invest another £1000 in consols, until the opportunity offered for purchasing ground rents, and still leave sufficient to make grants as usual.

The resolution was seconded by Mr. ALLEN and carried unanimously.

REPORT OF THE BENEVOLENT FUND COMMITTEE.

The report of this Committee included a recommendation of the following grants:—

£10 to the widow (aged 48) of a registered chemist and druggist. She had a grant in 1884, since which she has supported herself, but is now unable to do so, and suffers from bad health. (Birmingham).

£10 to a registered chemist and druggist (aged 48) who for many years conducted a small village business, but has had to give it up, and is afflicted with chronic disease. Has four children dependent on him. (Stroud).

£20 to the widow (aged 50) of a registered chemist and druggist, who has had two previous grants of £15 each, the last in 1881. She supports herself and her children by letting lodgings, and desires aid in furnishing her house. (London).

£15 to a chemist and druggist (aged 45), who passed the modified examination and has been dispenser at an infirmary for two years, but has had to give up his position owing to severe illness. (London).

£10 to a registered chemist and druggist (aged 70), who was in business for fifteen years, but failed in July last. (Deptford).

Three other applications the Committee declined to entertain.

Death of Annuitants.

The Secretary reported the death of two annuitants, viz., Emma Pitman, 84, on December 15; and Mary E. Spendelow, 61, on December 31.

Legacy to the Fund.

The Secretary also reported the receipt of a legacy of £25 from the executors of the late J. H. Wagstaff, a founder of the Society and a life member.

The VICE-PRESIDENT (as Chairman of the Committee) moved the adoption of the report and recommendations. There was nothing in the report calling for special comment, but he might mention that in one case the Committee had recommended a larger grant than usual, it being the case of a widow who appeared to be making very good use of the means at her disposal, and with the aid of a moderate sum to be invested in furniture, she would be placed in a better position. With reference to the position of the Fund at the end of the year it was very gratifying to him to find that the Committee had been able to meet the applications for grants, and provide the annuities, and still have a substantial sum left for investment; at the same time he should like to see a larger number of contributors, for there were still many connected with the Society, and a still larger number of those outside, who from time to time received benefits from the Fund, who appeared to take no interest in it.

The motion being seconded by Mr. WARREN,

The PRESIDENT, in putting it, said he hoped the time was not far distant when the Committee would feel in a position to consider the desirability of increasing the amount of the annuities. It was very satisfactory to find that the Committee was able to give substantial assistance to deserving cases, but he could not but feel that the sum given to the annuitants was not worthy of the Society, and they ought not to be satisfied until the annuities granted were of £50 a year. Possibly, if some proposition of this kind were put forward, some of those who did not at present subscribe would be stimulated to do so. He certainly thought that a distressed chemist and druggist, or his widow, ought to be able to live in something like comfort on an annuity given by the Society. It was gratifying to think that the annuities had been raised, in some cases, from £30 to £35, but even this was a very small sum, and he should be very glad when the Committee could see its way to increase it. It might not be raised to £50 all at once, but might be increased gradually £5 at a time, until it reached that figure. An annuity was certainly the best form in which assistance could be rendered to those who were in distress in their old age.

The resolution was then passed unanimously.

REPORT OF THE LIBRARY, MUSEUM, SCHOOL AND HOUSE COMMITTEE.

Library.

The report of the Librarian had been received, including the following particulars:—

	Attendance.	Total.	Highest.	Lowest.	Average.
November	Day . .	623	34	16	25
	Evening .	261	23	5	12

Circulation of books.	Total.	Town.	Country.	Carriage paid
November . . .	250	136	114	£1 11 6

Donations to the Library had been announced (see p. 479), and the Committee had ordered the usual letter of thanks be sent to the respective donors.

The Committee recommended that the undermentioned books be purchased:—

For the Library in London—

Mendeléeff, Principles of Chemistry.
Scott, Chemical Theory.
Mills, Photography Applied to the Microscope.
Sadtler, Industrial Organic Chemistry.
Durand et Schinz, Conspectus Floræ Africæ.
Annales de l'Institut Pasteur.

Museum.

The Curator's report had been received, and included the following particulars:—

	Attendance.	Total.	Highest.	Lowest.	Average
November	Morning	567	39	14	22
	Evening	116	12	2	4

Donations to the Museum have been reported on p. 479.

The staff of the Society's School attended and reported on their respective classes.

The consideration of a resolution of the Executive of the North British Branch with reference to local secretaries in Scotland was adjourned.

The PRESIDENT, in moving the adoption of the report, said the business was almost formal and required no comment. Being the commencement of a new year, it might, however, be opportune to remark that the donations to the Library were of increasing value. The Society was much indebted to various governments, including those of the Colonies, and societies in Great Britain and Ireland as well as abroad, for reports of their proceedings, and in some cases—the United States, for example—for encyclopædias. He need hardly say that all the donations were much appreciated.

Mr. GREENISH said it was satisfactory to notice that the sum paid for the carriage of books had increased.

The PRESIDENT said there was no doubt increasing use made of the Library. The proposition of the Executive of the North British Branch with regard to local secretaries was a very important matter, which had been partially considered, and required further deliberation.

The resolution was then put and carried unanimously.

REPORT OF THE GENERAL PURPOSES COMMITTEE.

The report of this Committee included the usual letter from the Solicitor stating the progress made with cases placed in his hands. Two defendants had paid one penalty and costs into court previous to trial, another three penalties, and another four penalties. Several cases were still standing for trial.

Other cases of alleged infringement of the Pharmacy Acts were considered by the Committee, and proceedings recommended.

The report was, as usual, read and considered in committee.

On resuming, the report and recommendations were unanimously adopted.

REPORT OF EXAMINATIONS.

December, 1891.

ENGLAND AND WALES.

	Candidates. Examined.	Passed.	Failed.
Major (10th) . . .	12	4	8
,, (11th) . . .	12	7	5
	— 24	—11	—13
Minor (10th) . . .	21	7	14
,, (11th) . . .	21	8	13
,, (16th) . . .	31	11	20
,, (17th) . . .	30	15	15
,, (18th) . . .	30	10	20
	—133	—51	—82
	157	62	95

First Examination.

18*th*.—Thirteen Certificates by approved examining bodies were received in lieu of the Society's examination.

CORRESPONDENCE.

A letter was read from Mr. Branson, thanking the Council, on behalf of the Leeds Association, for the grant made at the last meeting.

A letter had been received from L'École Superieure de Pharmacie de Paris, thanking the Council for copies of the Journal, and from Mr. Prosser, the new assistant local secretary for the northern portion of Birmingham, thanking the Council for his appointment, and expressing his desire to do all he could for the interests of the Society.

Proceedings of Societies in London.

SOCIETY OF CHEMICAL INDUSTRY.

LONDON SECTION.

At the last meeting of the London Section of the Society of Chemical Industry, held at Burlington House, on January 4, the death of Mr. Mumford, the Secretary of the Section, was announced, as well as the appointment for the time intervening between the present date and the next election, of Mr. John Heron as his successor.

After a vote of condolence had been passed,

Mr. Boverton Redwood read a paper on the "Galician Petroleum Industry." The first portion of the paper was historical, Mr. Redwood having discovered evidence that petroleum had been used and known in Galicia for nearly 300 years. Nothing of importance was, however, done until a manufacturer of cart grease from the crude petroleum noticed that the lid of the vessel in which the manufacture was carried out was covered with drops of oil which had doubtless been distilled from the contents. He took it to a local druggist who refined it by the ordinary methods and found it burned well. This was in 1852. In 1854 it was an article of commerce in Vienna. Looking at the map of Europe, upon which the chief oil fields were marked, it was seen that, as a rule, they ran in roughly parallel lines, in a north-westerly and south-easterly direction, and were closely associated with mountain ranges. The following table shows the specific gravity of crude Galician petroleum from various sources :—

Eastern end of belt	·830–·868
Intermediate portion of belt. . .	·835–·844
Western end of belt	·846–·859

Galician petroleum, in common with that from other sources, consisted chiefly of paraffins, although olefines had been obtained in the higher fractions; their presence was probably due to decomposition that had occurred during distillation. The original method of boiling for oil was by a process of hand drilling which was known as the "free fall" system. The plant by which it was effected was very simple, consisting of a wooden derrick erected near the mouth of the wall, upon the lower part of which was pivotted a long wooden beam, the short end of which was immediately over the mouth of the well, while the long end was provided with handles whereby it could be raised and lowered by labourers. The business of the chief driller was to stand by the mouth of the oil-hole and release the detent of the tool at the proper moment. As might be imagined, the operation was somewhat slow, but was useful in certain cases where labour was cheap and modern drilling plant costly or unobtainable. In the American or Canadian method steam power was substituted for manual labour, and the release of the detent, instead of being the immediate cause of the stroke, was only of subsidiary importance, being intended merely to clear the drill from the rock and prevent it sticking. Besides these systems the modification of either of them consisting in the use of a diamond-shod drill might be mentioned, but it was not generally adopted, and could not be reckoned a success.

An average sample of Galician petroleum, of good quality, contained about 7 per cent. of light oils or benzoline and about 52 per cent. of ordinary burning oil.

The second part of the paper consisted of a description of the production of ozokerite in Galicia, where it formed a considerable industry. A model was shown, representing the shed and the shaft beneath it, which were the chief visible equipment of an ozokerite mine. The industry is conducted in the most primitive manner, being usually purely domestic, the proprietor and his wife and family supplying the necessary labour themselves. In connection with the ozokerite industry Mr. Redwood mentioned that he had once when in company with an American desired to inspect the ozokerite deposits in the oil-bearing district on the shores of the Caspian, and had made strenuous efforts to obtain permission, but after much trouble had been informed that the Russian authorities would allow the American to go, but that "Redwood being a British subject would not be permitted." The most serious danger encountered by the miner for Galician ozokerite was that arising from the inrush of the semi-fluid material, the risk of suffocation being greater than that of explosion from the inflammable gases frequently met with, though that was sufficiently real to necessitate the use of safety lamps. Latterly stringent regulations had been made on such matters and were being forced to some extent. One mine was worth mention on account of its name and the circumstance from which the name was derived. It was called the "asparagus pit," and had been, as was thought, worked out, when a miner idly striking his pick against the rocky floor was astonished by a jet of ozokerite forcing its way through the hole thus made and solidifying in a form suggesting the vegetable in question. From that time the mine became again productive, the stick of ozokerite being merely the indication of a larger deposit. Ozokerite had been brought into use in this country by Messrs. Field and Co., who by distillation with superheated steam, obtained from it a hard, white wax suitable for candlemaking. Okonite was another product of ozokerite, and had excellent insulating properties, and was used largely for telegraph and cable work.

The discussion which followed presented no notable feature save that Mr. W. J. A. Butterfield speaking of one of the most important uses to which petroleum was put stated that considerable difficulty was sometimes experienced in dealing with petroleum for enriching coal or water gas when it contained water, and elicited from Mr. Redwood that such difficulty rarely occurred with oils lower than ·900 in specific gravity.

Provincial Transactions.

BRISTOL PHARMACEUTICAL ASSOCIATION.

The annual meeting of the above Association was held at University College, Bristol, on Friday, January 1, 1892; Mr. J. W. White, the President, in the chair.

The report and financial statement were approved, and the Council for the current year nominated.

Mr. Schacht then read a paper on "Primary and Secondary Education," which appears at page 549.

NEWCASTLE-ON-TYNE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The fourth meeting of the present session was held in Lockhart's Café on the evening of Wednesday, December 16, at 8.15. Mr. G. F. Merson, President, occupied the chair.

Mr. A. Russell Bennet read a paper entitled "Some Hints to Students Preparing for the Minor under the New Syllabus."

After a few introductory remarks the author briefly sketched the history of the old schedule, and having compared it with the new one, which is now in force, pointed out the advantages that would be gained by students who, in provincial towns such as Newcastle, were nearly altogether dependent upon the schedule for information regarding their examinations. The author first dealt with prescription reading, and in the course of his remarks recommended that the study of this subject should be commenced during the first period of apprenticeship. He also pointed out that by extending in full Latin the prescriptions that passed through their hands in the ordinary way of business they would keep up their knowledge of Latin syntax, which so many students seemed to forget in a very short time, and if a small text-book, such as Pereira's 'Selecta è Præscriptis,' were used for home work fewer cases of failure in that subject would be reported. In treating the subject of dispensing, samples of emulsions, mixtures, pills and suppositories were shown. These were all made from prescriptions which have been given to candidates in the examination room during recent years. The difficulties that very often proved the stumbling block to candidates were fully explained, and the author concluded by recommending the students to practice habits of accuracy, cleanliness and neatness, which were the principal factors in enabling men to ensure success both in the examination room and during their business life. In studying the subject of pharmacy the author recommended the B.P. in conjunction with any good treatise on the subject. In preparing for the Minor a note-book should be used, and all the B.P. preparations classified and carefully entered under their respective headings, with a brief synopsis attached to each, showing the composition and amounts of active ingredients as well as the *rationale* of the process where any special difficulty presented itself. Numerous examples were given, including the green extracts, liniments, liquors, ointments, etc. Sections of different kinds of plant tissues shown under the microscope served to illustrate how to proceed with the study of botany. These were fully described, and it was shown that if a simple microscope were used to examine sections of a plant, the study of botany, instead of being dry and uninteresting as some students believed it to be, would be very fascinating, and if followed properly it would well repay any trouble. In studying materia medica full justice could not be given to such an important subject unless the student were to work with the aid of specimens. These would require to be closely examined and compared with the characters given in the B.P. under their respective names. Specimens of good and inferior drugs were shown, and the difference in their physical appearance was brought under the notice of the members. The samples included aconite root, calumba root, gum gamboge, digitalis leaves, etc. In order to obtain a round knowledge of chemistry, the student should make himself familiar with general laws, he would then find the writing of equations very much simplified. Volumetric analysis was explained by practical demonstrations, and the results were calculated afterwards. A description and practical demonstration of the different kinds of barometers, thermometers, and hydrometers concluded the lecture.

On the motion of the Chairman, seconded by Mr. Mackenzie, a hearty vote of thanks was accorded to Mr. Bennet.

A letter from Mr. P. Bell, intimating his resignation as Secretary, was read, and Mr. A. Russell Bennet was elected to fill the vacancy thus caused.

Obituary.

Notice has been received of the death of the following :—

On the 25th of December, Mr. William Ellis Crassweller, Chemist and Druggist, 16, Upper Brook Street, Ipswich. Aged 29 years.

On the 23rd of December, 1891, Mr. Samuel Gibson, Chemist and Druggist, Linlithgow, N.B. Aged 43 years.

On the 2nd of January, 1892, Mr. William Kirkbride, Pharmaceutical Chemist, 8, Middlegate, Penrith, Cumberland. Aged 70 years.

On the 5th of January, 1892, Mr. John William Wain, Chemist and Druggist, Ripley, Derbyshire. Aged 53 years.

BOOKS RECEIVED.

YEAR-BOOK OF PHARMACY, comprising Abstracts of Papers relating to Pharmacy, Materia Medica and Chemistry, contributed to British and Foreign Journals from July 1, 1890, to June 30, 1891. With the Transactions of the Pharmaceutical Conference at the Twenty-Eighth Annual Meeting held at Cardiff, August, 1891. London : J. and A. Churchill, 11, New Burlington Street.

PRACTICAL DISPENSING FOR STUDENTS, Pharmaceutical and Medical. By C. J. S. THOMPSON. London : Office of *British and Colonial Druggist*.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

EARLY BOTANY AND MATERIA MEDICA.

Sir,—I read with much interest your article on William Turner, in your issue of the 26th ult. And with all that has been said in praise of Turner I fully concur; indeed, his having won the admiration of Lindley, who named the N.O. Turneraceæ after him, proves Turner's ability as a botanist. I wish some person would undertake to produce a reprint of his 1568 edition, with the appendix on the medicinal springs of England, Germany and Italy.

But my present object in writing is to say a good word for 'Gerarde's Herbal,' a copy of which lies open before me, on the pages of which are his illustrations of black and white henbane, which I think excellent, and of sufficient accuracy to enable the growing plant or the dried specimen to be recognized. On the opposite page is the condemned illustration of mandragora, and I must confess that from the lower leaves down the plant is made to bear a tolerably fair resemblance to a sparsely dressed ballet girl.

Still we cannot but be thankful to Gerarde for his great book. He was not in advance of his time, but he was fully abreast of it, and his good work has kept his memory green for three hundred years. GEORGE FOY.

Dublin.

J. Hodgkin.—Your advertisement should have been sent to the publisher's office, 11, New Burlington Street, W.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. J. Hodgkin, A. H. Mason, O. Hesse, D. Brown, C. Cooper, H. S. Cooper, A. Kinninmont, J. C. Stead.

THE SOLVENT ACTION OF ALCOHOL OF DIFFERENT DEGREES OF STRENGTH ON SOME OF THE DRUGS USED IN MAKING PHARMACOPŒIAL TINCTURES.

BY E. H. FARR AND R. WRIGHT,
Pharmaceutical Chemists.

NOTE VII.—ON TINCTURE OF STRAMONIUM SEEDS.

(*Continued from page* 473.)

The principal constituents of stramonium seeds, according to Flückiger and Hanbury's 'Pharmacographia' (p. 461), are an alkaloid, existing in combination with malic acid, and a fixed oil, of which the seeds are said to contain 25 per cent. The alkaloidal constituent was first isolated by Geiger and Hesse in 1833, and in 1850 was submitted to examination by Von Planta, who came to the conclusion that it was identical with atropine. This statement was subsequently confirmed by E. Schmidt (*Ber. der Deutsch. Chem. Ges.*, xiii., 370), who, however, afterwards modified his views, and concluded that daturine was really a mixture, in varying proportions, of atropine and hyoscyamine (*Archiv der Pharmacie*, xxii., 329).

Ladenburg also showed (*Berichte Chem. Ges.*, xiii., 909) that stramonium contains two alkaloids, which he designated heavy and light daturine, the former consisting of atropine and hyoscyamine and the latter of hyoscyamine only.

As to the distribution of the alkaloid in the plant and the comparative strength of the seeds and the leaves very little reliable information is obtainable.

Hurtz and Hopp (*Annal der Therap.*, 1862, p. 22) inferred, from experiments made by them, that an extract from the seeds possessed five times the physiological activity of an extract from the leaves. Evidence of this kind is, however, of very little value unless the proportionate amount of extract obtained from the seeds and the leaves is stated, as the yield varies within wide limits. The alkaloidal content of the seeds is given in 'Pharmacographia' as ·1 per cent. and that of the leaves as ·02 to ·03 per cent.

Hurtz (*Druggists' Circular*, Aug., 1884) reports having obtained a yield of daturine from the seeds of ·167 per cent.

E. Schmidt ('Year-Book of Pharmacy,' 1885, p. 242) obtained from 5 kilos of each of four specimens of seeds, 12·5, 18·4, 2·6, and 10·2 grams alkaloid, equivalent to a percentage yield of ·25, ·37, ·05, and ·20 respectively.

A. B. Lyons ('Manual of Practical Assaying'), estimating the alkaloid by titration with Mayer's solution, found the average yield of alkaloid by five specimens of the seeds to be from ·45 to ·55 per cent., and that from eight specimens of the leaves to be ·40 to ·52 per cent.

If these results could be trusted, they would appear to indicate that the percentage of alkaloid in the seeds and leaves is practically the same, but the process of estimation by titration with Mayer's solution almost invariably gives results which are too high, and a systematic examination of a number of samples of the seeds and leaves, with a view of ascertaining their relative alkaloidal strength, is still needed.

For the purpose of our experiments, eleven specimens of stramonium seeds were obtained, and a series of tinctures made from each, by the B.P. process, with menstrua of 80, 70, 60, 50, and 40 per cent. strength (by volume). It was remarked that all the tinctures became opalescent when kept, and all threw down a more or less abundant deposit. The latter varied greatly in appearance, that from the 80 and 70 per cent. tinctures apparently consisting of fatty matter in a semi-transparent crystalline condition, while the deposit from the tinctures of lower alcoholic strength was darker in colour and appeared to partake more of a resinous character.

In addition to the seed tinctures we also prepared, for the purpose of comparison, three series of tinctures from the leaves, menstrua of the same alcoholic strength, and the same proportion of drug to menstruum being used, as in the case of the seed tinctures.

Before proceeding to the quantitative estimation of the alkaloid, a few preliminary experiments were tried, in order to ascertain whether the process employed for the estimation of the alkaloid in tinctures of henbane and belladonna, was equally well adapted for the estimation of the stramonium tinctures.

For this purpose 300 c.c. of a standard tincture was prepared with a 60 per cent. menstruum, and the alkaloid estimated by the following processes, the usual precautions being taken to prevent loss of alkaloid in washing with chloroform, etc.

Experiment I.—Fifty c.c. of the tincture was evaporated to low bulk with addition of water, until all spirit had been removed. The residual liquor was allowed to cool and was then acidified with dilute sulphuric acid, and freed from fat and colouring matter by means of chloroform. It was then made alkaline, and the alkaloids removed by shaking with three successive portions of chloroform. From the mixed chloroformic solutions the alkaloids were extracted by three agitations with acidulated water, and were afterwards regenerated from the mixed acid solutions, after addition of excess of ammonia, by shaking out with chloroform. The latter solution was then shaken with ammoniated water, and after separation was drawn off and evaporated, and the residue dried at 100° and weighed.

Experiment II.—The tincture was evaporated to low bulk, the residual liquor allowed to cool, and an excess of dilute sulphuric acid added. It was then freed from fat and colouring matter by means of chloroform, a slight excess of ammonia added, the alkaloids shaken out with three doses of chloroform, the latter solutions mixed, and after treatment with ammoniated water evaporated, and the residue dried and weighed.

Experiment III.—The tincture was evaporated till all spirit was removed, and the residual liquor acidified with dilute sulphuric acid and shaken with chloroform and ether in turn, till the latter came away colourless. The alkaloidal solution was then made alkaline with ammonia, the alkaloids shaken out with three successive 15 c.c. ether (sp. gr. ·717), the mixed ethereal solutions evaporated, and the residue dried and weighed.

Experiment IV.—The tincture was evaporated to remove the spirit, the residual liquor acidified, and colouring matter removed by means of chloroform. It was then made alkaline and the alkaloids extracted with chloroform. From the chloroformic

solution the alkaloids were removed by agitation with acidulated water, the latter solution treated with a slight excess of ammonia; the alkaline liquid shaken with three successive portions of ether (sp. gr. ·717), and the mixed ethereal solutions evaporated, and the residue dried at 100°, and weighed.

Experiment V.—This was conducted exactly as No. II., the oil being removed by means of petroleum ether before the preliminary treatment with chloroform.

The results were as follows:—

Experiment I.	50 c.c. tincture	= ·014	gram alkaloids.
Experiment II.	50 c.c. ,,	= ·015	,,
Experiment III.	50 c.c. ,,	= ·012	,,
Experiment IV.	50 c.c. ,,	= ·010	,,
Experiment V.	50 c.c. ,,	= ·014	,,

These results indicated that the method of extraction by means of chloroform was thoroughly reliable, notwithstanding the presence of fixed oil in the tincture, and also showed that the preliminary treatment with petroleum ether, in order to remove the oily matter, was unnecessary. Confirmatory experiments with a 70 per cent. tincture, by processes II. and V., gave the following results.

No. II.	50 c.c. tincture	= ·015	gram alkaloids.
No. V.	50 c.c. ,,	= ·014	,,

The exact details of the process adopted are as follows:—

Fifty c.c. of the tincture to be estimated is introduced into a porcelain dish, and evaporated over a water bath to low bulk; water being added, if necessary, until all the spirit is removed. The residual liquor is allowed to cool, and is then acidified by the addition of 1 c.c. seminormal sulphuric acid, and the liquid filtered through cotton wool into a separating funnel. The dish and filter are rinsed first with a little acidulated water and then with 15 c.c. chloroform, the rinsings added to the contents of the funnel and the whole well-shaken. After separation the chloroform is drawn off, and the process repeated with 10 c.c. chloroform. The washings are mixed and freed from traces of alkaloid by shaking with three successive small portions of acidulated water, and these are separated and added to the original solution. The latter is then made alkaline with ammonia, and the alkaloids extracted with three successive 15 c.c. chloroform. To obtain the alkaloids in a pure condition, they are withdrawn from solution in chloroform by agitation with three successive small portions of acidulated water, the mixed acid solutions made alkaline with ammonia, and the alkaloids taken out by agitation first with 10 c.c. and then with two successive 5 c.c. chloroform. In cases where the final acidified aqueous solution was not colourless, the process of shaking out was repeated. The mixed chloroformic alkaloidal solutions were afterwards shaken with ammoniated water, and after separation were drawn off and evaporated over a water-bath, and the alkaloidal residue heated at 100° until the weight was constant.

The above process was found to be applicable to the majority of the tinctures without any modification; but with others greater difficulty was experienced than had been the case in any of the estimations previously made.

This arises from the fact that in many specimens of stramonium seeds there seems to exist some substance soluble both in alcohol and water, and not removable by chloroform either from an acid or alkaline liquor, and which possesses the property of emulsifying chloroform when that liquid is shaken up with a solution containing it.

No difficulty was experienced in removing the oil and colouring matter, but when the extract was made alkaline and shaken with chloroform, emulsification took place, and the chloroform refused to separate out clear, even after standing for some hours. Separation into two layers did, however, take place, the upper layer consisting of a brown alkaline mother liquor, and the lower layer of emulsified chloroform containing the alkaloid in solution, and holding in suspension some of the mother liquor. It was ascertained that all the alkaloid was taken out by the chloroform, and two processes were devised, whereby it could be extracted from the chloroform emulsion, and obtained in a pure condition. By the plan first adopted, the original alkaline liquor was shaken with three successive 15 c.c. chloroform, and after separation, these were drawn off in turn and mixed. The mixed chloroformic solutions were then shaken up with four successive small portions of acidulated water, by which means all the alkaloid was taken out, together with the mother liquor included in the chloroform magma, and the latter separated out clear. The acid solutions were mixed and made alkaline, and the alkaloids again shaken out with three successive portions of chloroform. The latter were drawn off and mixed and the process repeated (usually five or six times) until a point was reached where the alkaloidal solution became almost colourless, and a perfectly clear chloroformic solution was obtained. When this point had been attained, the alkaloids were once more extracted with acidulated water, the latter solution made alkaline, the alkaloids again taken out with chloroform, the chloroformic solution shaken with ammoniated water, and after separation drawn off and evaporated and the residue dried at 100° and weighed. The loss of alkaloid by this process is very slight, and there is no waste of chloroform, the same portion being employed all the way through for shaking out the alkaloids, a fresh quantity being used only for the final extraction of the pure alkaloid. The process, however, was a very long and tedious one, each estimation occupying four or five hours.

The following modification was found to give reliable results, and to shorten materially the time occupied by each estimation.

The chloroform magma is introduced into a separating funnel and shaken vigorously, when, as a rule, about half the chloroform separates out and can be run off. To the remaining emulsion 5 c.c. of 90 per cent. alcohol is added and the whole well shaken and then allowed to stand, when a perfect separation into two layers takes place, the lower layer consisting of chloroform and alcohol and the upper layer of a brown alkaline aqueous liquid. The whole of the alkaloid is taken out by the chloroform. The latter is drawn off and added to the portion previously separated, and the alkaloid extracted by shaking with three portions of acidulated water. The acid solutions are mixed and made alkaline and the alkaloids recovered by means of chloroform. This process is once repeated, and the final chloroformic solution, after shaking with ammoniated water, is drawn off and

evaporated, and the residue dried at 100° and weighed. These two modifications of the process of estimation were tried side by side on four of the most troublesome samples of tincture, and the results in each case were exactly concordant.

The alkaloid as obtained by either of these processes is in the form of a perfectly colourless, transparent fused mass. It is soluble in water and dilute acids, and the reactions generally correspond with those of the alkaloidal residue obtained from the belladonna tinctures.

A glance at Table I. will show that the most perfect exhaustion of stramonium seeds is effected by the use of a 60 or 70 per cent. menstruum, the average yield of alkaloid by the tinctures prepared with menstrua of these strengths being equal. It is open to question, however, whether a better preparation could not be obtained from the leaves. The chief objections to the tincture prepared from the seeds are that it almost invariably becomes turbid and deposits when kept, and also becomes opaque on dilution, which objections do not apply to a 50 per cent. tincture of the leaves.

The results of the examination of the leaf-tinctures are appended to Table I. The leaves from which No. 1 series was prepared were gathered from plants grown by one of us (Farr), and the deficiency of alkaloid is doubtless accounted for by the persistent rain and lack of sunshine which characterized the past season. The tinctures made from the other two specimens, however, gave the same average of alkaloid as the seed-tinctures. Lyons' results, referred to above, go to show that the alkaloidal strength of the seeds and leaves is the same, and should this fact be established as the result of further work upon the subject, we should recommend that this tincture, like those of henbane and belladonna, be prepared from the leaves, on the ground that a 50 per cent. tincture of the leaves is a more elegant pharmaceutical product than a 60 per cent. tincture of the seeds.

The results tabulated go to prove that the alkaloidal content of stramonium seeds does not vary to anything like the same extent as does that of most other drugs, the yield of the tinctures varying between the limits of ·020 and ·034, with an average of ·026 per cent. This tincture, like those of henbane and belladonna, readily admits of standardization, and the standard should be fixed not lower than ·025 per cent.

The average amount of alkaloid contained in the seeds, calculated upon the basis of our results, is about ·2 per cent.

The percentage amount of extractive in the tinctures was ascertained by evaporating 10 c.c. of the sample over a water bath, heating the residue at 100° till the weight was constant, and multiplying the result by ten.

It will be remarked that the last five series of tinctures show a much higher yield of extract than the first six, and it will also be noticed that the difference is more marked in the case of the tinctures prepared with the stronger menstrua. This discrepancy is accounted for by the fact that series 1—6 were made, as the Pharmacopœia directs, from the bruised seeds, while the drugs employed in the preparation of series 7—11 were reduced to somewhat fine powder before being converted into tincture. We have previously pointed out, in connection with the tinctures of conium and colchicum, that it is not advisable to reduce the drug to a fine state of disintegration. The sole result, in the case of stramonium seeds, is to expose the oily albumen to the free action of the menstruum, and as a consequence to load the tinctures prepared with the stronger menstrua with a quantity of oily and in all probability inert matter. This is proved (as was the case with tincture of colchicum) by the remarkable variation in the yield of extractive, by the tinctures of higher, and those of lower alcoholic strength. As a general rule, the weaker the menstruum, the greater the percentage of extractive in the resulting tincture, but in the case of seed tinctures this rule is reversed.

The effect produced on mixing the tinctures (1) with water and (2) with 90 per cent. alcohol, as indicating the presence or absence of oily, mucilaginous and other bodies, was noted, and the results are given in Table II. Those results indicate

Table I.—Showing Quantitative Results of Estimation of Samples of Tincture of Stramonium Seeds.

No. of sample.	Amount of alkaloid in grams from 100 c.c. tincture.					Amount of extractive in grams from 100 c.c. tincture.				
	80 p. c. tincture.	70 p. c. tincture.	60 p. c. tincture.	50 p. c. tincture.	40 p. c. tincture.	80 p. c. tincture.	70 p. c. tincture.	60 p. c. tincture.	50 p. c. tincture.	40 p. c. tincture.
1	·030	·034	·032	·030	·030	·52	·54	·54	·60	·61
2	·024	·026	·026	·024	·022	·52	·50	·56	·56	·55
*3	·021	·024	·023	·024	·017	·46	·51	·52	·52	·60
4	·030	·028	·027	·030	·029	·48	·58	·54	·52	·50
5	·028	·029	·028	·028	·026	·50	·61	·64	·78	·70
6	·020	·024	·025	·024	·018	·72	·74	·74	·78	·80
7	·026	·027	·0295	·023	·021	2·50	1·62	1·18	·74	·74
8	·021	·025	·0245	·019	·0205	1·76	1·46	1·24	·90	·70
9	·018	·019	·020	·015	·014	1·44	1·26	·92	·62	·52
10	·020	·023	·024	·021	·015	1·00	·96	·78	·68	·60
11	·021	·025	·023	·020	·018	1·34	1·14	·88	·74	·58
Average . .	·0235	·0258	·0256	·0234	·0209	1·02	·90	·77	·67	·64
Results of Estimation of Leaf Tinctures.										
1	·012	·015	·014	·014	·013	1·60	2·08	2·20	2·46	2·34
2	·024	·028	·028	·028	·028	2·04	2·48	2·68	2·80	2·82
3	·022	·022	·023	·022	·022	1·90	2·04	2·68	2·94	3·08

* Series No. 3 was made from seeds gathered in 1889.

Table II.—Showing Results obtained on Mixing the Samples of Tincture (1) *with Water, and* (2) *with 90 per cent. Alcohol.*

No	Result when 1 vol of tincture is mixed with 2 vols. water.					Result when 1 vol. of tincture is mixed with 3 vols. 90 per cent. alcohol.				
	80 per cent. tincture.	70 per cent. tincture.	60 per cent. tincture.	50 per cent. tincture.	40 per cent. tincture.	80 per cent. tincture.	70 per cent. tincture.	60 per cent. tincture.	50 per cent. tincture.	40 per cent. tincture.
1	Cloudy opal., then milky.	Slight opal., no ppt.	Cl. opal., then clear with cop. ppt.	Clo. opal., then clear with cop. ppt.	Clo. opal., then opal. with slight ppt.	Slight opal., then opal., no ppt.	Slight opal., then clear, with trace floc. ppt.	Opalescent, then clear with trace floc. ppt.	Clo., then clear, with bulky floc. ppt.	Clo., then then clear with bulky floc. ppt.
2	Cloudy, then milky with slight ppt.	Cl., then clear with bulky ppt.	Cl., then clear with bulky ppt.	Clo. opal., then clear with slight ppt.	Opal., then opal. with slight ppt.	Clear, faint trace ppt.	Clear, then clear with trace floc. ppt.	Faint opal., then clear with slight floc. ppt.	Opal., then clear, with slight floc. ppt.	Clo. opal., then clear, with floc. ppt.
3	Opal., then cloudy, no ppt.	Opal., then cloudy, no ppt.	Cl., then cloudy with slight ppt.	Cl., then cloudy, with slight ppt.	Opal., then clo. opal., no ppt	Clear, no ppt.	Clear, faint trace ppt.	Opal., then clear, with floc. ppt.	Opal., then clear, with floc. ppt.	Clo. opal., then clear, with floc. ppt.
4	Cl. opal., then cloudy with bulky ppt.	Cl. opal., then clear with bulky ppt.	Cl., opal., then clear with bulky ppt.	Cldy. opal., then clear with floc. ppt.	Opal., then clo. opal., no ppt.	Clear, faint trace ppt.	Clear, faint trace ppt.	Clear, trace ppt.	Clo. opal., then clear, with floc. ppt.	Opal., then clear, with floc. ppt.
5	Cl. opal., then clear with bulky ppt.	Cl. opal., then clear with bulky ppt.	Cl., then clear with bulky ppt.	Cl. opal., then cloudy opal. with slight ppt.	Opal., then clo. opal., no ppt.	Clear, faint trace ppt.	Clear, trace ppt.	Opal., then clear with slight ppt.	Clo. opal., then clear, with floc. ppt.	Clo., then clear, with floc. ppt.
6	Cl. opal., then opal. with bulky ppt.	Cl. opal., then opal., with bulky ppt.	Cl. opal., then clear with floc. ppt.	Opal., then clear with slight ppt.	Ft. opal., then clear with sl. ppt.	Clear, no ppt.	Faint opal., then clear with slight floc. ppt.	Opalescent, then clear, with slight floc. ppt.	Clo. opal., then clear, with floc. ppt.	Clo. opal., then clear, with floc. ppt.
7	Turbid, then cloudy with sep. of fat.	Turbid, then opal., with sep. of fat.	Turbid, then opal. with sep. of fat.	Clo., then clear with floc. ppt.	Opal., then clear with floc. ppt.	Clear, trace floc. ppt.	Faint opal., then clear with slight floc. ppt.	Faint opal., then clear with fl. ppt.	Opal., then clear, with mucil. dep.	Opal., then clear, with blky mucil. dep
8	Milky, then turbid with copious sep. of fat.	Milky, then clear, with copious sep. of fat.	Turbid, then clear with bulky floc. dep.	Clo., then clear with floc. ppt.	Opal., then cloudy, no ppt.	Clear, no ppt.	Clear, then very slight floc. ppt.	Faint opal., then clear, with fl. ppt.	Faint opal., then clear, with fl. ppt.	Opal., then clear, with floc. ppt.
9	Cloudy, then turbid, no sep.	Cl., then turbid, no separation.	Cloudy, then turbid, no ppt.	Opal., then cloudy, no ppt.	Opalescent and remains so.	Clear, no ppt.	Clear, then very slight floc. ppt.	Clear, slight floc. ppt.	Clear, slight floc. ppt.	Clear, slight floc. ppt.
10	Cl., then cloudy with floc. dep.	Opal., then clouyy with sl. floc. sep.	Opal., then cloudy, no ppt.	Opal., then clear with floc. ppt.	Slight opal., then opalescent.	Clear, no ppt.	Clear, slight floc. ppt.	Faint opal., then clear with slight floc. ppt.	Slight opal., then clear, with floc. ppt.	Opal., then clear, with mucil. dep.
11	Cl., then turbid with sep. of fat.	Cl., then turbid with sep. of fat.	Opal., then cloudy with slight sep.	Clo., then clear with floc. dep.	Cloudy, then opal., sl. floc. ppt.	Clear, no ppt.	Clear, very slight ppt.	Clear, slight floc. ppt.	Faint opal., then clear with fl. ppt.	Opal., then clear, with floc. ppt.
	Leaf Tinctures.									
1	Turbid, then clo. opal. and floc. ppt.	Turbid, no ppt.	Clo. opal., then cloudy opalescent, no ppt.	Opal., then clo. opal., no ppt.	Opal, then cldy. opal., no ppt.	Clear no ppt.	Faint opal., then clear, and sl. ppt.	Clo., then clear, with slight floc. ppt.	Clo., then clear, with sl. floc. ppt.	Cloudy, then clear, with floc. ppt.
2	Opal., then turbid with greenish floc. sep.	Opal., then turbid with greenish floc. ppt.	Opal., then turbid with floc. sep.	Opal., then cloudy, no ppt.	Slight opalescence then cloudy, no ppt	Clear, very slight floc. ppt.	Turbid, then clear, with sl. deposit	Turbid, then clear, with deposit.	Turbid, then clear, with bulky mucil. dep.	Turbid, then clear, with bulky mucil. dep.
3	Clo., then turbid with grecnish floc. ppt.	Clo., then clo. with greenish floc. ppt.	Clo., then cloudy with floc. ppt.	Opal., then cloudy, no ppt.	Slight opalescence, then opal., no ppt.	Clear no ppt.	Clear, then slight floc. ppt.	Clo., then clear, with bulky dep.	Clo., then clear with bulky mucil. dep.	Clo., then clear, with bulky mucil. dep.

Table III.—Showing Results of Experiments on Process.

	Alkaloid per cent.				Extractive per cent.			
	Maceration.	Double maceration.	B.P. process.	Continuous percolation.	Maceration.	Double maceration.	B.P. process.	Continuous percolation.
No. 1. .	·024	·025	·027	·027	·48	·52	·54	·46
No. 2. .	·019	·020	·021	·022	·84	1·02	·82	1·00

the appearance presented immediately on mixing the liquids, and also after standing for twelve hours.

In order to ascertain the process best adapted for securing perfect exhaustion of the drug, two samples were selected, and a series of tinctures made from each, with a 60 per cent. menstruum, by the following processes.

1. *Simple Maceration.*—An ounce of the bruised seeds was macerated in 8 fluid ounces of menstruum for seven days, with frequent agitation. The fluid portion was then strained off, and the marc submitted to pressure. The amount of menstruum required to make the volume up to 8 fluid ounces was then poured over the marc, which was again submitted to pressure, the expressed liquids mixed and made up to 8 fluid ounces, and the tincture filtered.

2. *Double Maceration.*—An ounce of the bruised seeds was macerated with 4 fluid ounces of menstruum for forty-eight hours with occasional agitation. The fluid portion was then strained off, and after submitting the marc to pressure it was again macerated for twenty-four hours with the remainder of the menstruum, and the tincture again expressed. The expressed liquids were then mixed, and a sufficiency of menstruum poured on the marc to make up the total volume, after the final expression, to 8 fluid ounces.

3. *The B.P. Process.*—Maceration and percolation, the last portion of the tincture being displaced.

4. *Continuous Percolation.*—An ounce of the coarsely powdered seeds was moistened with menstruum and packed in a conical percolator, more menstruum was then added, and percolation allowed to proceed slowly but continuously, until 8 fluid ounces of percolate had been collected.

The tinctures thus made were estimated by the process already given, with the results shown in Table III.

It would appear, from the results there tabulated, that perfect exhaustion of the drug may be effected either by the B.P. process or by that of continuous percolation.

GUM BARKS.

BY DAVID HOOPER.

Government Quinologist.

Gum bark, or *Pishin-puttai* of the Tamils, does not refer to the bark of a tree which exudes a gum by bruising or incision, but denotes a bark which has such mucilaginous properties that it could be used for special purposes in medicine and the arts, where the white of egg would be used elsewhere. Barks of this description occur in the natural orders Malvaceæ and Laurineæ, and students of materia medica know that drugs of these orders, marshmallow root and the barks of arboreous cinnamons, for instance, contain a peculiar mucilage, which is not precipitated by alcohol. A typical gum bark of the East is that of *Kydia calycina*, a malvaceous tree, growing extensively on the slopes of the Nilgiris, and largely employed in sugar refinery under the Tamil name of *Kadularangy-puttai*. On soaking a portion of this dried bark in water it rapidly swells, and the inside becomes coated with a slimy mucilage. The inner layers of the liber may then be removed like pieces of lace, and the gum is seen to be occupying the spaces between the longitudinally disposed fibres, apparently formed from the cellulose of the broken cell-walls. The bark of Kydia is sold in the bazaars, and the decoction is taken as an astringent and tonic, and the Vythians or native doctors consider it to be a specific for diabetes.

Dr. Mohideen Sheriff, in the 'Supplement to the Pharmacopœia of India,' gives *Tetranthera Roxburghii* as the botanical origin of *Pishin-puttai*, but offers no description of the drug under that heading. Mr. Hollingsworth, of the Madras Medical College, some time ago supplied me with an authentic specimen of the bark of *Tetranthera laurifolia*, or as it is now called in the 'Flora of British India,' *Litsæa sebifera*. The bark was of a reddish-brown colour and slightly balsamic odour, very different to that of cassia or cinnamon. The thickness was a quarter of an inch, and when soaked in water it became very mucilaginous. It afforded, on analysis, distinct reactions for an alkaloid, which had the characters of laurotetanine, a poisonous base lately discovered by Dr. Greshoff in the barks of several species of Javanese lauraceous plants.

About two years ago a collection of drugs for identification was sent to me by Dr. P. S. Mootooswamy, of Tanjore, and among them was a specimen of *Pishir-puttai* which, he said, was collected from trees growing in the jungles near Point Calimere. This bark had a most agreeable odour, resembling, but not identical with, Indian cassia, and the taste was decidedly sweet. It made a slimy mucilage when mixed with water and contained some tannic acid, but no alkaloid resembling laurotetanine could be separated from it. The bark is sold in the bazaars and it is known as *Mydalakady* among Muhammadans. It is used in medicine for its mucilaginous, demulcent and refrigerant properties. By powdering the bark with some benzoin, mixing it into a paste with a little water, and smearing this on reeds, and drying them in the sun, flavouring sticks called *Sambourany-vathe* are made, and are burnt as an incense or perfume. I have not been able to obtain the botanical source of this particular variety of gum-bark, but I am inclined to believe from its odour that it is an arboreous cinnamon.

From Travancore I have received on different occasions three specimens of gum-bark, all varying the one from the other. The first was a thick, red-coloured bark, a commercial article on the western coast, supplied to sugar refiners. The botanical origin could not be ascertained; it differed in physical characters from the barks previously mentioned, and yielded an alkaloid having the reactions of laurotetanine. Probably it was a Litsæa. The second description of gum-bark was that of *Kydia calycino*. The third specimen was sent by the Conservator of Forests for Travancore; it was named in Malyalum *Ava-tholi*, and derived, it was supposed, from a species of Cordia.

I have recently examined some samples of gum barks from the Madura district of Southern India, and stated to be used by the hill villagers in increasing the alcoholic strength of sago toddy. The plants yielding these barks were up to this time only known by their vernacular names, but as leaves, flowers and fruits were also sent, these enabled them to be identified. The request was also made that they should be analysed to ascertain the nature and effect of their use in native spirit manufacture.

The seven specimens of bark were as follows:—

1. Kadaly-marum* . . . *Olea glandulifera.*
2. Koppa-marum. . . . *Litsæa Zeylanica.*
3. Karukathan-gundu* . *Hiptage Madablota.*
4. Mullu-gundu . . . . *Jasminum flexile.*
5. Pungala-marum . . . *Ligustrum Roxburghii.*
6. Sudala-marum . . . *Litsæa wightiana.*
7. Kumala-marum . . . *Gmelina arborea.*

The *Olea glandulifera* is a stout, tall tree with white flowers and small black fruit. The bark is of a grayish colour with whitish specks, about $\frac{1}{6}$ of an inch in thickness, breaking with a close granulated fracture, inner surface brown.

The *Litsæa Zeylanica* is a moderate sized tree with yellowish-white flowers and black fruit; the leaves are ribbed and whitish on the under surface.

* Marum = tree, gundu = climber (Tamil).

The bark is grey and covered with lichens, smooth, $\frac{1}{6}$ of an inch thick, fracture close, showing white, glistening fibres running through the red substance of the middle and inner layers, brown and smooth internally. The bark gives off a fragrant odour when burning.

The *Hiptage Madablota* is a woody climber, reaching to the tops of trees over 100 feet high. The stems are from half to three quarters of an inch in thickness, and covered with a thin, smooth, reddish-brown bark enclosing a yellowish wood.

The *Jasminum flexile* is also a climber. The stems are about one inch in diameter, very woody and knotted, covered with a light yellowish-brown papery bark, exfoliating on the surface.

The *Ligustrum Roxburghii* is a stout tree about 50 feet in height. The bark is coloured russet-brown and is a quarter of an inch or more in thickness; fracture close, showing thick white fibres running through the brown middle and inner layers.

The *Litsæa Wightiana* is similar to *L. Zeylanica* in many respects. The bark has a greyish-green epidermis beneath which is a chocolate coloured surface; the fracture is short and light coloured, becoming red or brown by exposure to the air.

The *Gmelina arborea* is a common tree in the plains. The bark is about half an inch thick with a rugged, black and yellowish-brown surface, middle layer hard and brown, fracture granular, ochreous within.

Some documents accompanying these specimens stated that the barks of these trees were used "to increase the intoxicating effects of sago toddy." The bark is simply placed in the toddy and left there for two or three days. The bark No. 3, it is said, is not so frequently used, as the resulting liquor causes headache when drunk. With reference to No. 7, it was said that a tenth part of it would answer the purpose in the absence of other barks.

It will only be necessary to give the results of the chemical examination of these barks, in so far as they are likely to explain their action in the fermentation of sugar. Three of the plants curiously enough belong to the natural order Oleaceæ; these are *Olea glandulifera*, jasminum and ligustrum, and like other plants of this order contain a peculiar bitter principle, soluble in water and alcohol, and a yellow colouring matter called quercetin. Two other barks of the series belong to the same natural family of the laurels, and have a similar composition; these are the Litsæas. The Hiptage bark contains tannin and is simply an astringent; and the Gmelina belongs to a class of plants distinguished for their bitterness.

The amount of extract dissolved out of the bark by water and alcohol respectively were determined in order to ascertain their relative proportion, as it would seem that in the absence of much resin, the excess of water extract over the spirit extract would indicate mucilaginous matter, and on the barks being placed in the toddy, which in a fresh state is a watery solution of sugar, with some albuminous matter, the extract would dissolve, but as fermentation proceeded alcohol would be formed and the mucilage would become insoluble and precipitate, carrying down with it the viscid albumen and thus allow the sugar to ferment more rapidly. From the fact that other gum barks besides the Litsæas, such as *Kydia calycina* and *Guazuma tomentosa* are largely used in clarifying sugar, it is evident that some such object as this is intended in their employment. The astringent qualities of most of the above-mentioned barks are no doubt used for the purpose of forming insoluble compounds with albuminous matter in saccharine solutions; just as hops are used to remove this substance from malt liquor in the ordinary process of brewing beer. The hops are found to prevent in a great measure the tendency of the beer to become sour, in consequence of the conversion of alcohol into acetic acid, and in warm climates where such liquors are apt to run into the acetous fermentation very rapidly, it is necessary to employ astringent drugs to regulate the formation of alcohol and prevent the development of acetic acid.

The natives consider these barks a necessary ingredient in making spirit, for the following reasons. Firstly, they diminish the great sweetness of the toddy sugar. Secondly, they render the spirit more intoxicating. The first of these phenomena is accounted for by the chemical fact that sugar breaks up during fermentation into two other bodies, alcohol and carbonic acid; and in the second place the barks enable the operator to obtain a larger proportion of alcohol from his toddy than he could get from leaving it to brew without such adjuncts. The analyses of the barks, with the exception of the Litsæas, which contain laurotetanine, has revealed no principle of poisonous or intoxicating properties, therefore the idea of their directly communicating a potency to the spirit is not sufficiently established, and, besides, as the spirituous liquor is submitted to distillation afterwards, any alkaloid, such as strychnine, would be left behind in the retort. Some of the barks are aromatic, and these most likely are used to flavour the resulting spirit which would be the case if the aroma resided in a volatile oil. It is probably a spirit of this kind that Dr. Ainslie refers to under the title of *Puttaicharagum*, or bark-spirit, an alcoholic liquor in which barks of various acacias are used in the manufacture.

TERPENES AND CAMPHORS.*

BY O. WALLACH.

(*Concluded from page* 558.)

Limonene and Dipentene.

The structural identity of these two hydrocarbons has been already alluded to and dipentene described as the "racemic acid modification" of the dextro- and lævo-rotatory forms of limonene. Conclusions concerning constitution can therefore be equally deduced from the study of limonene and of dipentene compounds.

Limonene compounds differ considerably from corresponding dipentene derivatives in physical characteristics. The dipentene derivatives are necessarily optically inactive and frequently possess higher melting points than the active components.

	Limonene Series.	Dipentene Series
Tetrabromide $C_{10}H_{16}Br_4$ . .	105°	124°
Nitrol-piperide α	94°	154°
Nitrol-piperide β	110°	152°
Nitrol-anilide α	113°	126°
Nitrol-anilide β	153°	149°
Carvoxime $C_{10}H_{14}$·NOH . .	72°	93°

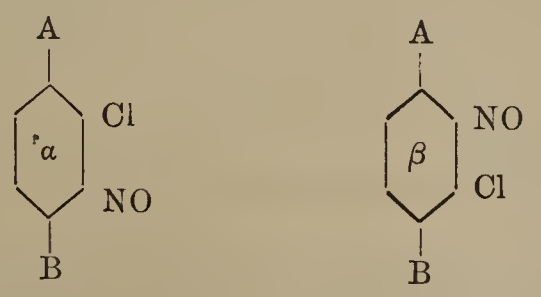
* Abstract from a lecture delivered before the Chemical Society at Berlin on February 23, 1891, and published in *Berichte*, xxiv., 1525.

Similar irregularities are observed in the solubilities and crystalline properties of dipentene and limonene derivatives. It is remarkable that if the active components yield good distinct crystals the inactive dipentene compound obtained by the mixture of the dextro- and lævo-limonene compound is generally little disposed to crystallize, and *vice versâ*, if the active compound crystallizes badly, the inactive modification is distinguished by its good crystallizing property.

Exceptionally complicated cases of isomerism characterise this series of terpenes. Even from the action of bromine on limonene a liquid and a crystalline tetrabromide result, but the intricate nature of this isomerism is more apparent in the preparation of the nitrosochloride and its conversion into nitrolamines. The relations have, however, been thoroughly studied and an instance can therefore be given in illustration.

Limonene combines very readily under the usual conditions with nitrosyl chloride, but the product has been shown to be a mixture of two isomerides, distinguished as α- and β-nitrosochloride, so that as corresponding compounds can be prepared from both dextro- and lævo-limonene, there are four different active limonene nitrosochlorides. The α-nitrosochlorides are very soluble in ether and exhibit good crystallizing properties, but the crystals, which are the most beautiful crystalline substances in the terpene group, do not keep more than a few weeks even at low temperatures. The β-nitrosochlorides are dissolved in ether only with great difficulty, and the crystals resemble those of pinene nitrosochloride, both in form and relative stability, the pure product appearing unaltered after long storage. Both α- and β-nitrosochloride are active in the same sense as the mother-substance, but the β-compounds rotate less strongly than the α-compounds.

As the nitrosochlorides are formed by the rupture of an ethylene bond and the addition of the components NO and Cl to both the carbon atoms previously doubly linked, it appears feasible to attribute the differences between the α- and b-nitrosochlorides to the structural difference indicated in the symbols—



But this assumption is untenable, as the α- and β-nitrosochlorides give without exception completely identical derivatives, and must therefore be considered structurally identical. Possibly polymerism plays the *rôle* here.

Another remarkable fact is observed when α-nitrosochloride is converted into a nitrolamine. For instance, if the crystalline and undoubtedly uniform α-nitrosochloride be allowed to react with an amine, so that theoretically the chlorine atom is replaced by the radicle NHR, not one base, but two isomeric nitrolamines with distinctly different physical constants are formed simultaneously. The rotatory power of one amine corresponds to the mother substance, the other rotates in the opposite direction. Both bases show a different melting-point, and in spite of their antagonistic optical behaviour they do not unite to form a new chemical individual. As an α-nitrosochloride can be prepared from both dextro- and lævo-limonene, and each again yields two optically different nitrolamines, four isomeric nitrolamines always occur in the limonene series, two of which have the same melting-point, but opposite rotation. If the solutions of such a pair, derived respectively from dextro- and lævo-limonene, be mixed, an inactive dipentene compound with completely different properties crystallises out. Two such dipentene compounds always obtain and are distinguished as α- and β-dipentene compound.

As already mentioned the substances obtained either from α- or β-nitrosochloride are identical, and either source yields the same six isomeric nitrolamines, four active compounds of the limonene series and two inactive dipentene derivatives. Whatever amine is employed in the reaction the same relations are always met with and have been studied completely in the dextro- and lævo- limonene series with aniline, piperidine, and benzylamine.

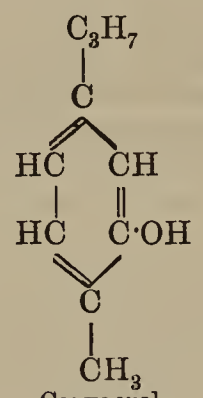
A satisfactory explanation of these facts is difficult, especially as it is necessary to consider the α- and β-nitrolamines as identical in structure. The hypothesis recently suggested by E. Fischer to explain similar observations amongst the carbohydrates, that in reactions where two optically different derivatives are obtained from the same mother substance a carbon atom becomes asymmetrical, is not applicable in thi instance. It has been proved by experiment that the α-nitrolamines are derived from the nitrosochlorides by direct substitution of Cl by NHR, and if the β-nitrolamines are formed in an analogous manner, the asymmetry of any carbon atom can be in no way affected in the process. The hypothesis would appear more tenable if further investigation shows that the β-nitrolamines are not formed by a direct substitution of chlorine by the amido radicle, but by a secondary reaction accompanied by alteration of atomic linkage. Whatever may be the explanation it is evident that a close examination of these peculiar relations will contribute useful information to our knowledge of the cause of optical differences in chemically identical substances.

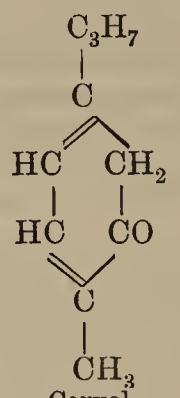
All the other reactions of importance in the determination of the constitution of limonene afford many difficulties. The easy formation of a tetrabromide and the existence of compounds with two molecules of halogen hydrides is indisputable evidence of two ethylene bonds in this hydrocarbon, whilst the fact that in anhydrous condition limonene only combines with one molecule of hydrochloric acid indicates that the two ethylene bonds are not equal in value, or that one is readily convertible into a diagonal bond. The unsaturated nature of the monohydrochlorides of the limonene and dipentene series is further demonstrated by their ability to combine with bromine, nitrosylchloride and hyponitrous acid, a property that is still possessed by the nitrosochlorides and nitrolamines. In this respect only one fact remains unexplained, as to the impossibility of preparing active compounds of the formula $C_{10}H_{16}{\cdot}2HCl, C_{10}H_{16}{\cdot}2HBr$, etc., whilst the tetrabromide and all other derivatives can be prepared as readily in the limonene as in the dipentene series.

The observation of Goldschmidt that carvoxime is identical with nitrosolimonene appears of great value in the determination of the constitution of limonene. Nitrosolimonene $C_{10}H_{15}NO$ is prepared by abstracting hydrochloric acid from limonene α- or β-nitrosochloride, lævo-cavoxime resulting from dextro-limonene, and dextro-carvoxime from lævo-limonene. Upon heating with dilute acids carvoxime yields carvol and hydroxylamine—

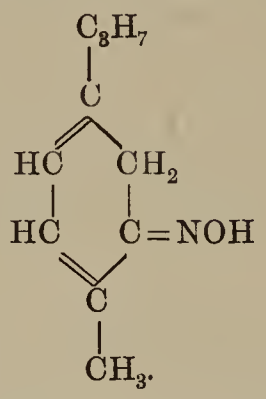
$$C_{10}H_{15}NO + H_2O = C_{10}H_{14}O + NH_2OH$$

whilst by suitable treatment with hydroxylamine carvol can be reconverted into carvoxime (nitrosolimonene). Carvol, moreover, is convertible into carvacrol, the relations between the two compounds being expressed by the following formulæ—

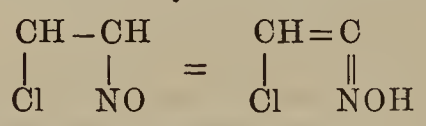

Carvacrol.


Carvol.

Nitrosolimonene (carvoxime) would therefore possess the formula :—

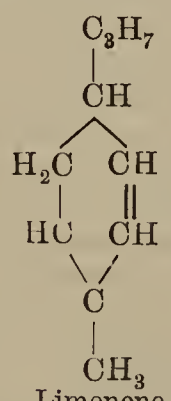


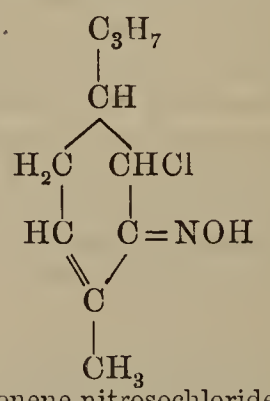
and the general behaviour of nitrosolimonene tallies with this assumption. But difficulties again appear when the formation of nitrosolimonene from limonene nitrosochloride is considered. This conversion is readily effected and also occurs when nitrolamines are heated, limonene nitrolanilide for instance yielding nitrosolimonene and aniline. Limonene nitrosochloride must therefore either contain the group NOH or be able to form it readily, which is only possible if the NO group is attached to a carbon atom combined with hydrogen. In fact limonene must contain the group CH=CH which by addition of NOCl forms



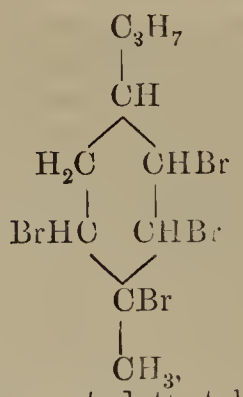
The occurrence of the latter grouping, at least as a pseudoform, is also indicated by the ease with which a benzoyl group is introduced into the molecule.

On account of its relation to carvol limonene has been assigned the formula of a dihydrocymene, of which several are possible. If those formulæ which contain no asymmetrical carbon atom be excluded the most probable formulæ for limonene and its nitrosochloride are—

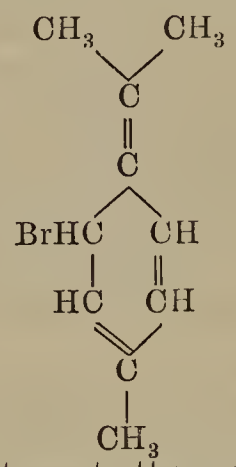

Limonene.


Limonene nitrosochloride.

But the formula of a compound resulting from the withdrawal of hydrochloric acid from limonene nitrosochloride would differ from that previously deduced from nitrosolimonene, a difficulty that can only be met by the assumption of intermolecular re-arrangement. Even then the hydrocymene formula for limonene might be retained, as it is so well supported in other directions and rearrangement of bonds so frequently occurs in the terpene series, if other facts did not also throw doubt upon its accuracy. Corresponding to the above formula for limonene that of limonene tetrabromide would be—



and it might be expected that bromcymene would be obtained by the withdrawal of hydrobromic acid from a compound of this formula. As a matter of fact upon boiling limonene tetrabromide with alcoholic potash a body of the formula $C_{10}H_{13}Br$ does obtain, though it is not bromcymene, but an isomeric, active, unsaturated compound, which becomes inactive on addition of hydrobromic acid and yields dipentene tetrabromide. This behaviour can only be explained by any possible hydrocymene formula for limonene on the assumption that bromine attached to a carbon atom bearing a propyl group possesses a strong tendency to combine with hydrogen of the side chain. If this view be accepted the monobromide $C_{10}H_{13}Br$ would probably be correctly represented by the formula—



In this uncertainty as to the propriety of representing limonene by a hydrocymene formula, it is advisable to bear in mind some new observations in the dipentene series that will demand consideration in the final decision of the question. It appears that dipentene dihydrochloride and dihydrobromide admit of halogen substitution, and in this way the following compounds have been obtained :—

$C_{10}H_{18}Cl_2$ . . . . . $C_{10}H_{17}Cl_3$ $C_{10}H_{16}Cl_4$
Dipentene dihydrochloride. 85–86. M.P. 105°
$C_{10}H_{18}Br_2$ . . . . . $C_{10}H_{17}Br_3$
Dipentene dihydrobromide M.P. 110°

These derivatives are crystalline bodies, and the tribromide especially can be easily prepared. If the tribromide be boiled with alcoholic potash, three molecules of hydrobromic acid are split off according to the equation—

$$C_{10}H_{17}Br_3 = 3HBr + C_{10}H_{14}.$$

The resulting unsaturated hydrocarbon is isomeric with cymene, boils at 182°, and yields a characteristic tetrabromide, $C_{10}H_{14}Br_4$, melting at 154°. This reaction also does not indicate close relationship between dipentene and cymene.

In connection with the dipentene compounds several oxygenated substances that form important intermediate members between pinene and limonene, as terpineol, terpene and cineole cannot be overlooked.

A graphic formula has already been assigned in this paper to terpene, $C_{10}H_{20}O_2$, and its beautiful crystalline hydrate, which illustrates its relation to terpineol and conversion into isomeric hydrocarbons of the terpene series. It is also useful to observe the close connection between terpineol, terpene hydrate, limonene and dipentene monohydrochloride and dipentene dihydrochloride, which form the corresponding alcohols and chlorides. Terpene hydrate is indeed always

formed when the dihydro-chloride or -bromide of dipentene remains long in contact with water or dilute alcohol. The hydroxyl groups, therefore, occupy the same positions in terpene as the halogen atoms in the halogen compounds. Without going into detail, it may be said that the hydrocymene formula that bests interprets the relations between dipentene dihydrochloride and terpene hydrate, and the behaviour of the latter compound, affords the most unsatisfactory explanation of the conversion of limonene into carvol. In fact, at the present moment, no formula suggests itself that will explain all the characteristic reactions of limonene, such as has been constructed for pinene.

Cineole, one of those substances that most frequently accompany the terpenes in essential oils, is an important constituent in ol. cinæ, ol. eucalypt. globul. and ol. cajeputi, and is also found in Australian eucalyptus oils, and the essential oils of rosemary, laurel, juniper, spikenard, myrtle, camphor, lavender, etc. The frequency of its occurrence is understood, if it be remembered that cineole can be prepared from terpene hydrate and terpineol, and that pinene is converted into the latter by the addition of a molecule of water. The properties of cineole are summarized below, because the knowledge of these definite facts is of importance in mastering the confusion prevailing in the terpene group.

Cineole (eucalyptol, cajeputol), $C_{10}H_{18}O$. Boiling point 176° C., sp. gr. 0·9267, $n_D = 1{\cdot}45839$. Cineole yields characteristic unstable addition-products with Br_2, J_2, HCl and HBr.

$C_{10}H_{18}O = H_2O + C_{10}H_{16}$ (dipentene).

$C_{10}H_{18}O + 2\,HCl = H_2O + C_{10}H_{16}\cdot 2\,HCl$ (dipentene dihydrochloride).

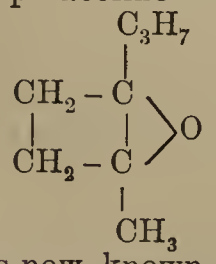
$C_{10}H_{18}O + O_5 = H_2O + C_{10}H_{16}O_5$ (cineolic acid, m.p. 196–197°).

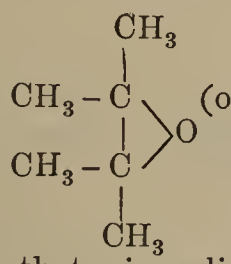
$C_{10}H_{16}O_5 = H_2O + C_{10}H_{14}O_4$ (anhydride of cineolic acid, m.p. 77–78°)..

$C_{10}H_{14}O_4 = CO + CO_2 + C_8H_{14}O$ (methylhexylene ketone ? b.p. 173–174°).

$C_8H_{14}O = H_2O + C_8H_{12}$ (m-hydro-xylene, b.p., 132–134°).

If a compound of the formula here attributed to cineolic anhydride loses carbonic monoxide and dioxide, a substance must be momentarily produced analogous in construction to that previously attributed to "pinacoline"—





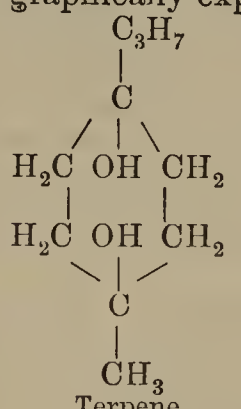
(old formula for pinacoline)

It is now known, however, that pinacoline undergoes molecular rearrangement into a methylbutylketone at the moment of formation, and it may be therefore assumed that the compound $C_8H_{14}O$ suffers an analogous change into an unsaturated ketone, probably methylhexylene ketone—

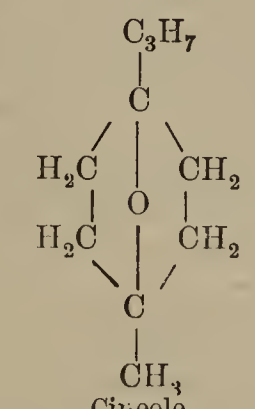
$$\begin{matrix}CH_3\\CH_3\end{matrix}\!\!>\!CH - CH = CH - CH_2 - CO - CH_3,$$

which then from loss of water by the combination of the oxygen atom with two hydrogen atoms of a remote methyl group yields a ring-body, a dihydro metaxylene.

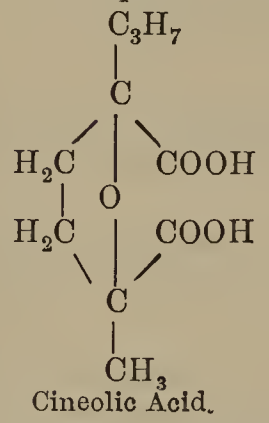
It will be observed that cineole has the same boiling point as limonene, dipentene and sylvestrene, but a considerably higher specific gravity and another refraction equivalent, hence the presence of a small quantity in limonene or pinene has no doubt given rise to many erroneous statements concerning these hydrocarbons by chemists who have considered exact observations of the physical properties sufficient for a basis of classification of the terpenes. The detection of cineole is, however, extremely simple if advantage is taken of its readiness to combine with bromine and hydrobromic acid. With respect to chemical reactions the near relation of cineole to dipentene must be prominently borne in mind, as by the action of dehydrating agents cineole is converted direct into dipentene, and various dipentene derivatives can also be prepared quantitatively from it. The greatest interest is attached to the behaviour of cineole towards oxidizing agents. By treatment with potassium permanganate an acid containing the same number of carbon atoms, cineolic acid $C_{10}H_{18}O_5$ results, and thus is convertible into an anhydride $C_{10}H_{14}O_4$. By dry distillation this anhydride is split up into equal molecules of carbonic dioxide, carbonic monoxide and a compound $C_8H_{14}O$, from which dihydrometaxylene is obtained by removal of water. These transformations are explicable if cineole is regarded as an anhydride of terpene and are thus graphically expressed—



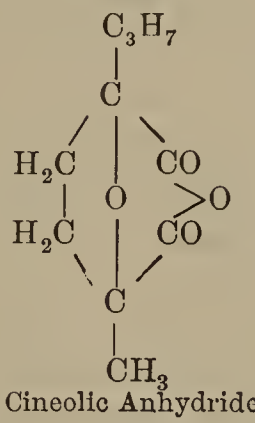
Terpene.



Cineole.



Cineolic Acid.



Cineolic Anhydride.

Some of the points involved in these reactions are worthy of especial notice as valuable lessons to investigators. In the first place the ready conversion of cineole into a metaxylene derivative shows how injudicious it is to deduce the constitution of a body under investigation from that of its final products without studying the intermediate phases of the reaction, however simple it may appear. Such a course in the above instance might easily have led to the erroneous assumption that cineole and even pinene contains two methyl groups in the meta position, since metaxylene is obtained from cineole, and pinene is convertible into cineole. An illustration is also afforded of the possible transformation of the ring-like arrangement of the molecules of saturated compounds nearly related to the terpene into an open chain, and the tendency of aliphatic compounds so formed to revert to a ring formation. This first observation of the formation of a hydrated aromatic hydrocarbon from a compound regarded as a ketone of the fatty series naturally suggested the question as to whether similar changes did not occur naturally. The investigations of Poleck and of Semmler have answered this question in the affirmative, since they found aliphatic aldehydes in essential oils that appeared to readily yield terpenes on splitting off water.

The chart delineating our knowledge of the mutual connections between the substances occurring in the essential oils is thus continually acquiring more definite features. Already the principal outlines of the subject have been distinctly recognized, and now diligent labour is required to fill in the details.

The investigation of the constitution of *sylvestrene* has been greatly retarded by difficulties besetting the preparation of sufficient quantities of the pure hydrocarbon, which it is necessary to regenerate from the hydrochloride. But sylvestrene is invested with especial in-

terest on account of its source, which is at present restricted to Swedish and Russian turpentine, in which it occurs together with pinene. Although in America turpentine is prepared from the same species of pine as in Sweden, yet no sylvestrene is found in the transatlantic article. The Swedish oil is indeed partially obtained by distillation, but as pinene is not known to be converted into sylvestrene at high temperatures, this difference of treatment can scarcely afford an explanation of the occurrence of sylvestrene. In Sweden, however, only the roots and the portion of the stem remaining after felling the tree are used for this purpose, and as limonene is found in the leaves and not in the stem, it appeared possible that sylvestrene occurred only in the roots of *Pinus sylvestris*, but investigation of an authenticated sample of the oil from this source negatived this theory. Apparently only one other assumption is tenable, that sylvestrene is formed during the changes that occur in the still living tree stumps before their removal, and this view is supported by that fact that fichtelit and retene, bodies closely allied to the terpenes, are known to be formed under these conditions.

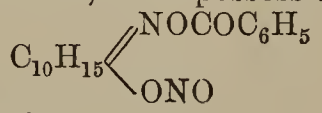
In physical and chemical behaviour sylvestrene, which contains two ethylene bonds, approaches dextro-limonene most closely, but is especially distinguished by the persistence of its rotation.

But little definite is known with respect to the constitution of the other terpenes.

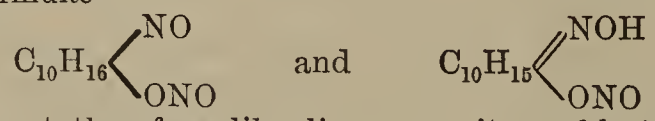
Terpinolene contains two ethylene bonds, indicated by the formation of a tetrabromide, and probably only differs from dipentene in the relative position of these ethylene bonds.

Terpinene and *Phellandrene* possess a different constitution to the other terpenes. Both combine with N_2O_3, but the characters of the two compounds, $C_{10}H_{16}N_2O_3$, are entirely different.

Terpinene nitrosite reacts very readily with fatty bases and even with ammonia, with elimination of the nitrous acid radicle (ONO) as previously described and formation of characteristic nitrolamines, of which terpinene nitrol-amine, -methylamine, -dimethylamine, -ethylamine, -diethylamine, -piperidide and -benzylamine have been prepared. With aromatic bases the reaction is not so characteristic, as the nitrous acid liberated acts destructively. The terpinene nitrolamines as well as the nitrosite behave in some reactions as if they contained a NO group; ketone bases cannot be prepared as from the analogous amylene compounds, terpinene nitrosite is absolutely insoluble in alkalies and is not altered by boiling with concentrated hydrochloric acid. In other reactions the same compounds behave as though an isonitroso group =NOH were present in the molecule; for instance, terpinenenitrolethylamine dissolves in caustic soda solution, and terpinene nitrosite yields a beautifully crystalline benzoyl compound, which, as the nitrosite can be regenerated from it by treatment with concentrated sulphuric acid, must possess the formula—



Terpinene nitrosite can therefore be represented by two formulæ—

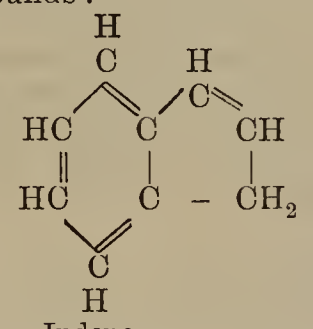


and must therefore, like limonene nitrosochloride, be considered a tautomeric compound.

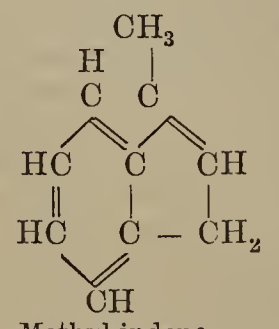
Phellandrene nitrosite possesses different properties. It is an unstable compound and does not yield nitrolamines, but can be reduced, as Pesci has shown, to a diamine, so that the constitution $C_{10}H_{16}\begin{matrix}NO\\NO_2\end{matrix}$ is attributed to it.

The nature of the isomerism that occasions the differences of behaviour between terpinene and phellandrene themselves, and their mutual dissimilitude to other terpenes can only be vaguely guessed at. In terpinene it may be due to an ethylene bond in the side chain, but the latest contributions to the knowledge of phellandrene suggest that in this unstable body there is no ring-like arrangement of the atoms in the molecule, and possibly it is to be classed with the fatty hydrocarbons.

In conclusion one other possible cause of isomerism in hydrocarbons of the formula $O_{10}H_{16}$ may be briefly referred to. In compounds that contain a side chain with three carbon atoms, as undoubtedly obtains in some terpenes, it is quite conceivable that component groups or atoms, like hydroxyl or halogen, that occur in an ortho position to the side chain, may combine with hydrogen of the side chain and a secondary closed chain be formed. Such compounds would belong to the indene type. Representatives of the indenes have been recently discovered, Krämer having isolated indene itself from coal tar and Roser synthetically prepared methyl indene. The hypothetical formula for these compounds:—

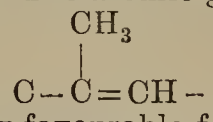


Indene.

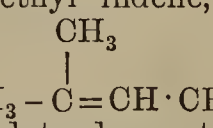


Methyl indene.

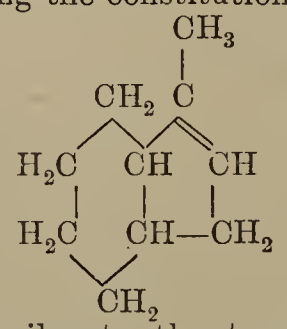
bears a certain analogy to that suggested for pinene, and experiment shows a similarity of chemical behaviour between terpenes and indenes, especially in with respect to the action of the oxides of nitrogen. For instance, indene combines with nitrous acid and yields a white crystalline body under the same conditions and with the same readiness as phellandrene. The behaviour of methyl indene towards nitrosyl chloride is still more suggestive, for it forms a white crystalline, insoluble nitrosochloride almost more readily than pinene. The atomic grouping—



appears exceptionally favourable for combination with NOCl, as pinene, methyl indene, and amylene (trimethylethylene)—



all exhibit a marked tendency to form an addition product with this reagent. If the benzene nucleus of methylindene, $C_{10}H_{10}$, could be completely reduced, a compound with the empirical formula $C_{10}H_{16}$ would be obtained, possessing the constitution—



and therefore similar to the terpenes in chemical behaviour. The synthetical preparation of this or a similar compound appears possible, but the question whether such hydrated indenes occur in nature is yet to be answered.

These reflections demonstrate that the history of the hydrocarbons $C_{10}H_{16}$ is still incomplete, and that although light has been thrown into the dark chamber of the terpenes, many corners that are still veiled incite to further explorations.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, JANUARY 16, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE "WEED KILLER" CASE.

FROM the report of the case heard before Judge PATERSON in the Barnstaple County Court last Tuesday, and published at page 584, it will be seen that a vigorous opposition is being made to the endeavour to enforce the provisions of the Pharmacy Act in regard to the sale of arsenic, or a preparation of arsenic, in the form of "weed-killer." Our readers will remember that in certain cases of accidental poisoning with articles bearing the name of "weed-killer" coroner's juries have expressed the opinion that greater care should be taken in their sale, and they have also recommended that the sale of arsenical preparations under that name should be brought under the notice of the Council of the Pharmaceutical Society. The action that has been taken by the Council is therefore in response to public opinion, and consistent with the duty imposed upon the Society's Executive as the custodian of public safety in regard to the sale of poisons. It may be gathered from the report of the case now referred to that the contest is really between the Society and the manufacturers of the particular "weed killer" in question, although the prosecution is directed against the retailer of the article. It is admitted by the legal representatives of the defendant that the preparation does contain arsenic, and hence the offence with which the defendant is charged is that constituted by the fifteenth section of the Pharmacy Act, viz., that of selling an article that is a poison within the meaning of the Act without being a legally qualified person, and thereby entitled to sell it. As the case is still undecided, and Judge PATERSON was of opinion that there are points connected with it which require his further consideration, we are not at liberty to do more than indicate the opposite views held respectively by the contending parties. On the part of the prosecution it is held that the sale of arsenic in the form of weed-killer by an unregistered person is in all respects analogous to the sale of a preparation of strychnine in the form of vermin-killer, and that both are equally subject to the same restrictions. And as it has been established by the judgment in the WHEELDON case, that the sale of strychnine in the form of vermin-killer is unlawful unless the actual seller be a legally qualified person, it is contended that a preparation of arsenic cannot be sold lawfully except by skilled persons who possess the requisite qualification.

On the part of the defence this view of the matter was disputed. It appears that eminent counsel's opinion has been taken in regard to the questions raised in the case, and the result is worthy of consideration as illustrating the difficulties which may have to be encountered in attempts to enforce the provisions of the Pharmacy Act with the double object of safeguarding the public and protecting the legitimate interests of registered chemists. It is considered that the use of vague and wide terms in preventive Acts of Parliament is the source from which difficulties arise in their construction. From the necessity of avoiding too strict definition it remains for the good sense of courts to decide how far the application of those terms is to be carried. And it is admitted by the eminent counsel, whose opinion was read in court, that this naturally leads to most unsatisfactory results. Considering the particular questions put to him in this case, he has arrived at the opinion that the Pharmacy Act was only intended to apply to preparations sold by druggists. That while the language of the first and fifteenth sections of the Act shows that it was intended to restrict the retailing of poisons to duly registered chemists and druggists, he is of opinion that it is impossible Parliament could have intended that all preparations containing arsenic should be sold only by chemists and druggists. In illustration of the soundness of this view Mr. MOULTON adds that, passing over pigments, it is well known sheep-dipping powder is sold in enormous quantities by other persons, and he considers that the sale of that article cannot be regarded otherwise than as a retail sale. In further support of his opinion reference was made to a dictum of Mr. Justice LUSH in the case of BERRY *v.* HENDERSON, to the effect that the Pharmacy Act only applies to poisons pure and simple, but not to mixtures containing them. The opposite dictum of Mr. Justice HAWKINS in the WHEELDON case was not overlooked ; but the conclusion arrived at by Mr. MOULTON is that amid the conflict of authorities, and bearing in mind that the Act passed more than twenty years ago, has, as he thinks, never been held to apply to numerous poisonous compounds containing arsenic and sold by other trades than druggists, the court would decide that the sale of arsenical weed killer does not come under the provisions of that Act, and that the article is not itself a poison within the meaning of the Act.

Leaving out of consideration the merely technical objection raised in regard to authority to

prosecute in this particular instance of alleged infringement of the Pharmacy Act, it may naturally be understood that upon the basis of the legal opinion above described the defence offered in the case should have been a bold as well as an ingenious one. The defendant's legal representative relied upon the preambles of the two Pharmacy Acts as furnishing evidence in support of his contention that the law relating to the sale of poisons does not apply to the selling of such articles as arsenical weed killer at all. What necessity, he asked, could there be that to qualify any person to sell a drum of weed-killer he should possess any practical knowledge of chemistry, or Latin, or materia medica?! He therefore argued that weed-killer containing arsenic could not be regarded as a poison within the meaning of the Act, and that the restrictions imposed by the Act upon the sale of poisons only applied to persons keeping chemist's shops. A further point relied upon for the defence in support of the argument that the Act only applies to poisons pure and simple, was the addition made to the poison schedule in reference to vermin-killers. It was contended that if the Act had any further application than that assumed it would have been unnecessary for the purposes of the Act to add to the poison schedule any further articles in the form of compounds, as was done in the case of the addition relating to vermin killers. It would of course be out of place to offer any comment upon either of the opposite views above stated, or to speculate upon the probable nature of the judge's decision. It may, however, be anticipated that in any case the question will be carried to a higher court. Before concluding we will take the opportunity of pointing out that the above mentioned idea of there being no necessary connection between the capability to sell poisons and the educational qualification of the seller is by no means a novel one, and we would also suggest that the use made of it on this occasion may serve to show the mistake made by those who think that the possibility of protecting the trade interests of chemists and druggists is not largely dependent upon the maintenance of a high standard of educational qualification on the part of all those who are recognized as belonging to that body.

In reference to some recent statements concerning quinine hydrochlorides Dr. O. Hesse has published the following remarks in Liebig's *Annalen*:— The neutral quinine hydrochloride crystallizes in bunches of needles, and when hydrated contains two molecules of water. This water is readily separated at 120° C. without fusion of the salt. The statement in a recent Pharmacopœia that the salt should melt at 75° C. is therefore incorrect. It does not melt until heated to 158° or 160°. The quinine does not then undergo alteration and does not pass into quinicine, as might be inferred from Pasteur's statements. When a water solution of the salt saturated at 15° C. is kept for some long time at a temperature of about 0° C. large octahedral crystals sometimes form instead of the bunches of asbestiform needles. On dissolving these crystals in warm water, so as to obtain a moderately saturated solution, the same crystals not unfrequently form again on cooling. But this crystallization is not the result of impurity. It is pure quinine hydrochloride, but different in the water of crystallization, and having the formula $2C_{20}H_{24}N_2O_2HCl+3H_2O$. Acid quinine hydrochloride $C_{20}H_{24}N_2O_2,2HCl$. This salt was obtained by Liebig by passing hydrochloric acid gas over dry quinine, and was described as an instable salt. It can be more conveniently prepared by decomposing quinine sulphate with an equivalent proportion of barium chloride or by mixing a solution of the neutral hydrochloride with one molecular proportion of hydrochloric acid, and evaporating the solution at a gentle heat. The acid salt then separates, partly in concentric groups of needles and partly in a gelatinous form, which after some time becomes crystalline. Both consist of the anhydrous dihydrochloride. The crystalline salt can be dried without alteration at 110° C., but the gelatinous salt becomes opaque at that temperature. Both give a white powder, which has a distinct blue reflection in sunlight. This salt has the same composition as the isoquinine dihydrochloride, under which latter name Lippmann and Fleissner appear to have described the quinine derivative formerly mentioned by Hesse.

* * *

We have been requested to announce that the Chemists' twenty-sixth annual Ball will be held at the Portman Rooms, Baker Street, W., on Wednesday, the 20th of January. A preliminary list of stewards is in course of being issued, and the number of them can be further added to. Applications for tickets should be made to the Honorary Secretary, Mr. Alfred H. Mason, 46, Jewin Street, Mr. Richard Bremridge, 16, Bloomsbury Square, or Mr. T. C. W. Martin, 36, Camden Square, N.W., and they must be accompanied by a remittance in payment for the tickets desired. As usual, the musical arrangements will be provided by Mr. Dan Godfrey's quadrille band, conducted by Mr. Dan Godfrey. Over and above the attractions of this ball as an opportunity for social intercourse it may be mentioned that in past years it has been the means of rendering considerable assistance to the Benevolent Fund, as it has been the practice to give any surplus receipts to that institution. It is probable, therefore, that this consideration may be an additional means of inducing members of the pharmaceutical craft to attend the ball.

* * *

We learn with much regret that Mr. John Morris Broad, of Hornsey Rise, died on Sunday, the 10th instant, at the early age of 39. Mr. Broad was a pharmaceutical chemist member of the Society and as divisional Secretary for North Islington took an active interest in pharmaceutical affairs. He was on more than one occasion a candidate for a seat on the Council, and was one of the founders of the Galen Lodge, recently established for the purpose of promoting masonic relations among members of the pharmaceutical body.

* * *

We have also to record the death, on the 28th December, of Mr. Martin Mohun, of Herne Bay, aged 54. Mr. Mohun was a pharmaceutical chemist and a life member of the Society.

* * *

The next meeting of the School of Pharmacy Students' Association will be held on Thursday, January 21, when a paper on "Commercial Baking Powders" will be read by Mr. R. S. Donington, and a Report on Botany will be given by Mr. H. H. Sturch

Transactions of the Pharmaceutical Society.

FIRST EXAMINATION.

January 12, 1892.

The following are the questions that were set for this examination :—

LATIN.

(*Time allowed—from* 11 *a.m. to* 12.30 *p.m.*)

I. (*For all Candidates.*) *Translate into Latin :—*

1. The heat of the sun is great.
2. He gave the book to one of his friends.
3. It is a foot and a half long, a foot wide.
4. It is agreed that nobody is born wise.
5. Having conquered the enemy they returned to the city.

II. Translate into English either A. (Caesar) or B. (Virgil).

(*Candidates must not attempt both authors.*)

A. CAESAR.

1. Helvetii, repentino ejus adventu commoti, quum id, quod ipsi diebus viginti aegerrime confecerant, ut flumen transirent, uno illum die fecisse intelligerent, legatos ad eum mittunt; cujus legationis Divico princeps fuit, qui bello Cassiano dux Helvetiorum fuerat. Is ita cum Caesare agit: si pacem populus Romanus cum Helvetiis faceret, in eam partem ituros atque ibi futuros Helvetios, ubi eos Caesar constituisset atque esse voluisset; sin bello persequi perseveraret, reminisceretur et veteris incommodi populi Romani et pristinæ virtutis Helvetiorum.

2. Equitum millia erant sex; totidem numero pedites velocissimi ac fortissimi, quos ex omni copia singuli singulos, suae salutis causa, delegerant. Cum his in proeliis versabantur, ad hos se equites recipiebant; hi, si quid erat durius, concurrebant; si qui, graviore vulnere accepto, equo deciderat, circumsistebant; si quo erat longius prodeundum, aut celerius recipiendum, tanta erat horum exercitatione celeritas, ut, jubis equorum sublevati, cursum adaequarent.

Grammatical Questions.—For those only who take Caesar.

1. Decline in the singular *uno die*; and in the plural *cujus legationis* (Par. 1).
2. Give the principal parts of all the verbs in Paragraph 2.
3. Give the three degrees of comparison (nom. sing.) of the adjectives and adverbs in Paragraph 2.
4. Parse fully: *Is ita cum Caesare agit* (Par. 1.)

B. VIRGIL.

1. Nascetur pulchra Trojanus origine Caesar,
   Imperium Oceano, famam qui terminet astris,
   Julius, a magno demissum nomen Iulo.
   Hunc tu olim coelo, spoliis Orientis onustum,
   Accipies secura: vocabitur hic quoque votis.
   Aspera tum positis mitescent saecula bellis:
   Cana Fides, et Vesta, Remo cum fratre Quirinus,
   Jura dabunt; dirae ferro et compagibus arctis
   Claudentur Belli portae: Furor impius intus,
   Saeva sedens super arma, et centum vinctus aënis
   Post tergum nodis, fremet horridus ore cruento.

2. At domus interior regali splendida luxu
   Instruitur, mediisque parant convivia tectis.
   Arta laboratae vestes, ostroque superbo:
   Ingens argentum mensis, caelataque in auro
   Fortia facta patrum, series longissima rerum,
   Per tot ducta viros antiqua ab origine gentis.

Grammatical Questions.—For those only who take Virgil.

1. Decline in the singular *pulchra origine*; and in the plural *compagibus arctis* (Par. 1).
2. Give the principal parts of all the verbs in Paragraph 1.
3. Give the three degrees of comparison (nom. sing. of the adjectives in Paragraph 2.
4. Parse fully :— *Vocabitur hic quoque votis* (Par. 1)

ARITHMETIC.

(*Time allowed—from* 12.30 *p.m. to* 2 *p.m.*)

[The working of these questions, as well as the answers, must be written out in full.]

1. Subtract one hundred and eleven thousand two hundred and ninety-four from the product of DCCXLIX and 304,206.
2. If 9 gallons at 18*s.* 6*d.* per gallon are mixed with 7 gallons at £1 1*s.* per gallon, how much water must be added to reduce the value to 16*s.* 6*d.* a gallon?
3. Simplify $\left(\frac{2\frac{1}{5}}{1\frac{4}{5}} + 3 + \frac{1\frac{4}{5}}{\frac{1}{5}}\right) + \left(\frac{1\frac{4}{5}}{2\frac{1}{5}} - \frac{\frac{1}{5}}{1\frac{4}{5}}\right)$.
4. Reduce to a vulgar fraction in its lowest terms

$$\frac{3\cdot25\dot{} - 2\cdot6}{3\cdot0\dot{2}}$$

5. Express approximately in English feet 39 metres 4 decim. 8 centim.
6. If a hectare of land be bought at 6*d.* a foot, at what price must it be sold per yard to gaid £302 10*s.*?
7. The flooring of a room 28 feet 6 inches long by 13 feet 4 inches broad is composed of $\frac{1}{2}$-inch planks, each 8 inches wide and 10 feet long. How many will be required, and what will be the weight of the whole if 1 cubic inch of wood weighs half-an-ounce?

ENGLISH.

(*Time allowed—from* 3 *p.m. to* 4.30 *p.m.*)

1. Give the meaning and, where possible, the derivation of the following words :—*confederation*, *democratic*, *Utopian*, *sophist*, *Draconic*, *atheism*, *undemonstrative*.
2. Analyse the following :

   "The times have been
   That when the brains were out, the man would die.
   And there an end; but now they rise again
   With twenty mortal murders on their crowns,
   And push us from their stool."

3. Parse fully: "Of two evils the less is always to be chosen."
4. In the following passage supply the necessary capital letters, and put in the stops and inverted commas where necessary :—this is the pathway cries one of the herdsmen this way we must hurry on for you have a long way to go yes says hay this way he shouts in english is that you hamilton yes is brodie with you no i suppose he has landed lower down brodie brodie he shouts but there is no answer.

*5. Write a short composition on one of the following subjects :—

(i.) Temperance.
(ii.) Discipline.
(iii.) Winter and summer out-door amusements contrasted.
(iv.) Example is better than precept.

DONATIONS TO THE LIBRARY AND MUSEUM.

At the meeting of the Library, Museum, School and House Committee, held on Wednesday, the 13th inst., the undermentioned donations were announced, and it was ordered that the thanks of the Society should be communicated to the respective donors :—

---

* This must be attempted by every candidate.

To the Library in London—

Allgemeiner österreichischer Apotheker-Verein, Zeitschrift, 1891. From the VEREIN.
American Druggist, 1891. From the EDITORS.
American Journal of Pharmacy, 1891.
Annual Announcement, 1891.
From the PHILADELPHIA COLLEGE OF PHARMACY.
Analyst, 1891. From the EDITORS.
Archiv for Pharmaci og technisk Chemi, July, 1890, to Sep., 1891. From the PUBLISHERS.
Australasian Journal of Pharmacy, 1891.
Annual Report, 1891.
From the PHARMACEUTICAL SOCIETY OF AUSTRALASIA.
Botanical Society of Edinburgh, Transactions and Proceedings, vol. 19, pp. 89–190.
From the SOCIETY.
British Medical Journal, 1891.
From the BRITISH MEDICAL ASSOCIATION.
Canadian Pharmaceutical Journal, 1891.
From the ONTARIO COLLEGE OF PHARMACY.
Chemical News, 1891. From the EDITOR.
Chemical Society of London, Journal, 1891.
— List, 1891.
— Proceedings, 1891. From the SOCIETY.
Chemist and Druggist, 1891.
Chemists' and Druggists' Diary, 1892.
From the PROPRIETORS.
Chemist and Druggist of Australasia, Jan., April, July, Sep., Oct., Dec., 1891. From PROPRIETORS.
Guibourt, Histoire des drogues simples, 1820–26. 2 tomes. From Messrs. ROBERTS AND CO.
Helbing's Pharmacological Record, July, 1891.
From Mr. H. HELBING.
Institute of Brewing, Transactions, 1891.
From the INSTITUTE.
Journal de Pharmacie, 1891.
From the SOCIÉTÉ DE PHARMACIE D'ANVERS.
Kaiserliche Akademie der Wissenschaften in Wien, Anzeiger, mathematisch-naturwissenschaftliche Classe, 1891.
— Sitzungsberichte, Chemie, 1890, 4–10. Heft.
From the AKADEMIE.
Linnean Society of London, Journal, Botany, 1891.
— List, 1891. From the SOCIETY.
Manchester Literary and Philosophical Society, Memoirs and Proceedings, ser. 4, vol. 4, nos. 1–5.
From the SOCIETY.
Morison (R.), Preludia botanica, 1669.
From Mr. J. J. O. EVANS.
Ny pharmaceutisk Tidende, nos. 15–26, 1890: nos. 1–21, 1891. From the PUBLISHERS.
Pharmaceutical Record, 1891. From the EDITOR.
Pharmacie Centrale de France, L'Union pharmaceutique et le Bulletin commercial, 1891.
From the PHARMACIE CENTRALE.
Photographic Society of Great Britain, Journal and Transactions, 1891. From the SOCIETY.
Planchon (L.), Les Aristoloches, 1891.
From the AUTHOR.
Royal Botanic Society, Quarterly Record, 1891.
From the SOCIETY.
Royal Gardens, Kew, Bulletin of Miscellaneous Information, 1891. From the DIRECTOR.
Royal Society of London, Proceedings, 1891.
From the SOCIETY.
Royal Society of New South Wales, Journal and Proceedings, vol. 24, pt. 1. From the SOCIETY.
Sei-I-Kwai, Medical Journal, 1891.
From the SOCIETY FOR THE ADVANCEMENT OF MEDICAL SCIENCE IN JAPAN.
Société française de botanique, Revue de botanique, nos. 81–103. From the SOCIÉTÉ.
Society of Chemical Industry, Journal, 1891.
From the SOCIETY.
Timehri, 1890, parts 1–2; 1891, part 1.
From the EDITOR.
Western Druggist, 1891. From the PROPRIETORS.
Year-Book of Pharmacy, and Transactions of the British Pharmaceutical Conference, 1891. 2 copies. From the CONFERENCE.

To the Library in Edinburgh—

Australasian Journal of Pharmacy, 1891.
From the PHARMACEUTICAL SOCIETY OF AUSTRALASIA.
Chemist and Druggist of Australasia, Jan., Oct., Nov., Dec., 1891. From the PROPRIETORS.
Pharmaceutical Record, 1891.
From Messrs. T. and H. SMITH and Co.
Royal Society of Edinburgh, Proceedings, vol. 17.
From the SOCIETY.
Society of Chemical Industry, Journal, 1891.
From Mr. J. R. YOUNG.
Year-Book of Pharmacy, 1870–89.
From Mr. ALEXANDER NOBLE.

To the Museum in London—

Specimens of native drugs in common use in Chili, including Boldo, Cheken, Matico and Pichi; *Acœna splendens*, *Chenopodium ambrosioides*, *Eritrichium gnaphalioides*, *Haplopappus Baylahuen*, *Ligusticum Panul*, *Margyricarpus setosus*, *Solanum crispum*.
From Messrs. CLAY and ABRAHAM.
Small specimen of Indian Drugs.
From Mr. ALFRED WILLIAMS.
Specimen of Saffron adulterated with the slender rhizome of a Carex.
From Mr. H. G. GREENISH.

To the Museum in Edinburgh—

Specimens of Agar Agar, Areca nuts attached to the stalk; *Andrographis paniculata*, with a Herbarium specimen of the plant; Incense Sticks; Aloes Wood (*Aquilaria Agallocha*); Conesso Bark (*Holarrhena antidysenterica*); *Andropogon laniger*; Fruit of *Urethani coagulans*; False Pellitory Root and False Sandal.

EVENING MEETING IN LONDON.

Wednesday, January 13, 1892.

On Wednesday, the 13th inst., Professor ARMSTRONG delivered his second lecture on "Fermentation," the chair being taken by Mr. Michael Carteighe, the President, at half-past eight o'clock.

At the conclusion of the lecture the PRESIDENT proposed a vote of thanks to Professor Armstrong, which was carried unanimously.

Pharmaceutical Society of Ireland.

LICENCE EXAMINATION.

At the January Pharmaceutical Licence Examination the following passed:—Messrs. A. B. C. Orchard, W. R. Wilson, H. S. Misstear, J. P. Parke.

One candidate was rejected.

PRELIMINARY EXAMINATION.

At the January Preliminary Examination the following passed:—Messrs. H. Bell, A. A. Brunker, R. C. Curtis, G. A. Deans, C. P. Fairweather, T. Ryan, H. R. Scott.

Five candidates were rejected.

Proceedings of Societies in London.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting was held on Thursday, January 7, Mr. H. Garnett, Vice-President, in the chair.

Mr. C. Morley read a paper on "Ancient Chemical Theories," ascribing the earliest theories or speculations of a chemical nature to the Arabians of the seventh century. According to Geber the then known metals, gold, silver, copper, iron, tin, and lead, were composed of mercury and sulphur in varying proportion, and hence arose the belief in the possibility of the transmutation of the baser metals into gold. Some of the formulæ of the alchemists for the preparation of the philosopher's stone were quoted. The speculations of Roger Bacon, Paracelsus, Van Helmont and others, were noticed, and then the phlogiston theory, which had considerable *primâ facie* evidence in its favour, and was at one time almost universally accepted, was discussed in greater detail.

After a short discussion on this paper, and on the subject, introduced by Mr. Hocking, of the darkening of salicylate of sodium when dispensed in conjunction with alkaline salts, such as bicarbonate of potassium, the meeting adjourned.

Provincial Transactions.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

At the meeting of this Association, held in the Pharmaceutical Society's House, 36, York Place, on Wednesday, January 6, at 9.15 p.m., Mr. John Lothian, President, in the chair, the following communications were read :—

Note on Volumetric Solution of Iodine.

BY J. H. HOSEASON.

Though the point dealt with in this paper might seem a small one, it was desirable that the Pharmacopœia should be as completely accurate in every detail as it could reasonably be. He had prepared a standard solution of iodine with which he had examined a sample of arsenious oxide, and found it to be pure. Some time after, the same iodine solution was used with the same sample of arsenious oxide, and it indicated only 97 per cent. As_2O_3. It was concluded that the iodine solution had deteriorated, but the question came to be how could its strength be ascertained without using arsenious oxide as a factor. Titration with standard soda solution was tried, but the end reaction, even with starch paste, was not sufficiently distinct. Nitrate of silver solution was also found to be inapplicable, as a portion of the iodide in the iodine solution combined with the silver at the same time. Certain points noticed seemed to indicate that iodine and iodide of potassium combined in a fixed ratio, but time did not permit of following out this enquiry.

A third method, which proved more satisfactory, was to add a known measure of standard potassium bichromate solution to a solution of potassium iodide in water with a sufficiency of dilute sulphuric acid. Iodine is then set free in the proportion of three molecules to one of potassium bichromate. Subsequent titration of this iodine with sodium hyposulphite solution determines the strength of the latter, and from this hyposulphite of sodium solution a weak or unknown solution of iodine might be at once corrected or standardized.

Arsenious oxide might also be used, and it had the advantage of being permanent and nonhygroscopic.

The defect in the Pharmacopœia to which Mr. Hoseason directed attention was this. The standard iodine used to fix the value of the hyposulphite of sodium solution is the one which answers the "characters and tests" of the Pharmacopœia. This official "iodine" is tested by using solution of sodium hyposulphite. It is evident, therefore, that the true value of the iodine can never be ascertained in this way, which is simply a case of reasoning in a circle. He suggested that the following should be the directions for preparing the volumetric solution of iodine:—"Mix intimately in a mortar, in the proportion of one of potassium iodide to four of iodine; place in a suitable arrangement and sublime. When cool place the sublimate in a desiccator for two hours. Of this chemically pure iodine, weigh off quickly on a paraffined paper the quantity required, or an unknown quantity may be weighed from weighing tubes and made up to the proper volume with water, so that each 100 c.c. contain 1·27 grain of pure iodine." He had examined some commercial and resublimed samples of iodine with the following result:—

No.	Quality.	Description.	Iodine p. c.	Moisture per cent.	
1	Re-sublimed.	Fine lustrous scales thin, dry.	100	0·0	
2	Re-sublimed.	Small crystalline fragments and dry dust.	99·5	0·5	
3	Commercial.	Fine scales and dust.	99·4	0·6	slight fixed residue.
4	Re-sublimed.	Very small crystals; lustrous, dry.	100	0 0	
5	Re-sublimed.	Very large thick scales and crystalline masses, very moist.	96·6	3·4	
6	Re-sublimed.	Very large thick crystalline scales, moist.	99·2	0·8	
7	Commercial.	Dry powdery mass.	97·6	2·4	slight fixed residue.

None of the samples contained chlorine or bromine in quantity. Sample 2 contained a trace of chlorine, and the two commercial samples contained a trace of non-volatile matter, but were otherwise of unexpectedly good quality.

Note on Liquor Potassæ.

BY JAMES PETRIE.

The examination of eight typical commercial samples gave the following results:—

Sample.	Specific Gravity.	KHO per cent.
1 . . .	1·050	5·76
2 . . .	1·114	4·07
3 . . .	1·741	6·91
4 . . .	1·061	6·36
5 . . .	1.560	5·80
6 . . .	1.052	6·13
7 . . .	1.063	4·53
8 . . .	1.054	6·36
B.P. Stand.	1·058	5·84

All the samples contained carbonate, but not in large quantity, and in two of them alumina was present.

The reading of the papers was followed by a discussion, taken part in by Messrs. Cowie, Hill, Hoseason, Lothian, Petrie, and Stephenson.

Mr. T. Stephenson, F.C.S., Bombay, then exhibited under a series of microscopes and explained a number of interesting sections of Indian plants.

On the motion of the Chairman cordial votes of

thanks were awarded to the authors of papers, to Mr. Stephenson and to the gentlemen who had lent microscopes.

GLASGOW CHEMISTS AND DRUGGISTS' ASSISTANTS' ASSOCIATION.

At the meeting held in the Waterloo Rooms on the evening of Wednesday, January 6, Mr. James Robb, President, in the chair, a lecture on "Seaweed" was delivered by Professor Thomas King, Anderson's College Medical School.

The lecturer said that seaweeds may be classed in three divisions: red, green and brown. Red and brown both contain the green colour, but it is overpowered by the darker shades; and as in phanerogamic plants the green colour is due to chlorophyll. Professor King then passed round a number of fresh specimens, describing minutely the various points of interest. He then described the method of collecting seaweed. If it could not be mounted at once, the next best plan was to pickle the weeds for the time being; but even a dry specimen revived wonderfully when placed in water. For mounting a specimen for the herbarium the best plan is to place the specimen on a sheet of thin, firm, white paper (the smoother the better) laid on a plate covered with water. When thoroughly revived remove from plate, cover with a piece of old cloth and press for some time. On the removal of the cloth the specimens will be found adhering closely to the paper. A number of specimens were exhibited under the microscope.

On the motion of the Chairman, a cordial vote of thanks was awarded Professor King, who in reply mentioned that algæ were not altogether confined to salt water, that there were also fresh water ones, and he would gladly aid anyone who might have a difficulty in recognizing a specimen, or any other point requiring explanation.

Parliamentary and Law Proceedings.

Action by the Pharmaceutical Society at Barnstaple.

His Honour Judge Paterson was occupied some time at the Barnstaple County Court on Tuesday last in hearing a case in which the Council of the Pharmaceutical Society of Great Britain, of which Mr. Richard Bremridge is the Registrar, were the plaintiffs, and Mr. E. J. Butt, seedsman and florist of Barnstaple, the defendant. The action was for the recovery of four separate penalties of £5 each incurred by the defendant in October and November of last year, for selling or keeping open a shop for the retailing and dispensing or compounding a poison, to wit, arsenic, or a preparation of arsenic contrary to the provisions of the Pharmacy Act, 1868, 31 and 32 Vict., cap. 121.

Mr. Flux appeared for the plaintiffs and Mr. A. F. Seldon for the defendant. Mr. Flux placed the Act before his Honour, and pointed out that the name of defendant was not in the Register, and the absence of the name of any person from the printed Register was evidence, until the contrary was proved, that such person was not registered according to the provisions of the Pharmacy Act. The first section of the Act referred to the illegality, and said, "It shall be unlawful for any person to sell or keep open a shop for retailing, dispensing or compounding poisons," unless such person be registered under the Act. That was the offence with which the defendant was charged. He had sold enough arsenic to poison every living man in that town. The 15th section enacted the penalty for doing the prohibited act, which was £5 for each offence, which might be sued for, recovered and dealt with in a manner provided by the Pharmacy Act, and it was in accordance with that Act that he now sued. Section 12 defined the manner in which the action should be brought, and that he (Mr. Flux) was within it was not in question. Section 14 said the penalty was to be paid as the commissioners of Her Majesty's Treasury should direct. As these sales were made by the defendant on October 27, November 4, 13 and 21 his case was that the defendant with his eyes open was persistent. The statute was passed for the protection of the public in regard to the sale of dangerous articles, and when offences were persistent there was no course short of sueing for the penalties. Section 2 of the Act said the articles mentioned in the Schedule shall be poisons within the meaning of the Act, and schedule A said "arsenic and its preparations." The law on the matter was considered in the case which was decided in 1890 by the Divisional Court, in the Pharmaceutical Society *versus* Wheeldon, 24th Queen's Bench Division, p. 683. It was held that an unregistered chemist's assistant, who in the absence of his master sells any poison or preparation was himself directly liable. It went to show that legislation for the protection of the public in that particular was substantial and effective. He referred to that case for two reasons, the one being that in the judgment of the learned judge, there was a very convenient statement of the law, which gave the law in an easy form, and the other was that the sale of poison in that case was on all fours with the sale of poison in the present case; in this respect, that the poison was an article contained in the mixture, and that this was a compound. It contained strychnine mixed with other ingredients, and it was sold as vermin killer, which was the name of the article. But for the purposes of the Statute it was a dangerous article, the sale of which was permitted only to experts, who would have to sell in the manner contemplated by the Statute, skilled persons for the sale of such dangerous articles. They might call it by whatever name they liked, but for the purposes of that Statute the article was one which was scheduled in the Statute, and so in the present case the arsenic was none the less arsenic because the article was called weed-killer or vermin-killer. The active ingredient in the case he had quoted was strychnine, and here the active ingredient was arsenic. If he satisfied the court on that point that was enough. There remained only for him to prove the fact of the purchase and the fact of the presence of arsenic. The latter was the subject of admission. The iron drums containing the weed killer were then placed on the table, and a portion of the label and directions read out. A letter was read by Mr. Flux from Mr. Seldon, dated January 8th inst., stating, "I am willing to admit that the cases mentioned in the particulars severally contain arsenic in large proportion." Mr. Flux then proceeded to prove the purchase.

Mr. George Longhurst, Superintendent of the borough police at Barnstaple, said he knew the shop of the defendant in Barnstaple. It was the shop of a seed merchant and florist in High Street, and was a retail shop and an open shop. On Tuesday, October 22, he went to the shop and saw the defendant. He went to make a purchase and he bought a gallon drum of weed killer. He bought it of an assistant but the defendant was present and saw the purchase. He spoke to the defendant after he had paid for the article, 3*s*. Witness said he was purchasing it for the Pharmaceutical Society and he expected it would be analysed. He replied, "I have been in communication with the manufacturers and I understand from them I can sell it." The drum produced was the one he then purchased.

His Honour asked if the plaintiffs wished to get a number of penalties, and whether that one penalty was not sufficient.

Mr. Flux said the defendant had invited a number

LIBRARY

of penalties. It was not a test case. It was a defiance in this particular case—a defiance of well settled law.

His Honour asked if the plaintiffs had been to defendant and cautioned him.

Mr. Flux said yes, in correspondence with him so far back as June, and the firm in Scotland who sold him the goods. The whole thing was in defiance of the most reasonable representation, which the plaintiffs from time to time made. He had no doubt the defendant was pecuniarily indemnified by the firm at Glasgow.

Mr. Seldon submitted that Mr. Flux had not gone far enough, for he had not proved that the Registrar of the Pharmaceutical Society had given him authority to take that action.

Mr. Flux said he had authority under the common seal of the corporate body to bring actions of that kind.

Mr. Seldon said that was a general thing, but where was the special instruction as regards that case

His Honour said Mr. Seldon was taking a technical objection, which he had a right to take, of course. He did not think it was wise, especially as he was trying to reduce the number of penalties.

Mr. Seldon said he had an object in this case, because there were members of the Council of the Society who actually offended against the Pharmacy Act every day.

Mr. Flux absolutely denied this, and said it was an improper thing for a professional man to make accusations against a whole body of men that they were law breakers. He could not justify it.

Mr. Seldon said he could; and he could prove it.

Evidence was then called on the point raised by Mr. Seldon.

Mr. Harry Moon said he was an assistant in the office of the Registrar of the Pharmaceutical Society of Great Britain in London. He knew the seal of the Society and the signature of the President, and the signature of Mr. Atkins, the Vice-President. That seal produced was the seal of the Society and it was countersigned by the President and Vice-President. He entered up the minutes of the meetings of the Council of the Society, and the Council of the Society had given authority for the bringing of that present action.

His Honour said the seal was sufficient, but

Mr. Seldon said the authority was given in the year 1884, and there was no authority to prosecute in that particular case.

The document was then read showing that Mr. Richard Bremridge was the appointed Registrar of the Society under the Act.

Mr. Seldon maintained that there must be special authority in each action.

His Honour said Mr. Bremridge was the Registrar appointed under the Act to sue in the name and by the authority of the Council.

Mr. Seldon asked his Honour to take a note of his objection, which was that general authority did not cover it, and that there must be special authority in each case.

In reply to his Honour, Mr. Flux said there had been a special minute in this case authorizing him to bring the action.

Mr. Harry Moon said he entered the minutes containing the resolution authorizing prosecution in this case, but he had not got the minute book with him. He was not present when it was passed. He wrote it out from the instructions of the Registrar, and he afterwards saw the President's signature to the minutes.

His Honour said they could not give an account of the minute without the production of the minute.

Mr. Flux thought the objection by Mr. Seldon should have been specially pleaded. The minute book was large and bulky.

His Honour said it was a technical objection and he should take it into consideration on the question of costs. He had no doubt there was a minute authorizing the action, but he should not like to decide without seeing it. His Honour decided to go on with the case but not to give judgment until the minute book had been produced.

Mr. Seldon said the point for his Honour to decide was really the construction of the Pharmacy Acts. He referred to the preamble of the Act of 1852, which said, "Whereas it is expedient for the safety of the public that persons exercising the calling of pharmaceutical chemists of Great Britain should possess a competent and practical knowledge of pharmacy and general chemistry." Also, "Whereas it is expedient to prevent ignorant and incompetent persons assuming the title and pretending to be pharmaceutical chemists," and so on. Also, it provided for examinations in botany, Latin, materia medica, general chemistry, and so on, all tending to show that the Act of Parliament was passed really to regulate the qualifications of the chemists and of the persons who were dispensing and mixing poisons which were taken by people for medicine, or for purposes of retailing and dispensing. The Act of 1868 followed that up by reciting that "It is expedient for the safety of the public that persons keeping open shop for the retailing or dispensing poisons should possess a competent practical knowledge of their business." Now that Act hardly applied to the selling of such articles as those, for he would ask what necessity was there for any person to possess any practical knowledge of chemistry, or Latin, or materia medica, to qualify him to sell a drum of weed killer such as that might be?

His Honour said the original section 1 said it was unlawful for any person to keep open a shop, and he supposed Mr. Seldon meant that that must mean a chemist's shop.

Mr. Seldon said that was so, but his argument was this, that this weed killer, containing arsenic as it did, was not a poison within the meaning of the Pharmacy Act.

His Honour: Who is the person to whom that first section applies? It says, "It shall be unlawful for any person to sell or keep open a shop."

Mr. Seldon: Keep open a shop for selling poisons, it means. It is not keeping open a shop alone; and the question was, what was a poison? That weed-killer was not a poison within the meaning of the Act.

His Honour said schedule A said it was a poison within the meaning of the Act; and section 1 said it was unlawful for any person (not confined to druggists) to sell or keep open a shop for the sale of arsenic and its preparations.

Mr. Flux: Any person, unless he is a chemist.

His Honour: Yes.

Mr. Seldon: We say that arsenic used with other things as a compound, as this weed-killer is, is not arsenic within the meaning of this section. The Act of Parliament relates simply to pure and simple poisons and not when used as an ingredient for the purpose of making a compound.

His Honour: Surely the Legislature meant to prevent the sale of it, irrespective of what the purpose was.

Mr. Seldon then pointed out that there was an addition to schedule A, in addition to the poisons. There was this paragraph: "Every compound containing any poison within the meaning of the Pharmacy Act of 1868, when prepared or sold for the destruction of vermin, etc." Now, if the Act applied to anything further than poisons pure and simple, where was the necessity of adding further poisons in that form, because there was no need for that to be added.

This point was argued for some time, after which Mr. Seldon quoted the case of Berry *v.* Henderson, in which Mr. Justice Lush laid down the following dictum:—"I observe that the schedule seems to treat

all poisons as sold in their simple state, or in some form of preparation alone, and it does not appear to contemplate any of them being mixed up with any other ingredients; it applies to them pure and simple."

Mr. Flux said that case went for nothing, as it was under the 17th section, and he was not charging the offence under that section.

His Honour said it was a dictum which he must consider.

Mr. Seldon said the defendants had also had the opinion of Mr. Moulton, Q.C.

By permission of the court Mr. Seldon read from the opinion as follows: "The questions raised in this case are of very great importance, and I must also add of very great difficulty. This difficulty arises from the incautious use of vague and wide terms in preventative Acts of Parliament. The Legislature, instead of making up its mind exactly what extent of protection shall be granted, uses comprehensive terms, and trusts to the good sense of courts not to allow them to be pushed too far. This leads naturally to most unsatisfactory results. Dealing with question one first I am of opinion that the Pharmacy Act was only intended to apply to preparations sold by druggists. The language of clauses 1 and 15 shows that it was intended to restrict the sale by retail of poisons to duly registered pharmaceutical chemists or chemists and druggists. It is impossible that Parliament could have intended that all preparations containing arsenic should be sold only by chemists and druggists, for to say nothing of pigments, it is well known that sheep dipping powder is sold in enormous quantities by persons not carrying on these trades, and such persons cannot be said to do otherwise than retail the article. It would therefore seem that the dictum of Mr. Justice Lush in Berry *v.* Henderson, that the Act only applies to poisons, pure and simple, and not to mixtures containing them, is well founded. But there is the contrary dictum of Mr. Justice Hawkins in the Pharmaceutical Society *v.* Wheeldon, which supports the contrary view. Amid the conflict of authorities, and bearing in mind that the Act so passed nearly a quarter of a century ago has never been held to apply to numerous poisonous compounds containing arsenic sold by other trades than druggists I am of opinion that the court would, if the question were raised, decide that the present case does not come under the provisions of that Act, and that the article is not a poison within the meaning of that same."

Mr. Flux said that if they looked at the *Pharmaceutical Journal*, which contained reports of cases of interest, they would find reports of cases in which penalties had been recovered for sheep-dips.

Mr. Seldon asked how the public were protected by chemists selling that weed killer instead of Mr. Butt.

Mr. Flux said chemists would not have sold it except under the protection provided.

Mr. Seldon proposed to call witnesses, chemists and druggists of Barnstaple, with regard to their practice and the construction of the Act, but his Honour said he could not hear them on the construction of the Act.

His Honour, after a little further discussion, as there was no further argument adduced, said he would give his judgment at the next court.

The Tinned Pea Question.

At Glasgow Sheriff Summary Court, on December 23 last, Alexander M'Kay, fruit merchant, 511, New City Road, was charged, at the instance of Mr. Peter Fyfe, sanitary inspector, with having, on August 5, sold to Inspector Armstrong one tin containing 1 lb. of preserved green peas, which were mixed, coloured, stained, or powdered with ·009 per cent. of copper, which is equivalent to 2·5 grains of sulphate of copper per pound of peas, and so rendered injurious to health. Mr. John Lindsay, writer, prosecuted, and Mr. D. T. Colquhoun, writer, and Mr. Alexander Russell, writer, appeared for the respondent.

Inspector Armstrong, of the sanitary department, gave evidence as to the purchase of the peas.

Dr. Ebenezer Duncan, in the course of a long examination, said he would not expect immediate violent effects in all cases, but in young or delicate persons he would look for irritation of the stomach more or less immediate from taking such peas. Witness then proceeded to give the result of an experiment he made with the view of finding out whether copper in green peas was soluble, and stated that he found it was. Questioned by the Sheriff, he said he could not say that he had ever traced a case of injury to the stomach home to green peas. He was quite certain of this, however, that many of the cases of biliousness which followed a dinner were caused by eating green peas coloured with copper.

Professor Simpson said a tin of peas with 2½ grains of sulphate of copper would be dangerous. If he took a tin of such peas every day—and a whole tin would not be a large dose—he should expect to be poisoned in the course of a longer or shorter time.

On January 7 Sheriff Birnie heard further evidence in this case.

Dr. Littlejohn, examined by Mr. Lindsay, said: I have been medical officer for the City of Edinburgh since 1863, and have taught the subject of toxicology for the last thirty years in the Medical School. Sulphate of copper I regard as a poison. All preparations of copper with food are poisons. The legumen of the peas and the copper form the albuminate, but it is a compound not absolutely insoluble. The juices of the intestines reduce the most insoluble compounds. We give albumen as an antidote in poisoning by copper and mercury, and we get rid of the albuminate as rapidly as possible by emetics. The antidote to copper poisoning is similar to the compound formed by the legumen of the pea and the copper. By dissolution of this compound in the stomach the poison is reabsorbed and the symptoms recommenced in the system. I have no hesitation in saying that the amount of copper in the peas in question in this case, 2·5 grains per lb. of peas, would be likely to be injurious to health. I should expect evil results to follow the continued use of such peas as an article of diet, varying, of course, with the constitution of the individual. Even where simple disorder of the stomach only was produced, that might expose a person to considerable risk, especially from infectious diseases. I myself would not go to remove a case of infectious disease if my stomach was out of order, nor would I allow my inspectors to do so if they were in a similar condition. I have not the slightest doubt that persons partaking of peas coloured with sulphate of copper are liable to have their stomachs deranged, and are more liable to be the victims of infectious disease. That is an extra danger, and I should say an acute danger, where copper is taken in small doses. It is more dangerous to take sulphate of copper in small doses than in large, because in small doses you have not produced the preservative vomiting which you have in large. It is more insiduous in small doses, and more apt to be stored in the system. I regard sulphate of copper as a cumulative poison. All metallic poisons are apt to be stored in the system when taken in small quantities. Even assuming the albuminate not to be soluble it would be indigestible. It would lead, no doubt, to colic and disturbance of the stomach, like any other body which ought not to be there. I regard indigestion as an injury to health which cannot be treated with indifference. I do not think there is any difference at all between the albuminate formed by peas and that formed by pickles or fruit. I regard sulphate of copper as a tonic in the same way as I regard arsenic, in favourable circumstances, as a tonic

or even strychnine if prescribed by a medical man; but I would not give people tonics without their knowledge. I have never experimented with the albuminate to test its solubility, but I have experimented with the very insoluble salts of lead and mercury, and I have no doubt that albuminate of copper will undergo very similar solution under the action of the powerful juices of the intestines. I should say the albuminate of copper is a less firmly formed compound than those of lead and mercury. I cannot say whether pepsine would have the effect of dissolving the albuminate of copper. I am aware that peptonizing powders are used regularly by many people as an aid to digestion, and I believe that these, added to the solvents of the stomach and intestines, would tend to the solution of the compound. While great difficulty has no doubt been experienced in finding any particular case of injury arising from the use of these peas, I believe that the indispositions which are invariably experienced in many cases after public dinners are frequently traceable to this cause. In Edinburgh these peas are not allowed at the medical dinners, possibly owing to the agitation in Glasgow.

Cross-examined by Mr. Colquhoun: How long have you been under the impression that the preservation of peas by sulphate of copper is injurious to health?—From fifteen to twenty years. During that time I have held the responsible position of medical officer of health for the city of Edinburgh. There has not been any prosecution in Edinburgh for selling these peas.

Holding the view just expressed, how do you account for your inaction in Edinburgh?—I find that the sale is not large, they are not an article of food among the poorer classes, and in the solitary analysis made the quantity of copper found was exceedingly small—·3067. That was between 1883 and 1885.

Are you aware that during nine out of the twelve months in the year in Edinburgh and throughout the whole country, nothing but these peas is used in hotels and other large establishments?—I have no reason to doubt it. I do not take these peas myself, and have not done so, except inadvertently, for the last twenty years. I have not tested the combination formed by the sulphate of copper with the legumen of the peas. I am sure it forms a compound. I agree with the statement in Woodman and Tidy's Forensic Medicine, p. 176, that albumen produces an insoluble albuminate of copper, upon which the acid juices of the stomach have little or no action. I have not come across one case of injury to health through eating tinned peas.

Is the solution of this compound possible after it leaves the stomach?—Mr. Kingsett, whom you are quoting, is of no authority as a physiologist; as a chemist he is *facile princeps*.

As a medical man do you say that this compound may be digested after leaving the stomach?—Undoubtedly.

Mr. Kingsett states, "I would say that if a person ate such pease, no harm can possibly result to his health from so doing." You disagree with that?—*In toto*. Messrs. Paul and Kingsett are highly respectable authorities, and on any point in chemistry I would bow to their opinion.

Blyth on Foods is a standard work. At page 188 it says, "the injurious action of coppered peas rests entirely on theory." Do you agree with that?—I do not.

Do you agree that the bulk of this compound is excreted by the fæces?—Yes.

Do you seriously tell us that a person taking a portion of one of these tins, either with 1·4 gr. or 2·5 gr. of copper to the lb. of peas, would be affected in health?—Possibly one out of 100,000 people might.

You say "might;" you do not say he would?—No. Sulphate of copper is a poison. It is an irritant when taken in the form of sulphate.

You do not wish the Court to believe that this combination as partaken of by the consumer of peas is an irritant?—Whatever is indigestible is an irritant. The copper is undoubtedly in a state of combination previous to entering the stomach. The medical profession prescribe sulphate of copper as a tonic and also as a gargle and astringent.

By Mr. Lindsay—If persons used these peas regularly I do not doubt that there would be more frequent cases of complaint.

By the Sheriff: I think there can be no doubt that sulphate of copper in sufficient quantity is a poison. We have two kinds of poisoning—acute and chronic. To cause acute poisoning it must be taken in sufficient quantity. In chronic poisoning we find that its effects are produced by very minute doses. Does that mean that the copper in chronic poisoning must be collected until there is a sufficient quantity, or that the continued irritation has the effect of poisoning?—I think the continued irritation. At the same time it is frequently stored up in one organ—viz., the liver.

Your opinion is that no quantity of copper and in no combination, should be taken by a person as food?—Such is my opinion. I am of opinion that we cannot say positively whether a minute dose will do harm or not, therefore it should not be used.

There is copper found in many natural substances?—I understand there is.

Is there any copper in bread?—I have heard of it. Possibly by the most delicate tests minute quantities may be found in bread; but I have never found it in bread in Edinburgh.

I have here a list in which copper is said to be found in peas, beans, wheat, corn, cocoa, etc. Have you any reason to think that this list is not correct?—I am alarmed to hear that copper exists in bread. It may depend on the soil in which the corn is grown, or from carelessness in manufacture. I do not think there is much division of opinion in the medical profession as to the injurious character of these peas, at least in this country. I am aware that there is a large trade in the peas. I cannot point to any authenticated case of injury from their use. It is true that many substances cause indigestion.

Would you forbid all of then?—Undoubtedly.

Bridescake, for instance?—Bridescake should never be eaten by a man over thirty.

Is it your opinion that under this Act any indigestible substance should be forbidden?—Not under this special Act. I cannot go that length.

Has the quantity used or likely to be used anything to do with your opinion as to whether such things should be used or not?—No; I go on the general principles.

Why should you permit certain substances which cause indigestion and forbid others?—Because we have indigestion from substances which are poisonous and others which are not. If the article is simply indigestible it is not absorbed into the system; but in poisons like arsenic, etc., they are taken up by the system and affect important organs.

But if all indigestion is injurious why should you permit one substanco which causes one sort of indigestion and refuse another which causes a different sort?—Because legislation cannot do everything.

Dr. Clark, one of the Glasgow city analysts, was also examined as to the solubility of the compound.

This closed the case for the prosecution.

For the defence,

Dr. Thomas Richard Fraser, Professor of Materia Medica and Clinical Medicine in Edinburgh University, said—I have held that position since 1877. I was supplied through Mr. Campbell with tins of peas similar to the peas in this case, and have partaken of these peas myself, and have permitted my family to use them. My children's ages range from two-and-a half to 14 years. Neither I nor any of my family have experienced the slightest inconvenience from the use

of these peas. I am aware that peas prepared with sulphate of copper are extensively used in this and other countries in Europe. I have never read or heard of a single case of injury to health arising from the use of these peas. I do not think that the proportion of sulphate of copper in the peas in question—which I understand to be 2·5 grains to the lb. of peas—is dangerous to health. I have chemically tested the peas, and find that a compound is formed by the sulphate of copper and the ligumen of the peas in the preparation. I found that that compound was relatively insoluble, there being practically nothing which is absolutely insoluble. It is so practically insoluble that I consider it inert and harmless—that is, the great bulk of it never enters the system. I do not dispute the fact that sulphate of copper is an irritant, but I say that the consumers of greened peas do not partake of sulphate of copper, and that it does not enter the system in any appreciable quantity.

Cross-examined by Mr. Lindsay.—I only used the peas myself on one occasion. My family had them twice.

You did not anticipate any serious results from the use of the peas?—No, certainly not. I have never heard of any case of injury to health from the use of greened peas, and would not expect to hear of such a thing.

Do you approve of poisons being mixed with foods?—No.

Why do you approve of this?—I am not aware that I have approved of it.

Is sulphate of copper a poison?—Yes, in certain quantities.

What is a poisonous quantity?—Possibly from about 5 to 10 grains.

Cay you fix the amount of sulphate of copper that might be used with impunity?—No, I never tried.

Are there people peculiarly susceptible to poisons?—Yes, in a sense. Persons suffering from stomach disorders might be more susceptible than others.

Do you regard sulphate of copper as a cumulative poison?—Witness: What do you call a cumulative poison.

Suppose you take sulphate of copper mixed with some food in small doses, and continued for several days, would you naturally look for evil results?—No.

I presume you know Professor Simpson, of Glasgow University?—I have that honour.

Well, if I tell you that Professor Simpson said that the continued use of these peas from day to day would lead him to expect poisoning by copper, what would you say to that?—I should only say I would not expect it.

Would you say that the whole of this compound passes through the bowels, and none whatever goes into the system?—No; you could never make a statement of that kind.

Take this tin of peas; suppose that the bulk of these peas, with their small proportion of copper which goes to the liver, suppose these are taken again and again, would that not show it to be cumulative?—No, I think not, because it would pass from the liver again.

Without injury to the liver?—I think so.

I suppose you have heard of people being poisoned by eating vegetables made in copper vessels?—They used to be heard of formerly, but not recently.

Can you tell me the reason why?—How could I tell you the reason?

Suppose I suggest a reason. Is it because iron vessels or vessels coated with tin are used now?—I do not know. It does not frequently occur. The form in which copper is combined also materially influences the maximum dose capable of being taken with impunity. I consider the combination in peas the least active.

Do you draw a distinction between the albuminate in pickles or fruit and the albuminate in peas?—There is no resemblance. They have nothing to do with each other at all. There is almost no albumen in such vegetables as generally occur in pickles, while there is a very large percentage in peas. There is almost none in fruits such as apples, pears, etc.

By Mr. Colquhoun: I have read Maestre's report, and I generally concur with the opinions therein.

Dr. John Dougall, Professor of Materia Medica and Clinical Medicine in St. Mungo's College, and Examiner in Chemistry for the Faculty of Physicians, Glasgow, and Royal College of Surgeons and Royal College of Physicians, Edinburgh, and Dr. John Glaister, Professor of Medical Jurisprudence and Lecturer on Public Health, St. Mungo's College, were examined, and gave corroborative evidence.

Mr. Colquhoun intimated that he had also in attendance Dr. John Barlow, Professor of Physiology in St. Mungo's College; Mr. Archibald Sloan, Dr. Angus M'Phee, Dr. Milne, and Dr. George M'Intyre, all of whom were held as concurring with the previous witness.

This closed the evidence.

The Sheriff, in giving judgment, said:—I recently gave a detailed opinion upon this precise point, and I may not be entitled to refer to that case as in any way bearing on the present case, because each must be looked at according to its own evidence, but that relieves me from giving any detailed opinion to-day. I expected in this case that I would have had evidence on the two points obviously desiderated—first, of practical injury from eating these peas, and, second, of the difference between 1·4 and 2·5. I have had none, and the facts remain precisely as in that case. The opinions of the most eminent men, both in their writings and as given orally, are diverse to the utmost extent. I do not for a moment say that actual injury in every case must be necessarily proved to bring it within this Act, but where the opinions are so obviously diverse as here of the best authorities it seems to me impossible to hold that it is proved that these peas have been rendered injurious to health. I think the proof lies on Mr. Lindsay, and that, until he can prove that, he cannot ask the verdict which he craves in this case. I therefore assoilzie the respondent. I am sorry I cannot give expenses, but I would have given them if I had had power.—*Glasgow Herald.*

ANSWERS TO CORRESPONDENTS.

W. H. Mortimer.—Your advertisement should have been sent to the publishers, 11, New Burlington Street.

Evans, Gadd and Co.—There is a copious index to each volume. There has not been a general index published since 1880.

NOTICES OF MEETINGS.

Chemists' Assistants' Association.—Thursday, January 21.—Short papers by members.

Chemical Society.—Thursday, January 21, at 8 p.m.—Papers to be read: "The Estimation of Oxygen in Water," by M. A. Adams; "A Pure Fermentation of Manitol and Dulcitol," by P. F. Frankland and W. Frew; "The Luminosity of Coal-gas Flames," by V. B. Lewes; "The Magnetic Rotation of Dissolved Salts," by W. Ostwald; "On the Dissociation of Liquid Nitrogen Peroxide," by W. Ostwald.

Newcastle-on-Tyne Chemists' Assistants' and Apprentices' Association.—The next meeting will be held on Wednesday evening, January 20, at 8.15, in Lockhart's Café, St. Nicholas Square, when Mr. H. Pattinson will deliver a paper on "Low Forms of Plant and Animal Life," with microscopic illustrations.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. J. Moore, E. H. Farr, A. Kinninmont, Macfarlan and Co., E. Merck, A. W. Bennett, A. H. Mason, J. C. Stead, C. Turner, Clarke, Bleasdale, Bell and Co.

EARLY BOTANY AND MATERIA MEDICA IN ENGLAND.

THE ERA OF GERARD'S HERBAL, 1597–1640.

(*Continued from page* 510.)

The next English herbal to that of Turner, published by Gerard Dewes in 1578, "At the signe of the Swanne in Pawles Churchyard," is a black letter folio, whose title page, adorned after the fashion of the time with figures of Apollo, Æsculapius, Arthemisia, Lysimachus, Mithridates, Gentius and the garden of the Hesperides, bears the following inscription :—

"A NIEWE HERBALL, or HISTORIE OF PLANTES. Wherin is contayned the whole discourse and perfect description of all sortes of Herbes and Plantes : their divers and sundry Kindes : their straunge Figures, Fashions, and Shapes : their Names, Natures, Operations and Vertues : and that not onely of those whiche are here growing in this our Countrie of Englande, but of all others also of forayne Realmes, commonly used in Physicke.

First set foorth in the Doutche or Almaigne tongue by that learned D. *Rembert* Dodoens, Physition to the Emperour, and nowe first translated out of Frenche into Englishe by *Henry* LYTE, *Escuyer*."

Of Lyte himself but little need be said. His French original—a translation of Dodoens by C. De L'Ecluse, bearing the date, 1557, and preserved in the British Museum—has copious M.S. notes in Lyte's handwriting, which show that he was well versed in contemporary botany; but he was not an original writer, and the service he rendered to English botany is that recorded on the title page of De L'Ecluse's Dodoens : "Henry Lyte taught me to speake Englishe." His object is a professedly benevolent one : that "even the meanest" of his countrymen ("whose skill is not so profounde that they can fetche this knowledge out of strange tongues, nor their habilitie so wealthy as to entertain a learned physition) may yet in time of their necessitie, have some helpes in their owne or their neighboures fieldes and gardens at home."

The high price of Lyte's herbal led in 1606 to the publication of a quaint quarto, "RAM'S LITTLE DODOEN : A briefe Epitome of the new Herbal, or Historie of Plants, lately translated into English by Henry Lyte Esquire, and now collected and abridged by William Ram, Gent."

"Where the great booke at large is not to be had, but at a great price which cannot be procured by the poorer sort," says the preface "my endevor hath bin chiefly, to make the benefit of so good, necessary and profitable a worke to be brought within the reach and compasse as well of you, my poor countrymen and women, whose lives, healths, ease and welfare are to be regarded with the rest, at a smaller price than the greater volume is."

As we shall see, Gerard's 'Herbal,' which for more than half a century was the standard textbook of botany in England and is still often quoted, was based on the "Pemptades" of Dodoens and contained copious extracts from De l'Ecluse and De L'Obel. Some mention of these authors therefore seems desirable.

Dodoens, physician to the Emperors Maximilian and Rodolph II., and subsequently Professor at Leyden, in the year 1589 collected all his botanical writings into one volume under the title of "Stirpium Historiæ Pemptades Sex," a book which in the original and translations met with general acceptance.

De L'Ecluse, "who," Pulteney says, "added more to the stock of botany in his day than all his contemporaries united," published his "Rariorum Plantarum Historia," in 1576. His descriptions are commended by Sachs for their fulness of detail and their attention to the structure of the flowers. He collected and described the plants of Germany, Hungary and Spain.

De L'Obel, physician to William of Orange and the States of Holland, during part of his life was superintendent of Lord Zouch's physic garden at Hackney, and was appointed botanist to King James I. His "Adversaria," which appeared in 1570, was dedicated to Elizabeth. In this work the plants are thrown into forty-four tribes, according to the external appearance or habit of the whole plant or flower, and at the head of each tribe is prefixed a synoptical view of all the species to be described under it. He gives the Greek and Latin, German, Dutch, French and English name, then a description of the plant, its time of flowering, the country indigenous to it, and in the case of the rarer English species the particular spot where it may be found. De l'Obel discovered new plants in several parts of England and added a number of new species to the grasses. In 1576 he incorporated with the "Adversaria" his "Observationes," "which still more than his 'Adversaria' attest his efforts to arrange plants according to their resemblance in form." He died in England in 1616.

John Gerard, a surgeon and for more than twenty years superintendent of Lord Burleigh's garden, had a large physic garden of his own in Holborn, of which frequent mention is made in the botanical literature of the time. His first publication was the list of the plants grown by him under the title of "Catalogus Arborum Fruticum, ac Plantarum, tam indigenarum quam exoticarum, in horto Johannis Gerardi, civis ac chirurgi Londinensis nascentium. Impensis J. Norton. 1596." A modern edition of this interesting little work, edited by B. D. Jackson, was privately printed in 1876.

Concerning Gerard's own part in the "Herbal, or General History of Plants," published in folio in 1597, quite a brisk controversy was waged.

Gerard's account of the matter is contained in his Dedicatory Epistle and Introduction to the Herbal. "To the large and singular furniture of this noble Iland," he says, "I have added from forren places all the varieties of herbes and flowers that I might anyway obtaine. I have laboured with the soile to make it fit for the plants, and with the plants to make them to delight in the soile, that so they might live and prosper under our climate, as in their native and proper countrie. What my successe hath beene and what my furniture is, I leave to the report of them that have seene your Lordship's gardens and the little plot of my special care and husbandrie. But because gardens are private, and many times finding an ignorant or a negligent successor come soone to ruine, there be that have sollicited me first by my pen, and after by tho Presse, to make my labours common, and to free them from the danger where-

unto a garden is subject: wherein when I was overcome, and had brought this historie, or report of the nature of plants, to a just volume and had made it, as the reader may by comparison see, richer than former herbals, I found no question to whom I might dedicate my labours. . . . I have heere set downe not onely the names of sundrie plants, but also their natures, their proportions and properties, their affects and effects, their increase and decrease, their flourishing and fading, their distinct varieties and severall qualities, as well of those which our own country yieldeth as of others which I have fetched further, or drawen out by perusing divers Herbals set foorth in other languages, wherein none of our countrie men hath to my knowledge taken any pains since that excellent worke of Master Doctor Turner ; after which time Master Lyte, a worshipful gentleman, translated Dodoens out of French into English ; and since that Dr. Priest, one of our London Colledge, hath (as I heard) translated the last edition of Dodoens, which meant to publish the same ; but being prevented by death, his translation likewise perished ; lastly my selfe, one of the least among many, have presumed to set foorth unto the view of the world the first fruits of these mine owne labours."

Johnson, "the best herbalist of his age in England," gave quite another account of the matter, when in 1688 he enlarged and amended Gerard's herbal. Dr. Priest, it appears, had been engaged by Norton to make a translation of Dodoen's "Pemptades," and at his death his manuscript came into Gerard's hands. Following De'Lobel, Johnson says: "This translation became the ground-worke whereupon Mr. Gerard built up this worke ; but that it might not appeare a translation he changes the generall method of Dodoens into that of Lobel, and therein almost all over follows his Icones both in method and names, as you may plainly see in the Grasses and Orchids. To this translation he also added some plants out of Clusius and other some out of the *Adversaria* and some fourteene of his owne not before mentioned. . . . Divers chapters have scarce a word more or less than what is in him (Dodoens). I cannot commend my author for endeavouring to hide these things from us."

Gerard seems undoubtedly to have been disingenuous in the matter. We learn from De l'Obel that when the first book of the herbal was in the press, "a curious searcher of simples," Garet, an apothecary, pointed out some gross errors in the text to Norton, who thereupon engaged De l'Obel to superintend the work, which he corrected "in a thousand places."

Gerard's want of learning is severely commented on also by Johnson. He accuses him of frequent mistranslations and of not being able to distinguish between "the antient and moderne writers," and also of having made many mistakes in arranging and referring to the figures of the herbal which were taken from Tabernæmontanus.

But Gerard undoubtedly stood high in the estimation of his contemporaries. De l'Obel, before the publication of the herbal, styled him "chirurgus et botanicus peroptimus," the Queen's surgeon, Baker, and "St. Bridwell, Phisition," give him unstinted praise. "Master Gerard," says Baker, "hath taken more paines than ever Mathiolus did in his commentaries, and hath corrected a number of faults that he passed over, and I dare affirme that Gerard doth knowe a great number of simples that were not knowen in his day. Upon his proper cost and charges, he hath had out of all parts of the world all the rare simples which by any meanes he could attaine unto, not onely to have them brought, but hath procured by his excellent knowledge to have them growing in his garden, which as the time of the yeere doth serve, may be seen; for there shall you see all manner of strange trees, herbes, rootes, plants, flowers and other such rare things, that it would make a man wonder how one of his degree, not having the purse of a number, could ever accomplish the same. I protest upon my conscience, I do not think for the knowledge of plants that he is inferior to any, for I saw him tried with one of the best strangers that ever came into England, and was accounted in Paris the only man ; and he, being here, was desirous of going abroad with some of our herbalists, for the which I was the mean to bring them together, and one whole day we spent therein, searching the rarest simples; but when it came to the trial, my Frenchman did not know one to his four." This Frenchman seems to have been M. Robin, herbarist to the king of France, whose knowledge of plants is commended in the herbal.

St. Bridwell also supports Gerard's claim to originality. "Many things," he says, "hath he nourished in his garden and observed in our English fieldes that never came in their, (former writers), pens to write of. Againe, the greatest number of these plants, having never beene written of in the English toong, would have wanted names for the vulgar sort to call them by, in which defect he hath beene curiously careful, touching both old and new names to make supplie, and lest the reader should too often languish with frustrate desire, to finde some plant he readeth of rare vertue, he spareth not to tell, if himselfe have seene it in England, in what wood, pasture or ditch the same may be seen and gathered."

Gerard's herbal treats of the whole vegetable kingdom in three books. "In three bookes as in three gardens, all our plants are bestowed." The first contains the grasses, grain, rushes, reeds, flags, and bulbous-rooted plants ; the second, herbs used in diet, physic, or for ornament and pleasure ; the third, trees, shrubs, fruit-bearing plants, rosins, gums, roses, heaths, mosses, mushrooms, and sea plants. "Each booke hath chapters as for each herbe a bed." In these the several species are described with their place and time of flowering, names and virtues.

"Mosses, mushrooms, and sea plants" form a sufficiently artless classification of the cryptogamia. Nor, when one considers what a little was known about these forms of life at so comparatively recent a date as the beginning of the present century, is one astonished at the inclusion of sponges and "corrall" among sea plants. "There be divers sorts of mosse growing as well within the bowels of the sea as upon the rocks," says Gerard of the Algæ. Interesting, too, to the curious is the realistic sketch, exactly coloured, of "*Muscus ex cranio humano, Moss von Todten Kopf*, mosse growing upon the skull of a man," and the division of fungi into "*Fungi Vulgatissimi Esculenti*, common

mushrooms to be eaten," and "*Fungi Lethales*, poisonous or deadly mushrooms."

Johnson, whose judicious editing "established the character of Gerard's herbal and gave it precedence as a popular book for more than a centuay," was a member of the Company of Apothecaries and kept an apothecary's shop on Snow Hill. For his botanical learning, the University of Oxford in 1648 conferred upon him the degree of Doctor of Physic.

Johnson's edition of Gerard's herbal, published in 1688, contains eight hundred plants not in the original work, and more than seven hundred additional figures. To it is prefixed a careful account of the labours of earlier botanists.

Johnson was one of the first botanists who investigated the flora of Wales. In the course of a tour in that country undertaken by him in 1641 he first found the yellow poppy, *Papaver cambricum;* the mountain saw-wort, *Serratula alpina*, and other plants. He had undertaken similar tours in Kent (1629) and the south and west of England (1634), both of which had resulted in the enrichment of the English flora.

Of him, as of Turner, it might be said, "He was a man of good judgment and learning, and well performed what he tooke in hand."

THE VALUE OF THE UNOFFICIAL PARTS OF IPECACUANHA.

BY DAVID HOOPER,
Government Quinologist.

About two years ago Professor Flückiger of Strassburg, informed me in a letter that he had ascertained that the seeds of Ipecacuanha were devoid of alkaloid. He also suggested that the leaves, if procurable, should be examined for alkaloid. At that time the only materials available for such an investigation were some very young plants growing in the Teak plantations at Nilambur in the Malabar district, and the leaves were being used for propagating purposes, as it was shown by Lindsay some years ago that a leaf in suitable soil is capable of producing roots and buds. The Ipecacuanha plants at Nilambur are making satisfactory progress considering the slowness of their growth. They have a good soil of sandy loam with organic matter, and they have sufficient moisture and shade; the root growth is more vigorous than that of the stem, and thousands of plants will soon be ready for supplying the root to the local Medical Store department.

Last month I was able to obtain six plants of two and a half years of age for examination. The roots were plump and dark coloured, the annulations were well-formed, and the length of the longer roots was eight inches. The stems were woody and wiry, decumbent, as long as the roots, greyish in colour, knotted and marked with leaf scars on the upper part, very slightly branched, quadrangular and smooth. The leaves were few and rather crowded at the upper part of the stem, opposite, shortly stalked, stipules large, united at the base, where are several ovoid glands, persistent, adpressed to the stem, whitish (pink on young plants), about as long as the petiole, deeply cut into four subulate laciniæ, blade 2–4 inches long or more, oval, pointed at the apex, entire, wavy on the margin, thick, with a few hairs on the edge, dark green, glossy, and nearly smooth above, paler, somewhat pubescent and with prominent veins beneath.*

The description of the plants from Nilambur agrees with the description of the cultivated variety of *Cephaëlis Ipecacuanha*, defined by the late Professor Balfour ('Pharmacographia,' 2nd ed., p. 370). The six plants when dried in the sun afforded :—

Root	21 grams.
Stem	8 „
Leaves	4·8 „

These were reduced to fine powder, and a sample of each was examined separately, according to the same process. The powder was exhausted with warm alcohol, the percolate evaporated to dryness on a water bath, water added to the dried extract and acidulated with diluted sulphuric acid. After filtering and washing with water the clear liquor was treated with some freshly prepared Mayer's solution, 1 c.c. of which corresponds with 0·0189 gram of emetine, until a precipitate ceased to be formed. The results of this analysis were as follows :—

Root contained	1·79	per cent.	of	alkaloid.
Stems „	1·13	„	„	„
Leaves „	1·45	„	„	„

The alkaloid was examined qualitatively; that separated from the stems and leaves had the same appearance and characters as that from the root, and it was doubtless emetine. Herbaceous plants, containing an alkaloid, almost invariably yield the same alkaloid in different parts of the plant, but in trees and shrubs different alkaloids often occupy different portions of the same plant. It is of interest to know that the leaves and stems of the true ipecacuanha contain a good proportion of emetine, but they are not likely to displace the root from its position in the Pharmacopœias and in commerce.

AGRICULTURAL INDUSTRIES OF MEXICO.†

Mexico has been estimated to contain 479 square leagues of forests, 18,134 square leagues of mountain land, and 4822 square leagues of uncultivated land. Extending through seventeen degrees of latitude, eight and a half of which are in the torrid zone and an equal number in the north temperate zone; and, owing to its physical formation, Mexico has three well-defined climates—hot on the coasts, temperate in the regions lying at an elevatlon of between 3000 and 6000 feet above the sea, and colder in those regions lying at a higher elevation. A recent bulletin, issued by the Bureau of the American Republic, says that the vegetable products of Mexico are varied in the extreme, owing to the diversified climate. Its productiveness is perhaps unsurpassed by any other country in the world. The soil produces all the cereals and all the fruits of Europe and the United States. Among the cereals the most abundant is Indian corn, which grows almost everywhere in the country. This is eminently a Mexican staple, serving as nutriment for man and

* The description of the leaves is after that in 'Medicinal Plants.' The figures of the leaves and root in that work are rather imperfect.

† From the *Journal of the Society of Arts*, January 1.

beast, and forming food for the majority of inhabitants in the form of cakes, called *tortillas*. What are known as the hot lands (*tierra caliente*), which lie between the coast and the foothills to the Cordilleras, produce the most exuberant vegetation. Excellent grazing lands abound, studded with groups of trees, among which the trumpet-flower tree, and the turpentine, or mastic tree, predominate. Here, also, are found great quantities of gigantic bamboos, known by the name of *tarros*. Nearer the foothills lie immense forests of valuable hard woods, such as mahogany, ebony, rosewood, iron wood, etc. These forests also furnish Campeche and Brazil wood, the rubber tree and many trees of medicinal value. Hundreds of varieties of plants, herbs, roots, etc., useful in medicine and in the industries, grow in great profusion. There are also, in many parts of the country, a great many kinds of mosses and lichens furnishing excellent dyes, among which the principal is the orchil, which grows in Lower California, and has for many years been an article of large exportation, the Mexican Government deriving large profits therefrom, as there is an export duty of ten dollars a ton. The vanilla plant grows wild in these lands, and sugar-cane is cultivated extensively in the States of Morelos, Vera Cruz, Mexico, Jalisco, Oaxaca, Tabasco, Campeche, Guerrero and Chiapas. Coffee is grown principally in the States of Chiapas, Vera Cruz, Morelas, Oaxaca, Michoacan and Colima, and the annual crop is valued at four million dollars. The coffee of Uruapam (Michoacan) is celebrated. Tobacco is a great product of the States of Vera Cruz, Tabasco, Campeche, Yucatan, Oaxaca, Chiapas and Jalisco. The tobacco crop averages a value of two and a half million dollars. The great cotton-producing region of Mexico is the district of Laguna, in the State of Coahiula, which furnishes over 40,000 bales per annum. Besides this State, cotton grow in Sonora, Chihuahua, Guerrero, and Chiapas, and in several others. The annual crop is valued at nearly eleven million dollars. The cocoa been is mostly cultivated in Tabasco and Chiapas. The best is grown at Soconusco. Chocolate sells at Soconusco for twenty cents a pound, and an excellent opportunity is said to be offered for the cultivation of the cocoa tree on a large and systematic scale. Soconusco is also the natural home of the rubber tree, but the natives foolishly chopped down and destroyed great numbers of these trees, and thereby retarded what would have become a great industry. A rubber tree once fairly started requires little or no care, and will produce the milk abundantly in from six to eight years from planting. In 1889 the Department of Public Works entered into a contract with three Mexican gentlemen to plant 15,000,000 rubber trees in the State of Oaxaca near the shores of the Pacific. The planting was to begin within eight months from the date of the contract and be finished within fifteen years, 300,000 trees to be planted the first year, and 1,000,000 each subsequent year of the term mentioned. A subsidy of three cents. per tree was guaranteed by the Government, and exemption from duties on all necessary materials, tools, etc. The hot lands also yield sarsaparilla, jalap, rice, arrowroot, beans, indigo, and many other products. This region is especially rich in fruit-bearing trees, principally among which may be enumerated the orange, lemon, citron, tamarind, guava, plum, plantain, nut, and banana trees and date palms. Pineapples and melons and many other tropical fruits grow wild. The banana and the orange grow spontaneously in great abundance near the Mexican coasts. The cultivation of the orange is very profitable. One man can cultivate with his own hands from seven to nine acres of orange trees. One tree in the tropic belt of Mexico will yield as many as 5,000 oranges. Sonora is a great orange-raising district, fruit coming from the vicinity of Hermosillo in that State being highly appreciated. The colder regions of Mexico produce corn, wheat, barley, and other cereals, and the maguey or agave, from which the national drink, *pulque*, is extracted. This plant is a native of Mexico, but it is found growing in the United States, although not in any great abundance. The maguey grows on the great plains, the plateaux, at an elevation of more than 7,000 feet above the sea. It is said that as far back as 1519 the native Mexicans cultivated the maguey, of which they made many uses. A great variety of products are obtained from the roots, leaves, and juice. Paper is made from the pulp of the leaves, twine, and thread from their fibre, and needles from the sharp tips of their leaves. These leaves also serve as thatching for the houses of the poor. The rare and valuable Mexican manuscripts in ancient times were made of pulp from the maguey, which resembled the papyrus. Pulque is the fermented juice of the maguey. It has been stated that in the city of Mexico over 250,000 pints of pulque are daily consumed, and in 1888 there were 822 shops in that city devoted exclusively to its sale. Mexico is becoming a wheat-growing country, and great impetus has recently been given to growing this grain. Wheat grows on the plateaux of Mexico from 6000 to 9000 feet above sea level. The area best adapted for its cultivation comprises 52,000 square miles, and is situated in the States of Mechoacan, Jalisco Guanaguato, Aguascalientes, San Luis Potosi, and Queretaro. The Mexican plan of cultivation makes it possible to take off the land three crops every two years—one crop of wheat, and two crops of Indian corn. Fibre plants grow in great profusion over nearly every portion of the territory of the Republic Principal among them are the agave, already mentioned, the banana tree, ramie, henequen, several kinds of cacti, among which figures the organ cactus and a species of cactus growing abundantly in the territory of Lower California, which is called *cirio*, and from which a good quality of paper is manufactured. The mulberry tree is found in many localities, and experiments lately made in the States of Vera Cruz, Puebla, Daxaca and Michoacan in the way of cultivating the silkworm, has produced good results. As regards the methods of cultivation in vogue in Mexico, they differ but little from those employed by the ancient Egyptians. Wooden beam ploughs with a small iron shoe are used. These make a furrow 5 inches broad by 5 deep. A hoe is also used, which often weighs from 3 to 5 pounds. With the exception of a few districts, all threshing of grain in Mexico is done by driving horses or mules around in a ring upon the straw, which is on the ground. The winnowing is done by men tossing the grain and chaff into the air with shovels.

SYNTHETICAL CARBOLIC ACID.*

BY H. W. JAYNE.

It has been known for some years that carbolic acid could be produced by numerous synthetical methods, but interest in the subject has been especially manifested recently on account of several firms, in response to the constant demand for purer preparations, having undertaken its manufacture on a commercial scale. Of the many reactions by which phenol can be produced, only two are, at present, commercially practical; both using pure benzol as the starting point.

The first or sulphonate method is applicable to the preparation of all phenols, and has been used for some years, producing on an immense scale naphthol, the

* Read at the Pharmaceutical Meeting of the Philadelphia College of Pharmacy, November 17. Reprinted from the *American Journal of Pharmacy*, December.

phenol of naphthalin. In this method pure benzol, free from thiophene, is placed with about five times its weight of strongest commercial sulphuric acid (67° B.) in closed cast-iron pots, provided with stirrers and lead coolers and capable of being heated by a steam jacket. While the mixture is slowly stirred, the vessel is gently heated with steam in such a manner that the vapours of benzol which pass into the cooler are continually returned to the kettle. After a number of hours the reaction is finished, and the benzol not acted on, is collected as it flows from the cooler. The crude benzol-sulphonic acid, mixed with the excess of sulphuric acid used, is allowed to cool and then diluted with water in a lead-lined tank. Slaked lime is added to the hot solution in sufficient quantity until it is faintly alkaline. This removes the excess of acid by forming calcium sulphate, which is then filtered off by means of a filter press. The clear liquor containing calcium benzolsulphonate is treated with sufficient sodium carbonate to precipitate all the calcium as carbonate, which is removed by filtration, and the liquor is now evaporated to dryness, leaving the sodium benzolsulphonate as a white powder.

In a large cast-iron kettle, heated by a coal fire, caustic soda is melted, and small portions of the dry sodium salt, prepared as above, are gradually added, and finally the whole is kept in quiet fusion for some time. The melt now contains sodium carbolate and sulphite, together with the large excess of caustic soda used—

$$C_6H_5 - SO_3Na + 2\,NaOH = C_6H_5ONa + Na_2SO_3 + H_2O$$

It is ladled from the kettle into pans and allowed to cool, broken up, dissolved in water and acidified with sulphuric or hydrochloric acid. The phenol thus liberated separates from the concentrated salt solution, and can be collected and distilled.

In melting the sodium benzolsulphonate with caustic soda it is necessary, in order to obtain a good yield, to use a very large excess of the latter. A greater yield is obtained with caustic potash, and if as large a quantity as six parts are used to one of the soda or potash salt a nearly theoretical yield can be obtained, but as this would greatly increase the cost, caustic soda is used instead.

It has been proposed to treat the melt after dissolving in water with carbonic acid gas, which would liberate the phenol equally well as a stronger acid, and in addition would form carbonate of soda or potash, which together with the sulphite already present could be converted into the hydrate by treating with lime, concentrated, and used for a second operation. It does not appear, however, that this has been carried out in practice.

The second method is much simpler. A pure aniline oil, preferably that grade called aniline for blue, is dissolved in water in a lead-lined tank covered with a hood, and provided with stirrers and leaden steam coils. The solution is acidulated very strongly with sulphuric acid, and to the hot liquid a solution of commercial nitrite of soda is gradually added, phenol being at once formed.

In this reaction the sodium nitrite, in contact with the acid solution, liberates nitrous acid, which forms diazobenzol sulphate with the aniline sulphate—

$$(C_6H_5NH_2)_2H_2SO_4 + 2\,HNO_2 = (C_6H_5N = N)_2SO_4 + 4\,H_2O$$

but as the solution is hot it at once decomposes into phenol with evolution of nitrogen—

$$(C_6H_5N=N)_2SO_4+2H_2O=2C_6H_5OH+H_2SO_4+4N$$

Neither of these synthetical methods can, at the present time, compete in price with the extraction of carbolic acid directly from the coal tar oils.

A good grade of crystal acid can be purchased abroad in large quantities at this time at about eleven cents per pound, while the pure benzol used in the first method is worth at the English refineries about fourteen cents per pound, and aniline oil about twenty cents, without taking into consideration the other expensive chemicals necessary to carry out the reaction.

When the synthetical acid was first placed upon the market it excited much interest, and purchasers were willing to pay the high price it commanded, believing that they were getting a much purer article than could be produced by the ordinary methods. This interest has, however, considerably abated since the acid has been found to redden just as easily as the best commercial grades.

It could scarcely be expected that an acid obtained by either of the complex reactions just described would not be contaminated by products formed by side reactions in the process. In its preparation by the sulphonate method, sulphur compounds (thiophenols, etc.) are likely to be formed; and its manufacture from a substance like aniline, which so readily produces colouring matters, could scarcely be carried out without at the same time forming bodies which at once, or later under the influence of light and air would discolour it.

In addition, commercially pure benzol or aniline oil always contain small quantities of, respectively, toluol or toluidine. These bodies being submitted to the same treatment as their homologues give cresylic acid. It is true that this acid would be present only in minute quantities, but sufficient to reduce the melting point of the resulting carbolic acid.

Lunge has shown that the addition of 1·3 per cent. of cresylic acid to pure phenol reduces the melting point 8° to 32½°, and in the preparation of a high grade carbolic acid a difference of a part of a degree is of great importance.

Forty degrees acid is at present a commercial article sold at excessively low prices, and if a small part of the attention and labour which is used in producing a synthetical acid was expended in the further purification of this 40° acid, without doubt just as good if not a purer article could be produced direct from tar oils and at a very much lower cost.—Laboratory of the H. W. Jayne Chemical Company, November 14, 1891.

THE PRODUCTION OF OIL OF BIRCH.*

BY WILLIAM H. BREISCH, PH.G.

The oil of birch was first distilled in Luzerne County, Pa., about the summer of 1865, shortly after that of oil of wintergreen, and now the manufacture of oil of wintergreen is almost entirely superseded by that of the former, owing to the difficulty experienced in procuring pickers of the wintergreen leaf. There are, within an area of six or eight miles, not less than five or six distilleries which produce annually between three and five thousand pounds of the oil. After being distilled, it is either brought to White Haven, the nearest shipping point, and sent to New York parties; or else it is sold to the merchants of the town and sent by them to New York.

The manufacture is quite a simple one.

The wood gathered for the purpose is the black birch saplings; another variety, the white birch, not being used, owing to its very small yield of the oil. The saplings are gathered principally in the summer months, the yield being the greatest at that time; but they are also gathered in the winter. The birch is cut into small pieces, varying from two to four or five

* From an Inaugural Essay presented to the Philadelphia College of Pharmacy. Reprinted from the *Amer. Journ. Pharm.*, December.

inches in length, by a very ingenious device of home manufacture, which consists of one or more knives fastened to the end of the shaft, while the other end is connected with a large wheel, and by means of a belt fastened to a water wheel. The birch is pushed under the knives, by hand, through a box or trough similar to that of a hay cutter, and when cut it is ready for the still.

The still is box-shaped, about eight feet long, four feet wide, and four feet high, with a copper bottom, and stayed with bolts. The head of the still is made of copper and connects with a circular worm made of copper or sometimes of tin, placed in a barrel which is filled with water, with a continuous stream of water flowing through it by which the vapours that come over are condensed. The still is filled with the birch wood to within about twelve inches of the top, and a sufficient quantity of water is then added to cover the wood. This is allowed to macerate from eight to twelve hours. The fire is then started and the distillation commences and continues for about eight or sometimes ten hours; but during the first two hours 90 per cent. of the oil has passed over.

For collecting the distillate a common fruit jar is generally used, fitted with a cork having two holes; a small funnel is put into one of the holes, so that the beak of the funnel is about two inches below the bottom of the cork, and connected with the other hole is a suitable pipe forming an outlet.

The distillate passes through the funnel into the receiving vessel, where the water and oil separate, the oil going to the bottom being heavier; and the water being lighter and in excess, passes through the pipe into a larger receiver, where it is reserved for the maceration of the next quantity of birch to be distilled. This is repeated a number of times before fresh water is used.

The yield, which is about 1 per cent., is most abundant during the months of July and August.

On taking a sample of the oil from the receiver only a short time after the separation of the water, I found the specific gravity to be 1·17; another sample from the same distillate, which was allowed to stand between forty-eight and sixty hours, so as to get more thoroughly separated, had the specific gravity 1·18, which I think conclusively proves that the lower specific gravity of pure oil of birch is due to water imperfectly separated.

The colour of oil of birch when first distilled is very light or almost colourless, but on standing a while becomes very much darker. Occasionally, the oil is found to be highly coloured, due to traces of iron from the oxidation of the tin worm or the can with which the oil comes in contact.

There are three ways of clearing the oil: by decolorization, filtration, and redistillation. The easiest method is decolorization, by putting the oil in a bottle, adding a few crystals of citric acid and agitating occasionally, until the oil is colourless, or nearly so.

THE ACTION OF AZOIMIDE ON LIVING ORGANISMS.

BY O. LOEW.

Experiments were made to test the action of azoimide (N_3H) on living plants and animals. Sodium azoimide was found to be a powerful poison in all cases; seedlings died in about three days if attempts were made to grow them in a nutritive fluid containing 0·1 per cent. of the poison. Algæ were not affected so readily, but did not grow. Bacteria were killed, and thus the material in question acts as an antiseptic. Experiments with yeast, penicillium, and other fungi were entirely confirmatory of the above. To animal life, as tested on infusiorians, various invertebrates and mammals (mice and rabbits) this substance is equally inimical. There is, first, loss of movement, preceded in mammals by muscular twitchings and finally death.

The imide is thus not available as a nitrogenous food; and the cause of its toxicity is considered to be its sudden decomposition when it comes into relation with the cells and the aldehyde containing radicles of proteid within them. This, occurring within the nerve cells, produce first, stimulation, hence the spasmodic movements, and then kills them. Probably the decomposition that occurs may be represented thus:— $N_3H+H_2O=N_2O+NH_3$. It certainly yields ammonia when acted on by platinum black.—*Journ. Chem. Soc.*

THE BOARD OF TRADE ON THE TRANSMISSION OF POISONS BY SEA.

Marking and Packing of Poisons.—Notice to Ship-owners, Ship-masters, and others.

The attention of the Board of Trade has been called to a case in which serious danger to human life was caused by the shipment, for transmission abroad, of a package of arsenic, without any label to show the poisonous character of its contents. This package was subsequently broken, and the contents became mixed with a quantity of articles used for human food, also forming part of the vessel's cargo.

The Board desire to call the special attention of ship-owners, ship-masters, and all others concerned in the shipment of poisons, to the provisions of section 17 of the Sale of Poisons and Pharmacy Act, 1868, which require that every package containing any of the following poisons:—

Arsenic and its preparations.
Prussic acid.
Cyanides of potassium and all metallic cyanides.
Strychnine and all poisonous vegetable alkaloids and their salts.
Aconite and its preparations.
Emetic tartar.
Corrosive sublimate.
Cantharides.
Savin and its oil.
Ergot of Rye and its preparations.
Oxalic acid.
Chloroform.
Belladonna and its preparations.
Essential oil of almonds, unless deprived of its prussic acid.
Opium and all preparations of opium or of poppies; when sold for export,

is to bear the name of the article and the word "poison," and any person infringing the provisions of the Act in this respect is subject to the penalty of £5 (five pounds) for each offence.

The Board further desire to call attention to the great importance of taking the utmost precautions in the package and stowing of poisons of all kinds on board ship, so as to reduce to the minimum the risk of breakage, leakage, or contamination in any way of the adjoining cargo.

This notice should be freely circulated among the shippers and exporters of poisons.

GEORGE J. SWANSTON,
Assistant Secretary, Marine Department
Board of Trade, January, 1892.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, JANUARY 23, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE REGISTER AND CALENDAR.

THE publication of the Register of chemists and druggists and of the Calendar of the Pharmaceutical Society of Great Britain, which usually takes place at this time of the year, should be matter of special interest for all legally registered persons engaged in the business. By the revision of the Register the public is provided with a correct and authoritative statement of the persons who are duly authorized to call themselves chemists and druggists, in virtue of having satisfied the requirements of the Pharmacy Act, the special object of which is to certify the competence of those lawfully acting in that capacity. The information thus urnished might often be usefully applied by magistrates and others, in cases where complaint is made of the quality of drugs or medicinal preparations, for t is too much the habit to assume as a matter of course that in all such cases the articles purchased have been obtained from legally qualified chemists. Very often that is not correct, and a reference to the Register would show at once that though the sellers of defective drugs or medicinal preparations are termed chemists, they have no right to that designation. In this respect the Register is also of advantage to duly qualified chemists and druggists, and its maintenance in a correct condition by the Pharmaceutical Society, without any expense to the general body, is a service rendered to the trade that is too little appreciated. That advantage might be considerably increased if individual members of the trade were to take the trouble of making it known when misapplications of the title of chemist and druggist have occurred in cases of prosecution under the Food and Drugs Act or other occasions. Short of such means of obtaining information on this point from those who, being on the spot, are fully conversant with the facts, it is almost impossible in many instances to prevent erroneous impressions being formed, to the disadvantage of chemists and druggists as a body.

The Calendar of the Pharmaceutical Society is also a book which is calculated to be of great utility to chemists and druggists, in many emergencies that may arise in the exercise of their business. Apart from the information it gives in relation to the constitution of the Society and the provisions of the Pharmacy Acts, it contains a full statement of all particulars connected with the examinations that have to be passed for obtaining legal qualification to carry on business as a chemist and druggist, and for obtaining the higher voluntary qualification of pharmaceutical chemist. In addition to this the Calendar contains extracts from all the Acts of Parliament which have any bearing upon pharmacy or the trade of chemists and druggists. The general orders of the Board of Inland Revenue and the regulations relating to the supply of medicines and medical stores for the mercantile marine, naval dispensers, the storage of explosives, inspection of weights and measures, etc., are also very fully set in forth in the Society's Calendar. All these subjects are of constant interest for chemists and druggists, and in regard to them the Calendar contains a fund of information that would often be found extremely useful for reference. We make this statement not only from a knowledge of what the Calendar contains but also with the experience that the great majority of the questions which are from time to time addressed to this Journal by chemists and druggists, are of such a nature as might readily have been answered by a reference to the Calendar. It ought, therefore, to be in the possession of everyone engaged in the business, and, in fact, to be regarded as the chemist's *vade mecum*.

CORONERS' JURIES.

A CASE lately came before Mr. Justice HAWKINS and Mr. Justice WILLS, which has a particular interest for pharmaceutical chemists, in regard to their exemption from liability to serve on juries. The question raised had reference to coroners' juries, for which it is believed that a man may even be taken from the street and compelled to serve. In the case to which reference is now made, a solicitor's clerk had been summoned to serve on a coroner's jury. He refused to do so, alleging as his reason that he was exempted by the Juries Act of 1870, which provides that solicitors' clerks shall not be liable to serve as jurymen. However, the coroner of the city of London, by whose authority he had been summoned, assuming that this exemption did not extend to coroners' juries, inflicted upon the solicitor's clerk a fine of five pounds for his non-attendance. Thereupon, application was made to the Court of Queen's Bench for a rule, calling upon the coroner to show cause why the order made by him should not be quashed. The counsel, appearing in support of the rule, was not called upon by the Court, but Mr. Justice HAWKINS at once stated that in his opinion the exemptions from liability to jury service applied as much to coroners' juries as to other juries. He referred to the language of the section as being clear on this point, and considered that there is no reason for supposing that coroners' juries were intended not to be affected. The words of the Act are, "shall be and are absolutely exempt from serving on any jury whatsoever," and Mr. Justice HAWKINS held that to be no less an exemption because coroners' juries are not bound by the ordinary rules of summoning. In that opinion Mr. Justice WILLS concurred, and consequently the coroners' order was quashed.

At page 594 will be found a notice concerning the carriage of poisons on board ships, which has been issued by the Board of Trade in consequence of representations made to that department by the Colonial Office in reference to this matter. It appears that a cask of arsenic shipped to New Zealand had been damaged on board ship in such a way that the arsenic escaped and became mixed with packages containing articles of food. Eventually the correspondence relating to this occurrence was forwarded by the Privy Council to the Council of the Pharmaceutical Society, with a request to be furnished with some suggestion on the subject. The reply sent to the Privy Council pointed out the provisions of the Pharmacy Act in regard to the export of poisons, and it has given rise to the issue of the notice to which attention is now directed. This notice is now being issued by the Board of Trade to ship-owners, ship-masters and others. According to the 17th section of the Pharmacy Act the partial exemption of articles exported from Great Britain from the provisions of that section extends only to those provisions which are solely applicable to poisons in the first part of schedule A, or require the labels to contain the name and address of the seller. It is therefore necessary that every package containing any scheduled poison for export should bear the name of the article and the word "poison," as a means of ensuring that proper precautions may be taken in stowing such packages on board ship, and preventing the contamination of the cargo.

* * *

It is of interest to note that at the special funeral service held in St. Giles' Cathedral, Edinburgh, on the 20th inst. in connection with the burial of H.R.H. Duke of Clarence, which was attended by the Town Council and representatives of military, legal, medical, mercantile and other bodies, the Pharmaceutical Society was represented by Mr. J. Laidlaw Ewing, Chairman of the Executive of the North British Branch, Mr. J. B. Stephenson, Chairman of the Scottish Board of Examiners, and Mr. John Nesbit, Portobello, a member of the Board of Examiners, for whom seats were reserved by the Cathedral authorities.

* * *

The Committee of the Chemists' Ball, at a meeting held on Monday last, decided, in consequence of the death of H.R.H. the Duke of Clarence and Avondale, to postpone the ball which was to have been held on Wednesday last. It has now been arranged that the ball shall take place at the Portman Rooms on Wednesday, April 20, and we are requested to inform our readers that the tickets which have already been purchased will be available on that date. We hope the postponement will not be permitted to interfere with the success of the ball, but rather that many who are now victims of the prevailing epidemic and who would have been unable to be present last Wednesday will be enabled to put in an appearance on the date now fixed upon.

* * *

The twenty-first annual ball of the Midland Counties Chemists' Association took place at the Edgbaston Assembly Rooms, Birmingham, on Thursday, January 14, and proved to be one of the most enjoyable ever held by the Association.

Transactions of the Pharmaceutical Society.

EVENING MEETING IN LONDON.

Wednesday, January 13.

The following is an abstract of the lecture on "Fermentation," delivered by Professor Armstrong on that occasion:—

In his second lecture Professor Armstrong discussed the *enzymes*, substances which, like invertase, induce changes of the nature of that whereby cane sugar is resolved into dextrose and levulose, as expressed by the familiar equation—

$$C_{12}H_{22}O_{11} + OH_2 = C_6H_{12}O_6 + CH_{12}O_6.$$

Premising that their study was of importance in connection with true fermentation phenomena, he dwelt on their wide range of usefulness; it is by their agency that our food and that of animals generally is digested, and in like manner that of plants, as exhibited in the transference of starch and other reserve materials. As an especially interesting illustration of the functions of an enzyme, attention was directed to Professor Marshall Ward's account of a lily disease in the 'Annals of Botany' for 1888. The disease is due to the development of a parasitic *Botrytis*, the hyphæ of which bore through the cell walls, boring power being possessed by the tips of the hyphæ, owing to the secretion of an enzyme capable of gradually disentegrating cellulose. Of special interest was the manner in which, in water cultures, neighbouring hyphæ became united by cross branches, a branch being seen to arise on one of the hyphæ and another to start growing out soon afterwards at a point opposite on the neighbouring hypha, the two branches meeting after a time and ultimately fusing together. Professor Ward attributes, and no doubt correctly, the outgrowth to a localization of the enzyme; he further suggests that there is a cause at work, determining the direction of growth, whereby hyphæ pursuing divergent courses, are led to approach each other; that, in fact, an attraction is exercised by the one upon the other. It is possible, however, that growth is influenced in direction by currents within the liquid, conditioned by the irregular diffusion of soluble matters from and into the cells. In any case the observations are of extreme interest, owing to the insight which they afford into the mechanism of cell growth.

The changes effected by an enzyme may conveniently be spoken of, as suggested by Sir William Roberts, as an enzymosis. Enzymes appear all to act in one way; they induce hydrolysis, and it is therefore probable that even coagulation of albuminoids is conditioned by hydrolytic change. Consequently, the enzymes may be termed *hydrolysts*, just as the person performing an analysis is called an analyst; and the analogy is in many respects a very complete one, the hydrolyst like the analyst being a mere intermediary, and serving but to bring together the interacting substances, emerging unchanged at the close of the operation, after receiving back the equivalent of the energy which is doubtless rendered up in securing association. The action of enzymes is really similar to that of acids, but more uniform, the action not extending beyond the stage of simple hydrolysis, whereas in the case of acids it sometimes extends further, as in the formation of levulinic acid from levulose.

A considerable number of enzymes are known of; most of them are each capable of inducing the hydrolysis either of a single compound or of a very limited number of compounds. Samples of such are *invertase* from yeast, which induces hydrolysis of cane sugar; the *diastase* of malt, which very rapidly induces the conversion of starch into amylin (dextrin) and amylose

(maltose), and subsequently, but much more slowly, brings about the hydrolysis of the amylin into amylon *emulsin*, which induces the hydrolysis of amygdalin into glucose, benzaldehyde, and hydrogen cyanide, and *myosin*, a constituent of mustard seed, which resolves potassium myronate, another constituent of the seed, into allyl thiocyanate and potassium hydrogen sulphate. Proteid hydrolysts appear to be numerous, but our knowledge of the effects they produce is at present most unsatisfactory, and is limited almost entirely to the observation of their peptonizing power. Cyto-hydrolysts, capable of inducing hydrolysis of cellulose, have been proved to occur in a number of seeds, and Brown and Heron have made the interesting observation that in germinating barley the disappearance of the cell wall always takes place under the influence of a cyto-hydrolyst prior to the pitting of the starch granules by the starch hydrolyst.

Until recently little was known of the location and origin of enzymes. In certain cases they occur free, that is to say they may be directly extracted with water from the crushed material, but more frequently it would seem that they are in some way held back and become liberated, either during growth, as in the germination of barley, or in consequence of the death of the cell, as in the case of yeast, from which the invertase cannot be separated unless the cell be either mechanically ruptured or killed by means of ether or chloroform, for example.

Most observations point to a highly local occurrence of enzymes both in the case of animals and plants. Thus diastase has been shown by Brown and Heron to be elaborated in a particular layer of cells in the barley embryo, viz.: the columnar cells of the so-called absorptive epithelium of the scuttellum. A specially interesting case, described by Marshall and Dunlop in the 'Annals of Botany' for 1887, is afforded by Persian berries, used as a yellow dye. The dye is chiefly contained in the husks or pericarps, but it has long been known that in order to obtain a satisfactory dye bath, the crushed berries, and not merely the pericarps, should be used. The dye is derived from a glucoside, *xanthorhamnin*, $C_{48}H_{66}O_{29}$, which yields rhamnin—the dye—and glucose on hydrolysis. Ward and Dunlop have shown that the enzyme capable of inducing hydrolysis of the glucoside present in the pericarps is located in the raphe—the cells lining a deep grove in the seeds enclosed in the husk.

Until the publication a few months ago of the research of O'Sullivan and Thompson on Invertase, our knowledge of the character and mode of action of enzymes was of a most fragmentary and unsatisfactory kind. It was known that they could be extracted by water, or still better by glycerol, and that they were precipitable from their aqueous solutions by alcohol, but such products were of slight activity. In some respects they were found to resemble proteids, but to contain a smaller average percentage of nitrogen. O'Sullivan and Thompson have succeeded in obtaining a "yeast liquor," very rich in invertase, by allowing yeast to liquefy spontaneously, and with the aid of such preparations they have studied both the nature and functions of invertase. It is a substance of an excessively unstable character, and yields a series of decomposition products, which, it would seem, are members of an homologous series, termed by O'Sullivan and Thompson the invertan series. They regard the several invertans as compounds of a proteid, "yeast albumenoid," with y-invertan, the latter in turn being a compound of the yeast albumenoid with a carbohydrate.

The mode of action of invertase has been ascertained by determining the speed at which the hydrolysis of cane sugar is effected under its influence. A measured amount of the invertase preparation was added to a cane sugar solution of known strength and the mixture maintained at any temperature at which it was desired to ascertain the rate of change; from time to time a portion of the liquid was removed and the action stopped by the addition of alkali; the extent to which change had taken place was then determined by observation with the polariscope. In this manner O'Sullivan and Thompson arrived at the conclusion that the hydrolysis of cane sugar under the influence of diastase is comparable with a chemical change of so apparently different a type as the interaction of hydrogen peroxide and hydrogen iodide. This latter interaction, which was thoroughly studied years ago by Harcourt, takes place strictly in accordance with the "law" that in the case of a substance undergoing a chemical change, of which no condition varies excepting the diminution of the changing substance, the amount of change occurring at any moment is directly proportional to the quantity of the substance. It is found, however, that in order to obtain regular results with invertase, a small amount of acid must be added, but the most favourable degree of acidity varies not only with each invertase preparation, but also with the temperature, and the percentage of active agent present; the higher the temperature the less acid is required; a very small difference being fatal at higher temperatures, 2 parts per million altering the rate elevenfold at 60°. Owing to some slight modifying circumstance which cannot at present be explained, the hydrolysis increases in rapidity to a greater extent than it should if it followed Harcourt's law, until about 80 per cent. of inversion is attained; it then proceeds at a slower rate. The time required to effect any given percentage of inversion is in inverse proportion to the invertase used. Harcourt found the rate of change doubled for every 10 degrees rise of temperature; at low temperatures this is true of the action of invertase, but not at higher, it being only 7·5 instead of 16 times as active at 55·5 as it is at 15·5. The addition of five per cent. of alcohol reduces the rapidity of change about one half. The most favourable concentration is obtained when 20 grams of cane sugar are present per 100 c.c.; an increase of the cane sugar to 40 grams is only slightly detrimental, but dilution operates very unfavourably. Invertase may be heated for a considerable time at 60° in presence of excess of cane sugar without its activity being permanently affected, although it cannot be heated alone at this temperature without suffering change. The products of inversion are without influence on the rate of change. The most active preparation obtained by O'Sullivan and Thompson inverted 74 times its weight of cane sugar in twenty-five minutes at 15·5°; as at 54 it would be 7·5 times as active, it would have inverted 550 times its weight, which is at the rate of about 22 times its weight per minute. In an experiment lasting a fortnight a quantity of invertase had induced the hydrolysis of 100,000 times its weight of cane sugar, and the action was still proceeding.

EVENING MEETING IN EDINBURGH.

Wednesday, January 13, 1892.

MR. J. LAIDLAW EWING IN THE CHAIR.

The third Evening Meeting in Edinburgh of the present session, was held in the Society's House, 36, York Place, on Wednesday, January 13, at 8.30. Mr. J. Laidlaw Ewing in the chair.

The minutes of last meeting having been read and approved, apologies for absence were intimated from Messrs. Adam Gibson, W. G. Mackenzie and J. B. Stephenson.

The following communications were read:—

PEPSIN WINE.

BY JAMES CLARK.

Some eighteen months ago, while the Inland Revenue authorities were instituting legal proceedings against

chemists who sold certain medicated wines without holding the necessary licence, the question, "Under what conditions may pepsin wine be sold?" received considerable attention from chemists.

The result of representations to the authorities was the issue of a regulation to the effect that pepsin wine would be exempt from licence, provided it contained not less than 320 grains pepsin and 120 minims strong hydrochloric acid per 20 fluid ounces.

The issue of this order led me to examine a number of commercial samples of pepsin wine to ascertain how near they agreed with the requirements.

These samples were obtained from what I consider typical sources, but I am not aware whether they had been prepared to meet the requirements of the regulation or not; they certainly were collected after the issue of the order.

Commercial pepsins are as widely different in their digestive values and solubilities as they well could be, some, alas! hardly deserving the name; this, together with the fact that no definite or recognised formula has been suggested by any of the bodies of pharmacists, to whom we look for such, is my reason for bringing this subject under notice.

While the regulation leaves no doubt as to the amount of pepsin the authorities expect to find in the wine no mention is made as to what digestive power the pepsin used must possess. From the fact that all medicated wines recognized in the Pharmacopœia are exempt from licence, I infer that they accept the Pharmacopœia as their standard.

On this assumption I maintain that the authorities expect one drachm of pepsin wine to completely digest not less than 100 grains of coagulated white of egg in one ounce of water acidulated with five minims of strong hydrochloric acid at 130° F. in thirty minutes.

It would be unreasonable to expect them to believe that 320 grains of a pepsin had been used, as the particular sample used might have contained a considerable percentage of some foreign ingredient. If a bad pepsin had been used, or the mode of preparation faulty, that is the chemist's business, as the authorities can only deal with the preparation as they find it.

I examined in all ten samples in April, 1891, with the following results:—

Table I.

No.	Coagulated Albumen.
1.	One drachm completely digested 124 grains.
2.	,, ,, ,, ,, 55 ,,
3.	,, ,, ,, ,, 76 ,,
4.	,, ,, ,, ,, 45 ,,
5.	,, ,, ,, ,, 33 ,,
6.	,, ,, ,, ,, 30 ,,
7.	,, ,, ,, ,, 98 ,,
8.	,, ,, ,, ,, 62 ,,
9.	,, ,, ,, ,, nil. ,,
10.	,, ,, ,, ,, 90 ,,

After an interval of nine months estimations were again made, and table II. gives the results:—

Table II.

No.	Coagulated Albumen.
1.	One drachm completely digested 116 grains.
2.	,, ,, ,, ,, 49 ,,
3.	,, ,, ,, ,, 67 ,,
4.	,, ,, ,, ,, 40 ,,
5.	,, ,, ,, ,, 30 ,,
6.	,, ,, ,, ,, 26 ,,
7.	,, ,, ,, ,, 90 ,,
8.	,, ,, ,, ,, 57 ,,
9.	,, ,, ,, ,, nil. ,,
10.	,, ,, ,, ,, 85 ,,

Each sample was estimated by itself.

A beaker was used as the water bath, five numbered test tubes, each containing 100 grains coagulated white of egg, five minims of strong hydrochloric acid, and one ounce of water were fixed in a piece of cardboard and dipped into the bath.

Heat was applied until the temperature was 130° F. when varying quantities of wine were introduced into the tubes. The temperature was kept constant at 130° F. for thirty minutes, the contents of the tubes being stirred frequently. The tube showing complete digestion at the end of the experiment was the one from which the quantities in the tables were calculated.

The results are by no means high; in fact, I believe they are as low as it is possible to obtain by any trustworthy method of estimation. For example, had I used, say 2 ozs. of acidulated water instead of one, and continued the digestion for six or more hours at a lower temperature, a comparatively larger quantity of albumen would have been digested. This method, however, is not admissible, as it departs considerably from our standard.

So long as each experimenter uses some special method of his own, so long will we continue to have different results with the same samples.

The wines when first examined were perfectly bright and free from sediment. They ranged in colour from very dark red to pale straw; one sample was so dark that it had the appearance of being artificially coloured. At the end of nine months they did not seem to have changed at all in colour, only a slight sediment being noticeable. This sediment was not observed in No. 9.

From table No. II. I infer that the wine does deteriorate a little by keeping, but the deterioration seems so small (not more than 9 per cent. over all), that when preparing a wine it becomes an easy matter to make an allowance for it.

A complete examination of pepsin wine ought to embody the amount of acid present, but owing to circumstances this has not been done. However, I do not think it would affect the matter one way or another. All the wines seemed to have been prepared with sherry, and three of the samples evidently contained glycerine. It is noticeable that these three (nos. 1, 7 and 10) give the highest results.

There is no doubt that dilute alcohol is a fairly good solvent for pepsin, the main question arising being whether or not it in any way affects the digestive power. Authorities differ widely on this point. On the one hand Dr. Eccles ('American Pharmaceutical Association Proceedings,' vol. 38, p. 136) firmly asserts that dilute alcohol completely and rapidly destroys pepsin, while M. Bardet ('Year-Book of Pharmacy,' 1888, p. 103) as emphatically maintains that in an alcoholic liquor containing not more than 20 per cent. alcohol, pepsin will remain indefinitely with impunity. The little work I have done agrees pretty much with Bardet's results, and I believe that the small percentage of alcohol present in sherry wine does not appreciably affect the digestive power of pepsin. I can see no practical difficulty in preparing a pepsin wine of good keeping quality and capable of satisfying the Inland Revenue authorities. The necessity of a definite formula for a popular preparation like this is very great, and it is remarkable that the compilers of the Pharmacopœia have not seen the necessity there is for at least one liquid preparation of pepsin.

The following formula has proved very satisfactory in my hands; and I would suggest that this or a similar formula should be inserted in the next Pharmacopœia.

Take of—

Pepsin, soluble scale	320 grains.
Distilled water	℥iij.
Glycerine	℥ij.
Strong hydrochloric acid	℥ij.
Sherry wine, detannated, B.P.C., to	Oj.

Mix together the acid and the water, and dissolve the pepsin in the mixture. Then add the glycerine

and make up to a pint, with the sherry wine. Allow to stand for three days and filter. The following test should also be appended to the formula:—

Three minims of this preparation will completely digest 100 grains coagulated white of egg in 1 ounce of water, acidulated with 5 minims hydrochloric acid in less than thirty minutes at 130° F.

It must not, however, be understood that 1 drachm of the same preparation would completely digest or render soluble 2000 grains in the amount of water recommended in the Pharmacopœia. In testing this preparation, and, in short, all pepsin preparations, the aim should be to ascertain what quantity is required to completely digest a given weight of albumen in a given quantity of water, and not what weight of albumen will be digested by a given quantity of the preparation in an excessive quantity of water. In the first method the strength of the peptone solution is always the same; and this is important, as the retarding effect of an excessive quantity of peptone must be carefully avoided.

In the second method the amount of acidulated water used is the important factor, and as no limit can be given to that amount, the digestive power of the same pepsin will always vary just to that extent.

There being no absolute test for pepsin, the only course left open is comparative testing, and the method I have suggested, which is merely that of the Pharmacopœia carried a step further, gives very good results. That is to say the Pharmacopœia test is designed to show the *least* that a pepsin *ought* to do, while the test I give, following pretty much on the same lines, shows the *full digestive power* of the sample.

The CHAIRMAN said this wine was not used now to anything like the extent it was about fifteen or sixteen years ago, and he thought the interference of the Inland Revenue authorities was rather uncalled for. Mr. Clark had investigated the subject evidently at the cost of much time, and in a very careful and praiseworthy manner. From the results given in his tables of analysis, there seemed to be a variation in the commercial article which called for the attention of the inspectors under the Food and Drugs Act. One thing that struck him was the question as to how far the hydrochloric acid affected the digestive power of the wine. He had spoken recently to a medical practitioner, who said he had come to the conclusion that the hydrochloric acid was as much the active agent in these preparations as the pepsin, and that in doses of 15 minims with 1 drachm of glycerine, it would produce all the results that could be obtained by the use of pepsin wine. The use of glycerine as a remedy for indigestion was well known, and was rendered very popular by an article recommending it which appeared in *Chamber's Journal* about three or four years ago. It was noteworthy that the samples of pepsin wine containing glycerine, always possessed greater digestive power than those from which it was absent.

Mr. DOTT said he had listened with much interest to the paper, and agreed generally with what had been said by the author. It was to be noted that, speaking broadly, wine was not a good menstruum for the preparation of popular remedies. It was frequently said, particularly by teetotalers, that alcohol, even in small quantity, interfered with digestion. Mr. Clark's results showed that such an opinion was not well founded, and that the quantity of alcohol in pepsin wine did not in any way diminish the digestive power of the pepsin. At the same time it was pretty evident that if a liquid preparation of pepsin was to be included in the next Pharmacopœia, it should not be a wine. It was very difficult to estimate the amount of pepsin in a solution. Indeed, they were in the position of not knowing exactly what pepsin was. It certainly could not be estimated by any gravimetric method. He was not sure that he quite followed the author in his method of determining the amount of albumin dissolved. It was extremely difficult to tell how much had been dissolved. The percentage of water in the coagulum varied very much, and unless it had previously been completely dried, the exact weight could not be easily fixed. With regard to the hydrochloric acid, he did not think it was of much use. No doubt, however, it had some effect on the digestive action, and must, to get the best results, be present always in the same degree of concentration, neither too little nor too much.

Mr. NESBIT said he had always made his pepsin wine with glycerine. He had never used strong acid but always the dilute acid, and his wine had been examined and passed by the Revenue authorities. He also understood that the action of the pepsin did not cease but would proceed indefinitely if more acid and water were added.

Mr. LUNAN said he thought a good deal depended on the quality of the wine used.

Mr. BOA said a few years ago he had given some attention to pepsin wine, with the result that he had been led to adopt a formula very similar to the one given by Mr. Clark. With regard to the Revenue insisting on the presence of a certain quantity of hydrochloric acid it seemed to be intended to render the wine unfit for use as a beverage. It thought it was erroneous to require that a certain quantity of pepsin should be used, because pepsin at 2*s.* 6*d.* per ounce or at 6*s.* or 8*s.* per ounce might be used. It was better to have a test, as suggested by the author, which would ensure that the proper pepsin was used. Mr. Dott had said wines were objectionable as a medium, but looking at the matter from a popular point of view he thought it was rather an advantage to have a wine preparation.

Mr. THOMSON said he would like to ask if Mr. Clark took care to have albumin from fresh eggs. He observed that his first experiments were in April and his second ones in January. At the latter season fresh eggs were not easily obtained, and the digestibility of the pepsin was affected by age and might explain the apparent deterioration of the pepsin wine shown by the second table of results. With regard to the action of the pepsin being indefinite the peptones found retarded and ultimately stopped the digestive process although the pepsin was not destroyed.

Mr. COULL said he had made the wine authorized by the Inland Revenue authorities, but his experience was that the public would not have it as it was far too acid. He thought 2 drachms to one pint was greatly in excess of what should be, and found that about 0·25 per cent. was the right proportion. He did not know whether Mr. Clark had ascertained the kind of pepsin used in his experiments. He had found that German pepsins, as a rule, were of very poor quality, while those of American make were, as a rule, of good quality and high digestive power.

Mr. HILL said the author had cleared up many points which were before vague. He thought the requirement of the Revenue that 320 grains of pepsin should be used in making the wine was not the right way to put it. A man might conscientiously use that quantity of pepsin, but how could the Revenue be sure that he had done so? Everything depended on the quality of the pepsin, the method of manipulation, and the test adopted by the Revenue. The Revenue might say that a sample of wine was faulty because by their test 1 fluid drachm did not dissolve 100 grains of albumin. But the man would at once reply that it would, and that he would show them that it could, and they know that by modifying the conditions of the test that could easily be done. What they should do was to require that a given volume of the wine should dissolve a given weight of albumin under given con-

ditions. This would remove all room for doubt and all chance of injustice. There could be no doubt that the Revenue insisted on a large percentage of hydrochloric acid with a view to rendering the preparation unfit for use as a beverage.

Mr. CLARK, in reply, said with regard to the statement referred to by the Chairman, that a medical practitioner had found practically the same effect by using hydrochloric acid without the pepsin, there was an important discussion on this point at the meeting of the American Pharmaceutical Association in 1890. At that meeting Dr. Eccles read a paper in which he made the same assertion. In the subsequent discussion this statement was thoroughly grappled with by Mr. Fairchild, of Messrs. Fairchild, Brothers and Co., who showed that such was not the case. Another speaker flatly denied the statement, and not a single authority agreed with Dr. Eccles. The so-called hydrochloric acid solution of albumin was not a real solution at all, and no peptone was formed. The importance of glycerine as a factor in pepsin wine was shown by samples 1, 7 and 9, and he had also used it in making his own wine. By using glycerine he obtained a wine 3 minims of which would do as much as one drachm of the wine made according to the Inland Revenue formula. He had the authority of Martindale for saying that glycerine was a good solvent and preservative of pepsin. He agreed with Mr. Dott as to the difficulty of estimating the quantity of albumin dissolved, and no gravimetric method would give at all accurate results, although Proctor, in his 'Pharmaceutical Testing,' gave a rough process for doing so. All that they could do was to secure good comparative tests. This was secured by his process, for the details of which he referred them to his paper. As to the hydrochloric acid he had not estimated this because there was not sufficient of the samples left after his pepsin determinations were concluded. But he had not thought it of any consequence to look for hydrochloric acid, as there could be no difficulty, on the score of price, in complying with the Revenue requirements in this respect. It was quite true, as Mr. Nesbit had said, that they could go on dissolving more albumin by adding an excessive quantity of water. But what they wanted was a definite comparative standard. As to the price of pepsin wine he thought it could be prepared, of excellent quality, for about one penny or three halfpence per ounce. On the point raised by Mr. Thomson he might say that he had been particularly careful in every case to use nothing but perfectly fresh new eggs. Mr. Coull said the quantity of acid was too large and had the effect of making the wine unpalatable, but he found that the addition of the quantity of glycerine in his formula had the effect of making it much more palatable. He did not think the percentage of acid was too high, seeing that the gastric juice contained about 0·3 per cent. He had used American pepsin and found it to be the best.

Mr. NESBIT asked if it was really the case that the Revenue authorities required that each pint of wine should contain two fluid drachms of strong hydrochloric acid in each pint, and when they made that demand?

Mr. HILL said the requirement was laid down in a letter from the Revenue authorities to Mr. Fisher, of Dumfermline, who had written asking under what conditions he could sell pepsin wine without a licence. The Revenue Department replied that they would not interfere provided 320 grains of pepsin and two fluid drachms of strong hydrochloric acid were used in making each pint of wine.

The CHAIRMAN in proposing a vote of thanks to Mr. Clark, which was cordially awarded, said it was sometimes alleged that these meetings in Edinburgh were rather a local assembly, but he was sure they all desired to make them as representative of the whole Society as possible. They were especially indebted to Mr. Clark, not only for the work he had done, but for his kindness in coming so far to read his paper in person. They were always glad to see any of their brother pharmacists throughout Scotland, and all who could attend or contribute papers to their evening meetings might always be sure of a hearty welcome.

The next communication was on:—

A STANDARD FOR AËRATED WATERS.

BY GEORGE LUNAN.

The explanation of my communicating this short note is, that having mentioned to Mr. Hill my experience of the extreme variability in strength of the ordinary potash and soda water met with in commerce, he suggested that I might bring forward the subject at an Evening Meeting, with a view to eliciting an expression of opinion and suggesting a uniform standard much lower than that at present sanctioned by the Pharmacopœia.

For ordinary consumption liquor potassæ effervescens and liquor sodæ effervescens contain too much of the respective bicarbonates to be altogether palatable or safe.

To meet the public taste, or for other reasons, manufacturers of the aërated waters referred to vary the quantity of alkaline bicarbonate according to their individual judgment. Some knowingly supply so-called "potash" and "soda" water containing not a particle of the salts, while others put a quarter or at the utmost, half the quantity required by the official standard. As illustrative of the degree of variability met with in ordinary practice I give a table showing the amount of alkaline bicarbonate found in each of five samples of potash water and five samples of soda water.

Potash.		Soda.	
Sample.	$KHCO_3$ Grains per pint.	Sample.	$NaHCO_3$ Grains per pint.
A . . .	16·524	F . . .	9·075
B . . .	13·580	G . . .	6·740
C . . .	12·808	H . . .	4·148
D . . .	8·796	I . . .	0·250
E . . .	none	J . . .	none

The Pharmacopœial standard is 30 grains per pint. The strongest of the above in the case of potash water is only little more than half, while the strongest in the case of soda water is rather less than one-third of the official strength. Practically two samples of "soda" water and one of "potash" water are simply plain aërated water. Surely if chemists are to act as protectors of the public health, it is their duty to discriminate between that which is medicated and that which is plain. Manufacturers who have educated their customers to believe aërated water to be soda or potash water, cannot be blamed if chemists do not repudiate the product.

In view of the marked discrepancies brought out in the foregoing table, one is inclined to ask why chemists should not be able to adopt a uniform standard for a potash and a soda water for ordinary use, and considering the complete absence of any sample approaching the official strength, one is led to ask why the Pharmacopœial effervescent waters can hardly ever be obtained in actual practice.

With regard to the latter question it would seem that the official standard water is too highly alkaline and unpalatable, but it is quite probable that the ordinary article is supplied under the impression that it is what is required, while the prescriber really supposes he is getting a much stronger preparation. It

would certainly be advantageous to medical practitioners who have mentioned the matter to me, if some standard were fixed so that they could always prescribe what they want, in the assurance that their wishes will be accurately carried out.

No uniform standard has been adopted, perhaps because it has never been definitely suggested, but there seems no reason why chemists should not agree on this point. I would therefore suggest that the Pharmacopœia should include two strengths, the present effervescing potash water and effervescing soda water, to be called liquor potassæ effervescens fortior, and liquor sodæ fortior, and an effervescing potash and soda water to be called liquor potassæ effervescens and liquor sodæ effervescens respectively, and containing not less than 4 and not more than 5 grains of the alkaline bicarbonates.

Mr. BOA said he thought the strength of ordinary potash and soda water should be left to the judgment of the manufacturers, who would probably find that their clients did not want much potash or soda in the water. The official standard was useful for medicinal purposes, and any medical practitioner could so order it, but it was too strong for the popular taste, as they did not want a soapy liquid to mix with their whiskey. He did not agree with Mr. Lunan as to the insertion of a second standard in the Pharmacopœia, and thought it would be superfluous to do so.

Mr. CLARK, Aberdeen, said the official standard gave too strong a water, and so far as he knew it was never offered for sale. With regard to Aberdeen he might say that a well-known maker of soda and potash water, having a large sale, contained about 1 grain per ounce of alkaline bicarbonate. In the case of gazogenes, they found all sorts of fancies as to the quantity of alkali, ranging from 30 to 120 grains.

Mr. DOTT said he concurred with Mr. Boa. One standard was sufficient, and it was unnecessary to fix a second standard for ordinary use, and that manufacturers should not be in any way bound as was proposed.

Mr. NESBIT said he agreed with Mr. Lunan. He thought it was hardly morally correct to sell as potash water a preparation containing only 5 grains of bicarbonate per bottle, and persons should be debarred from selling as potash water a liquid which contained no potash at all. The official liquor potassæ effervescens was too strong for use as an ordinary beverage, and he believed might induce kidney disease if used in large quantities. The Pharmacopœia was perhaps not a commercial book, but such a body as the British Pharmaceutical Conference might fix a uniform standard, which could be generally adopted by chemists.

Mr. ARTHUR said he presumed what was proposed was to fix a standard for medicinal use and not a commercial potash or soda water. For that purpose he thought the standard already official was enough.

Mr. HILL said if ordinary potash or soda water was used, only as a vehicle for whiskey, then it was useless to trouble about fixing a standard. But ordinary potash and soda water were largely used by medical practitioners as therapeutic agents. This subject had been mentioned to him both by medical men and by chemists from various parts of the country. Let them suppose that a medical man has a patient, for whom he prescribes ordinary potash water to be taken continuously as a beverage. This water is obtained from a pharmacist who sends out potash water containing 16 grains of potassium bicarbonate per pint. A certain therapeutic effect is produced, and the practitioner bases his practice on the clinical experience thus obtained. He comes across another case in which similar treatment is indicated. He prescribes potash water again, but this time it is obtained from a pharmacist, who sends out potash water containing only 8 grains of potassium bicarbonate per pint, or perhaps none at all. It was plain that he would be disappointed with the treatment, and might be misled as to the cause, and erroneously blame his diagnosis. There seemed to be some confusion in the minds of several as to the proposal made by Mr. Lunan. It was not proposed to limit the discretion of manufacturers in any way. What was proposed was that there should be two standards in the Pharmacopœia for liquor potassæ effervescens and liquor sodæ effervescens, so that medical practitioners or those wanting an aërated soda or potash water for medicinal use might order either the one or the other, with the assurance that they would always obtain a definite and reliable article. Outside of that manufacturers might sell anything they chose to meet the requirements of the whiskey drinkers or any others. If no uniform standard for a weaker potash or soda water than the official one was desired then nothing had been lost. But if, as he believed, some such standard was a desideratum, the discussion might have the effect of focussing opinion and ascertaining what standard would be best.

Mr. HENRY said he thought that where potash or soda water was wanted for medicinal purposes it ought to be of a uniform standard. From the discussion that had taken place and the results found on analysis by Mr. Lunan, the presumption was that the present official standard was too high. In place of having two official standards he would suggest that the present one might be reduced to perhaps 10 grains of alkaline bicarbonate per pint, and if any medical practitioner desired a stronger water, he could order it double or triple the official strength. It would appear that the aerated waters supplied when ordered for medicinal purposes differed in no respect from those supplied in ordinary commerce. He rather thought the makers of some of the samples examined by Mr. Lunan would be liable to a penalty under the Food and Drugs Act.

The CHAIRMAN said that so far as he was concerned he had never had an inquiry for the B.P. potash or soda water. If any medical practitioner desired to have such a water, he could easily order it, and in that case doubtless the official article would be supplied. He agreed that it was much too alkaline for ordinary use, and if taken indiscriminately would have a deleterious effect on the livers and stomachs of the consumers. In the course of some prosecutions for the sale of defective aerated waters some years ago, it came out in evidence that a very famous soda water contained a very small quantity of the bicarbonate. A medical acquaintance had said to him that he rather objected to the presence of soda in his soda water, and thought it was much more pleasant without it. He was inclined to agree with Mr. Boa and Mr. Dott in saying that another official standard for these aerated waters was superfluous.

Mr. LUNAN said, in reply, that they had had an interesting discussion and he hoped something would come of it. It was a fact that B.P. potash and soda water could not be get at all in Edinburgh. He thought they were somewhat too easy minded about what they sent out, and it would be a great advantage to fix a uniform standard. The only suggestion that commended itself to him in the course of the discussion was that of Mr. Henry, that there should be one official standard of 10 grains bicarbonate per pint. He had brought the subject forward partly as a self-education, as he was anxious to know what was the best thing to do to meet the requirements of the public and faithfully carry out the intention of prescribers.

On the motion of the Chairman a cordial vote of thanks was awarded to Mr. Lunan.

The next communication was a—

Note on the Official Iodine Preparations.

BY W. G. MACKENZIE.

The point I wish to bring forward in this note is so small that I almost feel as if I ought to make an apology for doing so. It is quite probable that the suggestion I have to make may have occurred to others who have had experience in the making of iodine solutions. I have been induced to direct attention to it from having observed that all the pharmacists with whom I have come in contact, make the official galenical preparations of iodine by either one or other of two methods. One method is to put all the ingredients into a bottle and shake briskly for a few minutes, renewing the agitation occasionally until complete solution is effected, which may occur any time between one and three days. The other method is to rub all the ingredients together in a mortar until dissolved. The objection to the first method is the great waste of time in effecting solution, a point of some consequence to a busy pharmacist, and very annoying when, from any cause, the preparation is required on short notice. The objections to the second method are, the uncleanliness which is always apparent and the inevitable loss of iodine. I have also observed that students in preparing the volumetric solution of iodine, land themselves in a similar difficulty as to the solution of the iodine. This difficulty is a necessary sequence, one might say, of the official directions which stipulate that the ingredients are to be gently agitated together until solution is effected. Those who have made the solution in this way will know that it is very tedious work getting the whole of the iodine dissolved. What I have to suggest is that by simply adding a very small quantity of the solvent to the iodine and iodide of potassium, and allowing them to lie in contact for a few minutes, without any agitation (or, at most, a slight rotatory motion at the end of five minutes), complete solution of the iodine occurs, and this solution may then be diluted to the required volume by the addition of the remaining portion of the solvent, be it spirit, water, or glycerine. The only shortcoming in the above process, as far as the liniment and tincture are concerned, is, that while the iodine is dissolved, the iodide of potassium does not dissolve so rapidly. To overcome this difficulty I make a further suggestion involving a slight modification of the official formulæ in the case of these preparations. The following, I have found, will meet the requirements of the process I suggest :—

Linimentum Iodi.

Take of—

Iodine	1¼ ounce.
Iodide of potassium	¾ „
Distilled water	1 fluid ounce.
Glycerine	¼ ounce.
Rectified spirit	9 fluid ounces.

Add the iodine and iodide of potassium to the water and glycerine, previously mixed. Allow to stand, without agitation, till dissolved; then add the spirit and shake together.

Tinctura Iodi.

Take of—

Iodine	½ ounce.
Iodide of potassium	½ „
Distilled water	1 fluid ounce.
Rectified spirit	19 „ ounces.

Add the iodine and iodide of potassium to the water. Allow to stand, without agitation, till dissolved; then add the spirit and shake together.

In the case of liquor iodi and the volumetric solution of iodine, it is only necessary to suggest that the directions read, "Add the iodine and iodide of potassium to an equivalent weight of water, allow to stand without agitation till dissolved, and dilute with water to the required volume."

By following this method I have found that all the preparations above referred to can be made in a few minutes, and avoiding entirely the use of a mortar, the objections to which I have already pointed out. I have also found this process very useful in dispensing a frequently prescribed iodine preparation, known as Morton's iodo-glycerine solution, the formula for which, as given by Martindale and Squire, is—

Iodine	10 grains.
Iodide of potassium	30 „
Glycerine	1 ounce.

It is difficult to prepare this solution in a mortar, and I have frequently seen it dispensed with solid particles of iodine in suspension, which would be likely to cause undue irritation when applied to the throat. By adding 25 minims of water to the iodine and iodide of potassium, allowing it to stand till dissolved, and making up to 1 ounce with glycerine, a perfect preparation is obtained in a very few minutes. I consider the addition of so small a quantity of water here quite permissible, as it interferes only very slightly with the viscidity of the preparation, which is the important feature in the use of glycerine as a medium for the application of iodine to the larynx. I should also say that I do not think there can be any objection on therapeutic or pharmaceutic grounds to the substitution of a small quantity of water for rectified spirit in the official liniment and tincture; or to the slight addition to the quantity of potassium iodide in the case of the former preparation, this addition being necessary to effect solution of the iodine in the quantity of water I suggest.

Mr. BOA said this note explained a circumstance that he had hitherto been unable to understand. Having occasion to make one of the iodine preparations he placed the ingredients in the shop bottle and gave it one shake. He was then called away and did not look at it again until next morning, when he found solution was complete. He afterwards had occasion to make the same preparation, and having put the ingredients in the bottle proceeded to shake. But solution was so slow that he had to turn them out into a mortar and dissolve by rubbing them together. He now saw how solution had been so easily affected in the first instance.

Mr. DEWAR said he had for some time made tincture of iodine by dissolving the iodine and iodide of potassium in half an ounce of water and then adding the rectified spirit.

Mr. NESBIT said he did not think they would be at liberty to interfere with the official formula for the tincture by adding water, as suggested by the author and Mr. Dewar.

Mr. DEWAR said it could be done by using 60 o.p. instead of 56 o.p. spirit.

Mr. ARTHUR said he had made many gallons of Morton's solution, and had used a little water in the making of it for many years.

Mr. HILL, who replied, said he was sorry Mr. Mackenzie was not able to be present himself. He knew that he had found that a fractional part of an ounce of water would dissolve the iodine and iodide of potassium in the tincture, but thought, as there was no objection, it was better to fix a full ounce as the quantity. He rather thought half an ounce would not be enough. He did not think Mr. Mackenzie's intention was to suggest an interference with the present official formula. What he had done was rather intended to point out an improvement which might be embodied in the next revised edition of the Pharmacopœia. So long as the present formula remained official they were, of course, bound to follow it.

On the motion of the Chairman a cordial vote of thanks was awarded to Mr. Mackenzie.

The ASSISTANT SECRETARY then directed attention

to the following donations to the Museum which were on exhibition at the meeting:—

A fine collection of forty-six typical specimens of cultivated cinchona barks.

From the ROYAL BOTANIC GARDENS, Edinburgh, per Professor J. BAYLEY BALFOUR, M.D., Regius Keeper.

A small specimen of muriate of aconitine in large, well-defined crystals.

From THOMAS SMITH, F.R.C.S.E., Edinburgh.

On the motion of the Chairman a unanimous vote of thanks was awarded to the donors. The specimen sent by Mr. Smith was exceedingly interesting, and the large collection of cinchona barks sent from the Gardens by Professor Balfour would be a very useful and valuable addition to the Museum.

The meeting then closed.

Provincial Transactions.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

The third ordinary meeting of this Association was held in the rooms of the Chemical Club, Victoria Hotel, on Wednesday, January 13.

Mr. F. B. Benger occupied the chair, and notwithstanding the inclemency of the weather there was a good attendance of members.

The Chairman, before calling upon Mr. Siebold for his paper, referred to the new bye-laws of the Pharmaceutical Society, pointing out that the entrance fee of two guineas hitherto required of chemists who had been in business before 1868, and who wished to become members of the Society, had been abolished; and further that those who having belonged to the Society had ceased to pay their subscriptions could be reinstated on payment of the nominal fee of one shilling. He hoped these new regulations would remove the last objection felt by some to join the Society. In Manchester there were now two annuitants receiving £35 a year each from the Benevolent Fund—would not that induce a number of gentlemen to become subscribers?

NOTES ON URINE TESTING.

BY LOUIS SIEBOLD.

Mr. Siebold said that the subject of urine testing was such a large one that all he could attempt on an occasion like the present was to give a few fragmentary notes respecting the detection of some of the more important abnormal constituents of urine, and to deal with the errors, misconceptions, and misunderstandings in connection with this subject, to which those not sufficiently experienced were occasionally liable. He intended to confine his observations that evening to the testing for albumen, sugar, bile, and blood.

Albumen.—The detection of larger quantities of this substance was under all circumstances, he said, an easy task requiring but little experience. But the case was different when very small proportions or mere traces of this constituent, such as occurred in the earliest stages of chronic albuminuria, had to be sought for. In such cases it was not uncommon that the albumen was overlooked, while in others it was occasionally discovered without being actually present. He would, in the first place, direct the attention of his hearers to the mistake not unfrequently committed of submitting to the test samples of urine collected first thing in the morning. It was precisely this portion of a patient's urine which in incipient cases of chronic albuminuria, or of Bright's disease, was occasionally quite free from albumen, though portions collected at any other part of the day might all contain appreciable quantities of it. This circumstance was known long ago, but that it was not so generally known as it deserved to be might be seen from the fact that many medical practitioners were still in the habit of asking their patients specially for samples of morning urine, and that but quite recently a letter appeared in one of the leading medical journals calling attention to the injudiciousness of this habit. It would be obvious that under such circumstances the existence of albuminuria might be overlooked. Another cause of occasional failures to detect the presence of albumen was the fact that after the medicinal administration of acids the urine failed to respond to some of the tests most commonly employed for the detection of this substance. He had fully dealt with this point years ago, in a paper read before the British Pharmaceutical Conference ('Year-Book of Pharmacy,' 1873), and had there described the course to be adopted for the certain detection of albumen under such circumstances. He found, however, that even now this disturbing effect of mineral acids, particularly on the heat test, was unknown to many practitioners. He felt inclined to regard the apparent diminution or disappearance of albumen in urine after the administration of such acids, as the cause of the erroneous notion once prevailing that these acids afforded valuable remedies in the treatment of albuminuria.

Referring next to the various means for the detection of albumen in urine, Mr. Siebold said that, notwithstanding the recent introduction of new and very delicate processes, the older tests, viz., the nitric acid test, the heat test and the reaction with potassium ferrocyanide in the presence of acetic acid, still maintained their popularity. Of these, the nitric acid test, though it would always be esteemed as an exceedingly handy one, was undoubtedly the least delicate of the three. This test, and the precautions to be observed to prevent errors due to the precipitation of urates, etc., were so well known as to render it unnecessary for him to dwell upon them. He desired to point out that in every case in which this test appeared to indicate albumen while the two other tests gave negative results, the indications of the nitric acid test should be regarded with distrust. In connection with this test he also wished to call attention to a recent observation by R. Stockman, that urine excreted after the administration of medical balsams showed a similar behaviour with nitric acid as albuminous urine. The resinous precipitate obtained under these conditions was found to differ from albumen by being soluble both in alcohol and in an excess of nitric acid. With regard to the heat test, which in experienced hands was always a very safe and delicate one, he wished to allude to a source of error occasionally brought about by the precipitation of mucous, and in rarer cases of medicinal resins, etc., on acidifying the urine to be tested previous to boiling. Any precipitate thus formed should be first removed by filtration. The quantity of dilute acetic acid used for slight acidification should be restricted to the very smallest proportion necessary to attain the end in view, and in the case of urines already acid it should not exceed one drop, since even a very small excess of acid diminished the delicacy of the test. The acid urine, perfectly clear or filtered, should be placed in two equal test tubes, and after boiling the contents of one of them for about a minute and subsequently adding a few more drops of acetic acid to re-dissolve any phosphates in case a precipitate was produced on boiling, the two tubes should be compared in a suitable light, when the slightest cloudiness due to albumen would easily show by contrast with the clear, unboiled liquid. In the case of a patient taking mineral acids the urine should first be rendered slightly alkaline with a weak solution of sodium hydrate, then filtered, re-acidified with the smallest requisite proportion of dilute acid, again filtered if necessary, and then placed

in the two tubes and treated as before. With these precautions the heat-test was always a thoroughly satisfactory one, both as regards trustworthiness and delicacy. It was exceeded in delicacy, however, by the reaction with potassium ferrocyanide and acetic acid, likewise a very excellent test, which might advantageously be performed in addition to either of the foregoing tests in order to exclude every possibility of doubt. In this case the urine should be mixed with an excess of acetic acid, and then with a few drops of ferrocyanide, and the albumen recognized by the formation of a precipitate or turbidity. Should the mixture of urine and acetic acid not be perfectly clear it ought to be filtered. For the detection of very minute traces of albumen the perfectly clear mixture should be divided into two parts for comparison, and the ferrocyanide added to one of these only. He (Mr. Siebold) denied the accuracy of the statement recently published in the *Pharmaceutische Centralhalle*, to the effect that the application of potassium sulphocyanide in place of the ferrocyanide constituted a still more delicate test.

Alluding next to the more modern tests for albumen, the lecturer said that he could confirm all that had been stated respecting the extreme delicacy of the reactions with picric acid and with potassio-mercuris iodide. With regard to the former it had been asserted that picric acid also formed precipitates in perfectly normal urine, and this was quite true, but he did not consider this fact as at all interfering with the value of this acid as a test for albumen, since the precipitation of albumen occurred immediately, while that of uric acid or of creatinine picrate only took place after long standing. The creatinine precipitate, moreover, was soluble on the application of heat. The test with potassio mercuric chloride required the previous addition to the urine of a fair proportion of acetic acid, and the removal by filtration of any turbidity thus produced. In this case, too, it was necessary to show that the precipitate produced by the reagent (potassio-mercuric chloride) was not dissolved on heating. Quite recently a new test had been introduced by A. Jolles, consisting in the mixing of the urine to be tested with an equal volume of strong hydrochloric acid and placing a few drops of saturated solution of bleaching powder on the surface of the mixture, whereupon a white turbidity was produced at the point of contact. The reaction was characteristic, but not very delicate. Arranging the various tests for albumen in their order of delicacy, picric acid and potassio-mercuric iodide would occupy the foremost position; next in order came the test with ferrocyanide, then the heat test, after this the cold nitric acid test, and finally the reaction with bleaching powder.

Sugar.—The lecturer stated that of the various tests for sugar based on the reduction of metallic oxides he preferred the one with freshly made Fehling's solution applied in the manner described by him in the 'Year-Book of Pharmacy' for 1873. The test thus performed was thoroughly satisfactory and enabled any careful and experienced manipulator to detect as little as one-fortieth per cent. of sugar, which he thought was sufficiently delicate for all practical purposes. The fermentation with yeast also constituted a valuable and thoroughly practical test, especially if performed in accordance with the directions recently described by W. Hausmann in the *Pharmaceutical Journal*, 3rd. series, xxi., 379. The formation of a yellow crystalline compound with phenylhydrazine afforded another good and delicate test for the detection of sugar. The most sensitive of all sugar reactions were undoubtedly those described by Molish (abstract, 'Year-Book of Pharmacy,' 1887, 108), consisting in the production of characteristic colorations with alpha-naphthol and thymol in the presence of sulphuric acid. The fact that these two tests gave distinct indications also with healthy urine, even when diluted with many times its volume of water, had been put forward as a definite proof of the presence of traces of sugar as a normal constituent of urine, but this was a conclusion the correctness of which he (Mr. Siebold) could not admit. If healthy urine were evaporated to dryness, the residue extracted with alcohol solution of potash, the deposit formed in this mixture after prolonged standing dissolved in water, this solution treated with an excess of acetate of lead, the filtered liquid freed from lead by sulphuretted hydrogen, and the excess of the latter expelled, the resulting liquid failed to give any indications of sugar, while saccharine urine similarly treated always gave a positive result. From this he concluded that Molish's tests were not entirely unaffected by urine constituents, other than sugar. In his opinion the normal occurrence of sugar in healthy urine still remained unproved. Before quitting this part of the subject, he desired to call the attention of his hearers to the recent discovery in the blood, and more especially in the chyle, of a glycolitic ferment, possessing the power of destroying glucose, and to the observation that this ferment disappeared in the blood of patients suffering from diabetes.

Bile.—The usual mode of detecting bile pigments in urine depended on the play of colours produced on the addition to the urine of nitric acid containing nitrous acid. He, Mr. Siebold, had no doubt that most of his hearers who had worked with this test would have found it more or less unsatisfactory. He would strongly recommend to them Rosenbach's modification of this test, which was as follows:—Urine containing bile, when passed through white filtering paper, imparts yellow or brown colour to the paper. On allowing one drop of strong nitric acid to run down the side of the moist filter, it leaves a yellow stream, soon changing to orange, with a violet border, on the outside of which blue and emerald green zones may be observed.

Blood.—The presence of blood corpuscles in urine was so easily detected with the aid of the microscope that he (the lecturer) thought it unnecessary to dwell on this point. As a chemical test for the presence of blood he would recommend that described by Luchini, according to which the urine under examination was shaken with chloroform and about one drop of acetic acid, and the presence of blood deduced from the colour imparted to the chloroform. As a confirmatory test the urine might be precipitated by means of tannin, the precipitate collected, washed, dried and incinerated, and the ash tested for iron. These chemical tests would also succeed in cases where the microscope failed, namely in all those instances in which the urine contained any dissolved blood and no corpuscles.

The lecture concluded with a brief reference to quantitative urinary analysis, insisting once more, as he did at the Pharmaceutical Conference in 1873, that for the purposes of such analyses specimens of entire urine collected in twenty-four hours ought to be submitted to analysis, and not merely specimens collected singly during the day. He reiterated the reasons for the adoption of this course, showing that quantitative analyses of samples of urine not representative of the whole day's discharge were in a majority of cases of but little practical value.

In spite of all that had been said and written on the subject at various times, this fact was still very commonly overlooked.

In reply to a question by Mr. Charles Turner, Mr. Siebold said that the potassio mercuric iodide test for albumen was performed simply by adding a small quantity of reagent to the urine previously mixed with acetic acid. He could assure Mr. Turner that this test had no action whatever on urea. Alkaloids

and peptones were liable to form precipitates with this re-agent, but such precipitates differed from the one due to albumen by being soluble on the application of heat.

In answer to observations by Mr. J. Spilsbury, the lecturer said that with regard to the test for albumen he could not admit that the addition of nitric acid to the boiled urine was preferable to the acetic acid. His own experience went entirely the other way. As to quantitative analysis of urine, his only reason for saying so little on the subject was that there was absolutely no time on an occasion like the present to deal with more than very small and fragmentary portions of so large a subject as that of urine testing.

On the motion of Mr. William Stones, seconded by Mr. Wm. Kirkby, a vote of thanks was accorded to Mr. Siebold for his interesting address, and a hope was expressed that at some future date he might read another paper on a subject the proper understanding of which might be of great utility to pharmaceutical chemists.

Parliamentary and Law Proceedings.

The Pharmaceutical Society and Unqualified Men.

At the Sheffield County Court last Thursday (the 14th inst.), before his Honour Judge Ellison, William Sales, described as a shopkeeper, 59, Gower Street, Sheffield, was sued by the Council of the Pharmaceutical Society of Great Britain through the Registrar, Mr. Bremridge, for £15, penalties for three offences against the Pharmacy Act. Mr. T. R. Grey, barrister (instructed by Messrs. Flux, Son and Co., London), appeared in support of the claim, and Mr. A. Muir Wilson represented the defendant.

Mr. Grey, in stating the case, said the Society were suing for penalties under the Act of 31 and 32 Victoria, chap. 121, sec. 15. That was an Act amending 15 and 16 Vict., which affirmed the royal charter of 1843. The aim of the Act under which the Society were suing was the safety of the public, preventing ignorant and incompetent persons from assuming the title of or pretending to be pharmaceutical chemists, or assuming the title of chemist and druggist. Another object was to prevent persons from selling or keeping open shop for the retailing, dispensing or compounding of poisons without possessing competent and practical knowledge of their business. A further object was to prevent risks of accident arising from the sale of poisons by unqualified persons, and to throw difficulties in the way of persons who were desirous of doing business for felonious purposes. Under section one it was unlawful for any person to sell or keep open shop for the retailing, dispensing or compounding poisons, or to assume or use the title chemist and druggist, or chemist, druggist or pharmacist, in any part of Great Britain, unless such person was a pharmaceutical chemist or a chemist under the Act and was registered. Section 2 referred to schedule A with regard to the articles which were classed as poisons, and these included all preparations of opium or poppies. Section 3 set out who were chemists and druggists within the meaning of the Act. Section 13 was the next section of importance, and it was to the effect that an annual register should be kept, to be published and be in evidence, and the last few lines of that section were, "and the absence of the name of any person from such printed register shall be evidence, until the contrary shall be made to appear, that such person is unregistered according to the provisions of the Pharmacy Act or this Act." Then came section 15, under which the Society were now specially suing, and this declared that from and after December 31, 1868, any person who kept an open shop for the retailing, dispensing, or compounding of poisons, or who should take, or use, or exhibit the name or title of chemist and druggist or chemist or druggist, not being a duly registered man, should for every such offence be liable to a penalty of £5. In this case they were suing the defendant, in the first place for selling a poison, secondly for keeping open shop for the retailing of poison, and thirdly for taking, using, or exhibiting the name or title of chemist.

Mr. Wilson: I should like to ask the learned counsel whether he is asking for the threefold penalty for the same offence, or going to be content with one penalty! He has put it in such a form that it looks like prosecution and not an action.

His Honour: I understand he claims for three offences.

Mr. Wilson: It is really one offence of selling poison.

His Honour: It is merely a question under the Act of Parliament whether they are distinct offences or one offence.

Mr. Wilson: They are distinct offences under the Act, but it all relates to the sale of one bottle of poison, and yet they are having a three barrelled shot at us.

Mr. Grey, continuing, said it was true the name of J. T. Griffin, chemist, was over the shop and on the labels placed upon the bottles, but in respect to that he had to say that J. T. Griffin did not carry on business in Sheffield, but at Chingford, Essex, and there was nothing to show that the business carried on at 59, Gower Street, Sheffield, was his. The presumption therefore, was that J. T. Griffin was not the proprietor of that shop, but the defendant himself was keeping open shop, contrary to the statute. It was clear with regard to the actual selling of the poison that the defendant was liable. In the case of the Pharmaceutical Society *v.* Wheeldon, before Mr. Justice Hawkins, it was held that an unregistered chemist's assistant who, in the absence of his master, sold any poison or preparation containing poison was liable to the penalty, notwithstanding that he effected such sale on behalf of his master and that his master was duly registered. The whole point of the statute was to try and stop the selling of poisons by unqualified people.

His Honour: That is quite clear.

Mr. Grey: And it is necessary to take these steps.

Joseph Higgins, ex-sergeant of police, was then called, and he stated that on August 14 he visited 59, Gower Street. He saw the defendant serving in the shop, and asked him for two pennyworth of laudanum. The defendant supplied him with it, finding the bottle, for which he charged a penny. He (witness) sealed the bottle up, and handed it to Mr. Moon.

Mr. Harry Moon, from the Pharmaceutical Society, stated that the last witness handed him the bottle on November 10, and a few days ago he gave it to Mr. Eastes for analysis.

Mr. Ernest John Eastes, analyst and assistant to Professor Attfield, and Fellow of the Institute of Chemistry, said the sealed bottle he found to contain a preparation of opium which was usually called laudanum.

Mr. Grey said the only other evidence was the Register for 1891. This did not contain the name of the defendant, and therefore according to the Act of Parliament he was not qualified as a chemist.

His Honour: Yes, *primâ facie*.

Mr. Grey: Unless, of course, he shows the contrary. Continuing, he said the name of John Taylor Griffin appeared in the Register for 1889, and his address then was 4, Nether Edge Road, Sheffield, but the last Register showed that he had removed to Chingford.

Mr. Wilson intimated that he should not call wit-

nesses, and proceeded to address the Court. He first drew his Honour's attention to the fact that no authority had been shown for Mr. Richard Bremridge, the Registrar of the Society, bringing this action. He therefore asked that the plaintiff should be non-suited unless Mr. Grey disclosed his authority.

His Honour: I do not know whether there is anything in the Act of Parliament about that.

Mr. Grey: No, it is unnecessary, but the authority is here (holding up a document).

Mr. Wilson: I object to it, if it is not properly proved.

His Honour: I will take a note of your objection, but is that your only point?

Mr. Wilson: No.

His Honour: You do not take any objection as to Mr. Bremridge being the right person to sue on behalf of the Society.

Mr. Wilson: I admit nothing about Mr. Bremridge. We have no evidence that he is the Registrar. I want to see whether this Society has authorized this man to be sued for three offences, when there is really only one. With regard to the second paragraph in the claim; there is no evidence to show that the defendant kept his shop open, within the meaning of the Act of Parliament, for the retailing, dispensing and compounding of poisons.

His Honour: Yes, I think there is evidence of that.

Mr. Wilson: Evidence that he was in the shop.

His Honour: That he sold in the shop.

Mr. Wilson: That is an offence about which I cannot say very much.

His Honour: But it is evidence of keeping open shop if he sells in open shop.

Mr. Wilson: Ah! If he keeps the shop.

His Honour: Well, it is his *primâ facie*.

Mr. Wilson contended there ought to have been some evidence as to the tenancy of the shop and other matters connected with it, to show that he kept open shop. His next point was that there was no evidence that he used or exhibited the name or title of chemist. He did not see that he could resist the allegation that his client did sell a poison, and the case cited by the learned counsel was sufficient on that, because if he set up that the defendant was the assistant or local manager of John Taylor Griffin it would be no excuse and would not free the defendant from the penalty. Although it was common knowledge that in nearly every chemist's shop in the land assistants sold poisons, who were not registered, yet that would not help him. It should be well and clearly known now that any unregistered assistant who sold poison was liable to the penalty of £5.

His Honour: Of course the evil is just the same, because the master may be out.

Mr. Wilson: Sometimes we find that the unqualified men appear to know more than the registered people. But I submit the action is not properly before the court. There is no evidence that my client kept open shop. This Society, with all the power and money that it has behind it, surely could have got to know who was the actual tenant.

His Honour: There are very few cases, I see, that have been decided under this Act.

Mr. Wilson: Very few; perhaps it is that the Society are waking up. But still, if a Society comes before the court, they must come on proper legal lines, and particularly when they are seeking to recover three distinct penalties for the same act. It is a heaping up of penalties, which is not becoming a Society of this character. It is true the penalties are imposed under the statute.

His Honour: You mean keeping open shop by the tenant?

Mr. Wilson: I do, your Honour.

His Honour: And that the shop belongs to the person whose name is given over it?

Mr. Wilson: Yes; and I say he is not liable to the other two penalties.

His Honour: A man may be liable, clearly, to those three penalties. Supposing he sold in the shop, had his name over it, and kept open shop he would be liable to the three penalties.

Mr. Wilson: I admit at once that if my client had had over his shop "W. Sales, Chemist," he would have been liable to the three penalties.

His Honour: I think so.

Mr. Wilson: But as to the decency of the thing that is another matter, and I do think that a Society like this should not try and persecute the poor unfortunate man that has got into this difficulty. My client has tried to pass on two occasions, and he hopes to pass almost immediately, and then we shall get over all this difficulty. However, he says he has done wrong, and I cannot resist judgment on the first item.

His Honour: As you call no witnesses it is simply a question of law.

Mr. Grey, in replying to Mr. Wilson's arguments, said section 12 declared that the Registrar of the Society was the person to recover penalties under the Act.

His Honour: You ought to prove that this gentleman is the Registrar.

Mr. Grey: I should ask, in that case, to re-call Mr. Moon.

Mr. Wilson: But your case is closed.

His Honour: Of course I shall allow it; it is merely a technicality.

Mr. Moon, re-called, produced a document bearing the seal of the Society, and authorizing Mr. Bremridge, the Registrar, to sue for penalties incurred under the Act.

His Honour held that that was sufficient evidence.

Mr. Grey was about to address the court on the points of the defendant keeping open shop and using the title of chemist, when—

Mr. Wilson interrupted, contending that as he had called no witnesses counsel could not argue on questions of fact.

His Honour said that to some extent Mr. Grey must speak of facts.

Mr. Grey: He is trading under that name.

His Honour: What you have shown is that this man Griffin has got a shop at Chingford and is on the Register for that place, but it does not follow from that that he is not carrying on at a shop in Sheffield.

Mr. Grey: No, he may have a shop at Sheffield, but what I say is this; I have produced sufficient evidence to put the defendant on his trial as to his being the occupier of that place.

His Honour: You know that this is a penal statute, and of course the burden is upon the person who enforces the penalty. The burden is upon you to show that he has incurred the penalty which the statute names.

Mr. Grey: Yes. But having shown that Griffin is not at 59, Gower Street, but at a totally different place, that he never was at 59, Gower Street, and that William Sales was the only person at that shop, it is for him to show that it is not his shop, and that he does not get the benefit of the sales.

His Honour: Do you say that the defendant has wrongfully put up the name of John Taylor Griffin.

Mr. Grey: I do say so. I say he is trading under that name like, for instance, people who carry on under the name of persons who are dead.

Mr. Wilson: Boot and Company, Limited, what about them?

Mr. Grey: It is not J. T. Griffin but W. Sales who I say is the owner of this shop and who has acted as a chemist.

His Honour: Supposing it was something else—not a chemist but a bootmaker—we know perfectly well

that bootmakers carry on their business under other names in perhaps twenty towns, why should not chemists?

Mr. Grey: That may be so, but then there is evidence to show it. It is only a qualified person who can carry on this business at all.

His Honour: But is not the presumption of law in favour of the Act being properly done, and if the name of John Taylor Griffin is on that shop, is not the presumption that it is rightly there, that the man who put it there had authority to do so, and was not carrying on for himself but for Griffin?

Mr. Grey: Well, I will leave the case where it is.

His Honour: I think properly you ought to have brought John Taylor Griffin here to have told me it was not his shop.

Mr. Wilson: Mr. Griffin would say it was his shop.

Mr. Grey: Put him in the box then.

Mr. Wilson: Certainly not; you must prove your case. I am not going to prove my innocence; you most prove me guilty.

His Honour: I feel the weight of that.

Mr. Grey: I submit that I have proved sufficient.

His Honour: What you have proved is this, that the defendant, in a shop which has the name of John Taylor Griffin over it (who is a registered chemist) sold a bottle of laudanum. Well, what is the inference a jury would draw from that fact? Why, that the person keeping that shop open was Griffin, and that the person selling the laudanum was his servant. True, he is liable under the Act for selling poison, but how is he liable for keeping open shop for another man and exhibiting the name of another man as chemist who is a chemist?

Mr. Grey: Because we prove that Griffin does not carry on business there at all.

His Honour: Who says he does not?

Mr. Grey: I have put in two registers which show that he never had an address at 59, Gower Street, Sheffield, at all. His address was Nether Edge Road and then he moved to Chingford, in Essex.

His Honour: Does the Act require a registered chemist to declare every shop he holds? Supposing a registered chemist carries on business in twenty towns is he to be registered for every one of those shops?

Mr. Grey: He has to give his change of address when he moves from one place to another.

Mr. Wilson: That is where he may be found and not every place that he does business at.

Mr. Grey: He has never given 59, Gower Street, Sheffield.

His Honour intimated that he should give judgment on the 28th inst.

Poisonous Weed Killer.

At the Lewes Bench of Magistrates, on Tuesday, the 12th inst., before Mr. J. G. Blencowe, Esq. (in the chair), Major F. S. Shenstone, W. L. Christie, F. G. Courthope, and C. R. Kemp, Esqrs., Richard Stevenson, seed and corn merchant, of North Street, Lewes, was summoned for selling a gallon of poisonous preparation, to wit weed destroyer, without registering the sale of the same in a book as required by statute.

Mr. H. Prince appeared for the prosecution, and Mr. J. H. Holt represented the defendant.

Mr. Holt raised a preliminary objection to the information on the ground that it did not clearly and sufficiently indicate the offence with which the defendant was charged.

The Magistrates' Clerk: Do you want the case adjourned?

Mr. Holt: I shall ask for the information to be dismissed on the grounds I have stated.

The information, together with the Act of Parliament bearing on the subject, was then read by the Chairman.

Mr. Holt, proceeding, said the defendant was charged with having sold and delivered a certain quantity of arsenical preparations without having signed the entries required by the statutes in such case. There were two Acts of Parliament, one the Arsenic Act relating to the sale of arsenic, and the other the Pharmacy Act of 1868, relating to the sale of poisons, including arsenic. Now, the offence under each of the statutes would be materially different, and they wanted to know under which statute were they charged with the offence? He submitted that they could not be charged under both statutes—it must be either one or the other. There was a separate offence under the Arsenic Act and a separate one under the Pharmacy Act of 1868, and they had not the slightest idea with which offence they were charged. Consequently he asked that the information be dismissed on the grounds that it did not sufficiently disclose the offence.

Mr. Prince said, of course, if his friend had asked him or the police, he and Supt. Waghorne would have furnished him with the precise information in the matter. The case had been brought by a public authority, and they did not want to conceal anything; they wanted it to be disposed of on the broadest and fairest issues. He knew of no obligation which they were under to satisfy the other side as to under which statute they were proceeding. Here there were two statutes, and they were proceeding under both of them, and they had a perfect right to do so. They were proceeding under both the Arsenic Act of 1851 and the Pharmacy Act of 1868. Certain provisions made the Pharmacy Act really supplemental to the Arsenic Act. He submitted that the charge was perfectly regular, and he was entitled to ask their worships to proceed with the charge as it appeared on the summons.

Mr. Holt contended that Mr. Prince could not proceed under both of the Acts. It must either be one or the other.

Mr. Prince said he should deal with the case practically under the Pharmacy Act, but he maintained he was entitled to proceed under both Acts. If the bench put him to an election he should elect to proceed under the Pharmacy Act. Mr. Prince, proceeding, said the facts of the case were, he did not think, in dispute. It would probably become more a matter of law than facts. The case was of great importance not only to the defendant but to the country at large, and it was very desirable indeed to obtain some proper decision from some competent court as to whether the transaction in question was an innocent one or an illegal one.

Mr. Holt here interposed, and intimated that if Mr. Prince was proceeding under the Pharmacy Act he should plead guilty.

Mr. Prince: That simplifies matters altogether then. Continuing, Mr. Prince said it was not a matter of money but of principle. He would just state the facts. On November 2 Supt. Waghorne directed a tradesman in the town to purchase of the defendant a gallon of what was called "weed killer." Mr. Waghorne had previously given a friendly hint to the defendant that, having regard to what had recently taken place at Crowborough, the stuff should not be continued to be sold, as it was dangerous or illegal. Mr. Stevenson did not seem to have appreciated Mr. Waghorne's suggestion, and the latter instructed, owing to a difficulty which he had previously experienced in trying to purchase the article elsewhere, Mr. Head, who was not in any way an informer, to purchase a tin of the weed killer in the ordinary way of business. The tin eventually found its way to the County Analyst in the exact condition it was purchased, and an examination showed that it contained a strong preparation of arsenic, a spoonful of which to a gallon of water would be fatal to a human being, and if the contents of the

tin had been placed in an ordinary wooden barrow and water, or other liquid placed in the barrow, the wood would have absorbed a large quantity of arsenic, and the water would have been of a very dangerous character, as was taken at Crowborough recently. This prosecution was instituted by the county police in the hope that it could be shown that the transactions in question were absolutely illegal, and must not be continued, and if this "stuff" was to be sold it must be sold with the precautions to the public required by the Act. He then called

Horace Head, gardener, of Lewes, who stated that on November 2 he purchased a gallon tin of weed killer (produced) from the defendant.

Were you asked to sign any book?—No, sir.

Did you in the same condition as you bought it hand it over to the police?—Yes.

Were you asked for what purpose you required the preparation?—Yes; and I said I was going to put it on my garden walks.

Serjeant Coppard said he received the tin of weed killer (produced) from the last witness and handed it over to Superintendent Waghorne.

Superintendent Waghorne stated that he received the tin and handed it personally to Mr. Moore, the county analyst, in the same condition as he received it.

Mr. Prince said there was some question as to whether there was a brass plate on the tin when bought.

Witness: No; I passed it on in exactly the same condition as it was handed to me.

Head (re-called) said he did not notice any brass plate.

Mr. Moore, county analyst, was next called. He deposed to receiving the tin from Superintendent Waghorne and said, from an analysis of the contents, he found a colourless solution, consisting of strong alkaline preparation of arsenic.

Mr. Prince: What would be the strength of a teaspoonful?—A teaspoonful would unquestionably be fatal to an adult.

On the ground of its strong arsenical properties?—Yes.

If that kind of stuff was placed in an ordinary wooden tub, what effect would it have?—The wood would absorb the arsenic, which would be translated to water. It would be extremely dangerous.

In answer to Mr. Holt, the witness said that the colour of the liquid was not blue; it was like pond water.

In reply to the Chairman, Mr. Moore said that this was the first sample of the preparation that had come under his notice, but he believed that it had been made the subject of other prosecutions in other parts of the country under the Pharmacy Act.

Mr. Prince said that there was a large quantity of it made at Tunbridge Wells.

Mr. Holt, in mitigation, urged his client's absolute ignorance of the illegality of the transaction. This preparation was sold by a large firm at Glasgow. They were the patentees of the article, and had sold it for six years, and no prosecution had ever been taken. Mr. Stevenson had sold it for three years and he was not aware that he was in any way committing a breach of the Act with reference to the sale of poisons. Had he been told that it was, he would not for one moment have continued dealing with it. Every tin was labelled "poison," and all precautions were taken for the safety of the public. He would ask their worships to treat the case in a very light manner. Mr. Stevenson was totally ignorant that he was doing anything wrong, and the article had been sold and was at the present time sold by numerous seed merchants all over the country. Of course, the decision of the bench would have some effect of stopping the sale and confining it only to chemists and druggists.

Samuel Elphick, seed merchant, of the Cliffe, Lewes, was then similarly summoned.

Defendant pleaded guilty, but said that he had no idea he was committing any offence by selling the weed killer.

Mr. Prince said the facts in this case were exactly the same as in the last, but he might say, in justice to Mr. Elphick, that the preparation was manufactured by another firm, and was, he believed, slightly less powerful.

Mr. Prince said he should like to draw the attention of the bench to the fact that Mr. Moore was not acting in the capacity of county analyst in the present case, because it was not a prosecution under the Adulteration Act. He was there as what he might call an expert witness, and he therefore asked to be allowed the fees usual in such cases. It was compulsory for him to be called.

Alderman Kemp: The police produced the witness; cannot the costs in producing him be included in the police charges paid by the County Council?

Mr. Prince: Oh, yes: that will do. It is only a matter of principle.

The Chairman: I think there will be no difficulty about that.

The Bench, after a few minutes' consideration, imposed a fine of £1 and 19*s.* 6*d.* costs in the first case, and £1 and 13*s.* 6*d.* costs in the last.—*Sussex Express.*

BOOK RECEIVED.

PROCEEDINGS OF THE CHEMISTS' ASSISTANTS' ASSOCIATION, containing papers and discussions and full particulars of the meetings held during the Session, 1890–1891. No. VII. Jenkinson and Son, Stamford. Price 2*s.* 6*d.* From the Secretary.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

PICTET CHLOROFORM.

Sir,—We beg to be allowed to oppose the statements in Messrs. Macfarlan and Co.'s letter in the *Pharmaceutical Journal*, January 2, p. 528, by the following:—

(1.) The sample in question has not been ordered from ourselves, as ought to have to have been done to preclude the possibility of the bottles being opened and the contents tampered with, as seems to have been the case. We have applied for the registered number of the bottle, in order to compare our retained sample of same manufacture.

(2.) The very grossness of the facts urged show they cannot possibly refer to the average standard of Pictet's chloroform. Even the raw material it is made from is better than the stuff described by Messrs. Macfarlan.

(3.) We have invariably found the boiling point of our chloroform to remain with ½° C. from commencement of distillation to the boiling over of the last drop, provided the necessary precautions are taken to prevent overheating.

We refer, for corroboration of the last, to the *British Medical Journal*, January 2, p. 22.

Berlin, N. Usedomstrasse 28. RAOUL, PICTET AND CO.

NOTICES OF MEETINGS.

Chemists' Assistants' Association.—Thursday, January 28.—"Continuous Percolators and Fat Extractors," by W. H. Symons, F.I.C., F.C.S.

R. P. Roe.—Your advertisement should have been sent to the Agents, 11, New Burlington Street. See p. 595.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. J. C. Stead, T. Horton, C. G. Yates, A. H. Mason, H. Saxby, T. W. Skeet, J. Clark, W. G. Mackenzie, W. Mair, R. P. Roe, J. and A. Churchill.

"THE MONTH."

Digitalein (Digitonin).

In a memoir on the physiologically active constituents of *Digitalis purpurea*, Schmiedeberg classified the compounds into soluble and insoluble digitalins, according to their behaviour towards water. The soluble digitalins included a glucoside very slightly soluble in water, to which Schmiedeberg gave the name digitonin, and a less definite body called digitalein. Digitonin has been recently examined by Kiliani (*Pharm. Journ.*, xxi., 979), and in a communication presented to the Paris Academy of Sciences (*Comptes Rendus*, Nov. 9, 648) M. J. Houdas records his investigations on the same compound, although he prefers to retain for it Nativelle's name of digitalein. The confusion arising from the retention of two different systems of nomenclature for the digitalins by French and German chemists respectively has already been commented upon in these columns (xvii., 163). M. Houdas mentions that the most characteristic property of digitalein (Schmiedeberg's digitonin) is the formation of crystalline compounds with the alcohols of the fatty series and with the phenols, which also contain water of crystallization. He describes such compounds with methyl, ethyl, and amyl alcohols, and with carbolic acid prepared by the addition of the respective alcohols to an aqueous solution of digitalein, and remarks that the solubility of the crystals is inversely proportionate to the molecular weight of the alcohol employed. The compound with ethyl alcohol loses its alcohol and water at 110° C., dissolves slowly in cold water, rapidly in boiling water, but the solution on evaporation only yields a gummy mass, all attempts to crystallize digitalein from water being at present unsuccessful. The glucoside is only slightly soluble in absolute alcohol, less so in chloroform, ether, or ligroin, and the aqueous solution shows $[\alpha_D] = -49{\cdot}25$. Analyses give results in accord with Schmiedeberg's figures and corresponding to the formula $C_{31}H_{52}O_{17}$ (Kiliani found $C_{27}H_{44}O_{13}$), but M. Houdas expressly states that he considers the above formula merely tentative until he has examined the decomposition products. He also comments upon Kiliani's statement that digitonin yields equal molecules of digitogenin, glucose, and galactose. Without denying that such may be the final products of hydrolysis, he states that the substance to which he applies the name of digitalein may be converted by the action of very dilute sulphuric acid into two new crystalline glucosides without formation of any glucose. The isolation of a new crystalline glucoside, resembling strophanthin and ouabain in composition, from the amorphous digitalin of the Codex, is also mentioned.

Lupanine.

The investigations of Hagen on the constituents of the blue lupine, *Lupinus angustifolius*, brought to light a new alkaloid, to which he gave the name "lupanine." This alkaloid differs from that found in the seeds of the yellow lupine, *L. luteus*, and from analyses of the hydrochloride, hydriodide and platinum salt Hagen describes it as a tertiary base with the formula $C_{15}H_{25}N_2O$. As this formula is obviously incorrect, C. Siebert has further examined the alkaloid with a view of ascertaining its correct formula and whether it possesses any near chemical relation to lobeline (*Pharm. Journ.*, xxi., 162), to which *prima facie* it bears some resemblance (*Archiv d. Pharm.*, ccxxix., 531). For the extraction of the alkaloid Siebert employs Hagen's method, which involves such rough treatment of the basic constituents of the seeds that the question whether lupanine occurs as such in the plant or is the decomposition product of a mother substance may very well be raised. Certainly lupanine itself is a very stable compound, and would suffer little in the extractive process, for Siebert finds that it is practically unattacked by concentrated hydrochloric acid at 200° C., or by boiling aqueous or alcoholic potash solution. An examination of the haloid salts, all of which crystallize well with two molecules of water, as well as of the platinum and gold salts, indicates that lupanine is a monovalent base of the formula $C_{15}H_{24}N_2O$. The free base has not been obtained crystalline, but combines readily with methyl iodide, as Hagen stated, to a crystalline additive product, whence its tertiary nature is concluded. By dry distillation with soda-lime lupanine yields half its nitrogen as ammonia, half in the form of a pyridine base, whilst the evolution of an unsaturated hydrocarbon indicates the presence of a side chain in its molecule. An oxidation experiment with potassium permanganate in acid solution yielded a neutral crystalline compound of the formula $C_{15}H_{20}N_2O_3$ and a non-crystalline, non-nitrogenous acid. Lupanine and lobeline have no close constitutional relationship.

Salicylic Acid Reaction.

According to Messrs. Schneegans and Gerock (*Journ. Pharm. Els. Loth.*, Nov., p. 285) the violet colour resulting from the mixture of 10 c.c. of a 0·2 per cent. solution of salicylic aldehyde with 2 c.c. of a very dilute solution of perchloride of iron may be removed by shaking it with 5 c.c. of chloroform or ether. But if only 0·0002 gramme of salicylic acid be added the violet colour remains persistent. A similar reaction occurs with the methyl ester of salicylic acid, and it may be used to detect as little as 1 part in 500 of free acid in artificial oil of wintergreen.

Sophorine and Cytisine.

Among the numerous compounds isolated from plants in the chemical laboratory at Buitenzorg, Java, which were recently the subject of a communication from Dr. Greshoff (*Pharm. Journ.*, [3], xxi., 559, 1056), was an alkaloid obtained from the leguminous seeds of *Sophora tomentosa*. A small quantity of this substance, received by Professor Plugge as a thick red-brown fluid, when tested physiologically gave results indicating the probability that it is identical with cytisine, the alkaloid of laburnum seeds, and this probability was strengthened by the results of such chemical and spectroscopical tests as were possible with the small quantity of material available (*Archiv d. Pharm.*, ccxxix., 561).

Conditions favourable to Growth and Germination.

The view currently taught in botanical text-books that the turgidity of the cell-contents is the sole cause of the growth of the cell-wall is disputed by Professor Godlewski (*Anzeiger der Akademie der Wissenschaften*, Krakau), who points out that, while growth varies greatly with the temperature, the turgidity of the cell remains the same at different temperatures. Again, it is in the youngest parts of a plant, where turgidity does not vary with the presence or absence of light, that growth exhibits the greatest variation between day and night. Without asserting that turgidity has

no influence, Godlewski maintains that the growth of the cell is mainly due to a special property of the living protoplasm, which is not only contained within the cell, but also permeates the cell-wall. The rays of the sun exercise a retarding influence on growth, but not immediately, since the stem of *Phaseolus multiflorus* lengthens more by day than by night. Any diminution of moisture in the air causes a sudden but transitory retardation of growth; while an increase in moisture causes its temporary increase. Violent increase in temperature retards growth. The temperature of the soil appears to have very little influence on growth. From experiments made, chiefly on *Zea Mays*, *Lactuca Scariola*, *Triticum æstivum*, *Vicia Faba*, and *Nicotiana Tabacum*, Professor Aloi has arrived at the conclusion that the electricity of the atmosphere exercises a beneficial influence on the growth of plants, while that of the soil has a similar influence on the germination of seeds. The vigour of germinating seeds is largely due to the depth at which they are planted; when too near the surface they will not grow vigorously. Kraus has shown that the optimum depth for each species does not depend in any way on the size of the seed. Those of leguminous plants are comparatively indifferent to the depth at which they are planted; while the vigour of germination of maize is greatly dependent on this condition. In the same way the eyes of potatoes and other vegetative reproductive organs will only germinate vigorously when planted at a favourable depth.

Influence of Poisons on Germination.

M. C. Cornevin has made some interesting observations on the action of poisons on the germination of the seeds of the plants which produce them, with special reference to saponine, cytisine, nicotine, and narcotine. In the cases where the poison is formed in the seeds, as saponine in those of *Agrostemma Githago*, and cytisine in those of *Cytisus Laburnum*, its presence in no way hinders the germination of the seed. Where the poison occurs in some other part of the plant than the seed, as in the latex, its effect on the germination of the seed varies in different cases. Seeds of the tobacco plant, when brought into contact with nicotine, either do not germinate at all, or the process is greatly retarded; while, on the other hand, of the alkaloids contained in the poppy, narcotine, codeine, and narceine stimulate the germination of the seeds; morphine and thebaine appear to produce no effect; and papaverine acts as a poison.

Kefyr.

The milk-fermenting kefyr or kephir of the Caucasus and other parts of Eastern Europe has long been known as a special form of yeast, to which the name *Saccharomyces kephir* has been given, and which presents a strong similarity to the well-known "ginger-beer plant." Mr. C. L. Mix finds a similar yeast in use in parts of the United States and of Canada. It occurs in the form of small granules of a dirty brown colour, and consists of a small proportion of yeast-cells imbedded in zoogloea-like masses of rod-shaped bacteria. The yeast-cells are spherical or elliptical, the former averaging 4·2 μ in diameter, the latter varying between 10·5 and 6·5 μ in length, and 6 and 4 μ in breadth. They increase by budding, and no formation of spores could be detected. They do not invert cane-sugar like ordinary beer-yeast. They cause alcoholic fermentation in lactose or milk-sugar, and in dextrose, but not in cane-sugar or saccharose. The bacteria are short cylindrical rods containing a homogeneous protoplasm, and vary between 8·5 and 4·5 μ in length; their breadth being about 0·8 μ. Under cultivation they develope into leptothrix-filaments in which spores appear. They appear to take no part in the fermentation, remaining almost entirely imbedded in the zoogloea-masses during the process.

Action of the Colours of Flowers on Photographic Plates.

It has long been believed that insects could detect tones higher than those audible to the human ear; and it is probable that they can also detect rays of light invisible to the human eye. Being struck with the fact that the flowers of *Sicyos angulata* were very largely visited by insects, notwithstanding their small size and light green colour, Dr. P. Knuth has made a series of experiments with the view of determining the relative intensity of the action of flowers of different colours on photographic plates. The flowers experimented on were those of *Chrysanthemum segetum*, *Calendula officinalis*, a dark red *Dahlia*, *Centaurea Cyanus*, *Bryonia dioica*, *Sicyos angulata*, a white *Phlox*, etc. As a general rule Dr. Knuth found that the order of succession in the development of the plates corresponded to the curve of the chemical rays of the spectrum, the images of the white flowers coming out first, those of the red flowers last, except that the light green flowers of *Bryonia* and *Sicyos* came out earlier and stronger than might have been expected, requiring but little longer exposure than the pure white flowers. The only explanation of this phenomenon which the author is able to suggest is that the flowers of these plants give out ultra-violet rays, which are able to attract the visiting insects. By a series of optical experiments Herr Knuth demonstrated that the flowers of *Sicyos* have about one-half, those of *Bryonia* about one-third, the intensity of pure white; which is much more than that of a mixture of white and black that would produce an equally bright tint of grey.

Oil as a Reserve Material in Plants.

The gradual transformation of starch into oil in the autumn in many trees has been studied by M. Suroz (VIII. Congress Russischer Naturforscher und Ærzte), especially in the cases of the lime, poplar, birch, and plum. This process begins to take place in the smaller branches from the middle of August to the early part of September, according to the species, and is completed at a period varying between the end of October and the middle of November. The oil thus formed then begins to travel from the slender branches to the trunk, and, by about the end of December or beginning of February, has completely left the twigs. The passage takes place apparently both in the bark and in the wood. This condition lasts only a few days, or, at the most, a month, when a transport sets in in the opposite direction, the branches becoming, by the end of February or beginning of April, as full of oil as they were in the autumn. A transformation now takes place, beginning in the youngest branches, of the oil into carbohydrates,—starch and sugar. This storing up of oil takes place in all the amylaceous tissues, viz., in the parenchyme both of the bark and of the wood.

A series of experiments has been made by M. L. Daniel in grafting on roots and tubers. He finds that it is, as a general rule, easy to obtain a graft on a root or underground stem of a plant nearly allied to the graft-plant, and in some cases even on a species belonging to a different natural order; as, for instance, of *Saponaria* on *Œnothera*. For the graft to succeed, it is not always necessary for the generating layers of the host and of the stock to be in contact with one another. The failure of grafting is often due to an obstacle of a little-known character presented by the cell-walls of the graft-plant to the passage of certain nutritive substances from the cells of the host to those of the graft. This is especially the case with inulin in the Compositæ.

Grafting on Underground Parts of Plants.

The fact, which Dr. Frank and Dr. Otto claim to have established, that the leaves of leguminous plants can make direct use, in their nutrition, of the free nitrogen of the atmosphere, has suggested to them a practical application to agriculture. As a consequence of this absorption of nitrogen, the leaves of leguminous plants contain a larger proportion of asparagin in the morning than in the evening. They recommend that those crops which are cut green for fodder, such as clover, should always be cut shortly after sunset; and, for the same reason, they suggest that evening is the best time for the pasturing of cattle, especially when the weather is clear and warm in the daytime.

Supply of Food-Material in Green Crops.

Maquenne (*Comptes Rendus*, cxiv., 25) finds that the metals of the alkaline earths combine directly with nitrogen at a red heat, forming nitrides which are decomposed by water with formation of ammonia. He considers that there is evidence of a considerable affinity of these metals for nitrogen, which may serve to account for the production of cyanogen compounds in some metallurgical operations. The composition of the nitrogen compounds obtained has not yet been ascertained, but will form the subject of a future communication.

Metallic Nitrides.

In the last number of the *British Medical Journal* two methods of antiseptic treatment of this disease have been described. Dr. William Robertson reports that he has found the administration of benzol very effectual in relieving the initial symptoms of influenza. For adults ♏v. and for children ♏iij., given every two or three hours with chloroform water and tragacanth mucilage, caused no inconvenience, and did not interfere with the digestion. Mr. Francis Taylor Simson, in the same journal, recommends the use of carbolic acid, 2 minims of the pure acid to be taken three times a day. In many hundreds of cases treated in this manner it is stated that there has been complete and quick recovery, the temperature frequently falling from 102° or more to normal in twenty-four hours.

Influenza.

The rose oil exported from Southern Bulgaria and Turkey is often adulterated with geranium oil, and for the detection of this admixture G. Panajotow recommends the use of fuchsin and sulphurous acid. It was shown by O. F. Müller that a number of resin oils and lacs have the property of giving colour reactions with a solution of fuchsin decolorized with sulphurous acid. With geranium oil it gives a fine blue coloration. To apply the test two or three drops of the suspected oil are shaken with 2 c.c. of the reagent. With pure rose oil a red coloration is produced after about twenty-four hours; but with geranium oil a bluish violet colour is produced at once, and after two hours it becomes blue. Mixtures of the two oils in different proportions always gave a blue coloration, even when the proportion of geranium oil was small. In this way it is stated that the least admixture of geranium oil may be detected with certainty. The action of concentrated sulphuric acid may also be of use in detecting the adulteration of rose oil with geranium oil. Both oils give a brownish liquid when mixed with strong sulphuric acid, but in the case of rose oil this brown liquid forms with strong alcohol a clear solution, while in the case of geranium oil the addition of alcohol separates a flocculent yellow fatty precipitate.

Test for Rose Oil.

Curtius has continued his investigation of the remarkable compound N_3H, to which the names of hydrazoic acid, imidazoic acid and nitrohydric acid have been applied (*Pharm. Journ.*, [3], xxi., 378), and has described some methods of obtaining salts of this acid, which can be carried out with less danger than the preparation of the acid itself. He also describes some of the metallic salts of the acid (*Berichte*, xxiv., 3341). The silver salt N_3Ag may be obtained in colourless crystals by evaporating an ammoniacal solution. It is violently explosive. The mercurous salt N_3Hg is crystalline, and acquires a yellow colour on exposure to light. It is less explosive than the silver salt, and on addition of ammonia is converted into a black insoluble substance. The lead salt N_6Pb forms colourless crystals, closely resembling lead chloride. It is insoluble in ammonia and very sparingly soluble in boiling water; and when slightly warmed exploding with great violence. The sodium salt N_3Na is also crystalline. It is feebly alkaline, very soluble in water, insoluble in alcohol and in ether. It does not explode when struck, but only when heated. The ammonium salt N_4H_4 is extremely explosive and very volatile, but can be crystallized from a solution in boiling alcohol. On addition of ether to the alcoholic solution, the salt is precipitated in the form of a snow-white crystalline powder. A water solution evaporated in vacuo yields large, transparent prisms, which become dull on exposure to the air.

Hydrazoic Acid.

Berthelot and André have observed that humic acid prepared from sugar or starch by the action of hydrochloric acid, loses its dark colour when kept in white glass bottles exposed to light. When a few grammes of moistened humic acid is placed in a large glass flask and exposed to light they find that after a few hours a considerable quantity of carbonic acid is generated and the humic acid acquires a brown colour. If the gas is drawn off the action continues. The oxidation does not extend to the nitrogen of the air, no traces of nitric acid having been detected, as is the case when ether is oxidized under similar conditions. Humic acid prepared from vegetable soil also undergoes the same change, though in a less degree. The authors regard this change as purely chemical and independent of the influence

Spontaneous Oxidation of Humic Acid.

of microbes, and although that influence no doubt contributes under ordinary conditions to the production of carbonic acid, it is not indispensable (*Comptes Rendus*, cxiv., 41).

Frangulin.

T. E. Thorpe and A. K. Miller have continued their investigation of this constituent of the bark of *Rhamnus frangula*, and have arrived at the conclusion that its composition is represented by the formula $C_{21}H_{20}O_9$, first assigned to it by Schwabe (*Arch. Pharm.*, ccxxvi., 569). It was found scarcely possible to determine the composition with certainty by analysis alone, for though it is easy to obtain a product that is distinctly crystalline and apparently pure, no definite test has been found by which its purity can be proved. The determination of the formula of frangulin has therefore been based partly upon an examination of the products of hydrolysis. By treatment with a mixture of dilute mineral acid and alcohol, frangulin is gradually converted into a clear reddish-brown solution. On evaporating off the alcohol a product (emodin) insoluble in water was obtained, the amount of which was as nearly equal to what should be obtained, on the assumption that the formula of emodin is $C_{15}H_{10}O_5$, as could be expected in an operation of the kind. The soluble product of hydrolysis was a dextro-rotary fermentable sugar, that was concluded to be rhamnose $C_6H_{12}O_5$ (*Journ. Chem. Soc.*, lxi., 1).

Salophen.

Under this name a preparation has been introduced by Messrs. Bayer and Co., of Elberfeld, which is intended to answer the purposes to which salol has been applied without being liable to produce the ill effects which have been thought to result from the elimination of phenol when salol undergoes decomposition in the intestine. Chemically the new substance is described by the name acetylparaamidophenolsalicylic ester. As compared with salol its constitution is represented by the formula—

$$C_6H_4\!<\!\begin{matrix}OH\\COO.C_6H_4.N\end{matrix}\!<\!\begin{matrix}H\\COCH_3\end{matrix}$$

the formula of salol being—

$$C_6H_4\!<\!\begin{matrix}OH\\COO.C_6H_5\end{matrix}$$

When decomposed in the intestine salophen yields salicylic acid and acetylparaamidophenol, a substance which passes through the organism almost without decomposition and possesses antipyretic properties. Salophen contains 51 per cent. salicylic acid: it has the form of thin laminar crystals, is neutral and free from taste or smell. It is almost insoluble in cold water, but slightly soluble in hot water. In alcohol or ether it dissolves freely, especially with the aid of heat. It dissolves readily in solutions of caustic alkalies. Salophen is prepared according to Goldmann (*Pharm. Zeit.*, xxxvi., 773) by heating a mixture of salicylic acid and paranitrophenol to 170° C. and stirring phosphorus oxychloride into the melted mass. The nitro ester thus produced—

$$C_6H_4\!<\!\begin{matrix}OH\\COO.C_6H_4.NO_2\end{matrix}$$

is dissolved in alcohol, and by reduction with tin and hydrochloric acid it yields amidophenylsalicylic ester—

$$C_6H_4\!<\!\begin{matrix}OH\\COO.C_6H_4.NH_2\end{matrix}$$

which is combined with tin chloride as a double salt. After evaporating off the alcohol this salt is dissolved in water, the tin is separated by treatment with soda, the ether acetylated in the usual manner, and the acetylated product recrystallized from benzol. At a meeting of the Berlin Medical Society, Dr. Guttman has recently spoken favourably of the action of salophen in acute rheumatism when given in doses of 4 or 5 grammes and upwards.

Amount of Alkaloids in Opium.

At a recent meeting of the Société de Therapeutique, in Paris, M. Adrian read a paper on the variation of commercial opium in regard to the amount of alkaloids. From the examination of 38 samples he found that the morphine ranged from 7 to 12 per cent., while the narcotine varied from 0·10 to 3·975 per cent.; while according to the Codex it ought to be 2·5 per cent. Stress was laid upon the importance of a proper proportion of the two bases, and it was suggested that only such opium as contained 10 per cent. morphine with 2·5 per cent. narcotine should be used for pharmaceutical purposes.

Incompatibility of Borax with Salts of Alkaloids.

Christiaens points out that in preparing a lotion with cocaine hydrochloride and borax he found that the alkaloid was precipitated by the alkaline reaction of the borax. The same effect would be produced with other salts of alkaloids, and might lead to inconvenient results. Dujardin, of Lille, has already shown that chloral is also liable to undergo decomposition when dispensed together with borax.

Alkaloids of Angustura Bark.

The bark of *Galipea cusparia* has been frequently examined, but without any definite knowledge of its constituents having been obtained. Vauquelin and Blanche found in it a very bitter substance. Brandes detected an alkaloid, angusturine, which neither Geiger and Hesse nor Pfaff were able to obtain. Grindel, Brande, Hayer, Crell, Filter, and Fischer also examined the bark, and C. Herzog stated that it contains 0·7 per cent. of a volatile oil having the formula $C_{13}H_{24}O$. The ethereal oil was extracted by Oberlin and Schlachdenhauffen. Saladin stated that he obtained by treatment with dilute alcohol a non-nitrogenous crystalline substance insoluble in ether and melting at 45°, which he named cusparin. Herzog was unable to obtain this substance. Pfaff states that the bark contains an ethereal oil, a peculiar bitter extractive, a bitter and an oily resin, and free tartaric acid. Winkler and Husband isolated a bitter substance soluble in water and alcohol, and, lastly, Körner and Böhringer obtained two bases—cusparine, $C_{19}H_{17}NO_3$, and galipeine, $C_{20}H_{21}NO_3$. Beckurts and Nehring have now made a further investigation of the bark. That first operated upon had been long kept, and had but little aromatic odour. It yielded but little ethereal oil as compared with the fresh bark afterwards used. By extracting with warm water acidulated with sulphuric acid an alkaloid was obtained mixed with resin which rendered its crystallization difficult. Subsequent experiments showed that most of the alkaloid could be extracted by cold ether, and that another portion insoluble in ether could be extracted, together with a bitter substance, by cold alcohol, while another substance showing a blue

fluorescence on addition of ammonia could be extracted from the bark by boiling it with water acidulated with sulphuric acid, after the alkaloid and bitter substance had been removed. A large quantity of the bark was therefore extracted first with ether, then with alcohol, and lastly with water acidulated with sulphuric acid. The ether extract was of a brown colour and had the peculiar smell of the bark. To separate wax and ethereal oil it was shaken with dilute sulphuric acid and a small quantity of alcohol to facilitate separation until the watery solution was but slightly coloured. A greenish-yellow coloured solution of the salt of the alkaloid was thus obtained, which was washed with ether to separate adhering ethereal oil and resin. Upon adding carbonate of soda solution until the reaction was faintly alkaline a copious precipitate was thrown down which gradually aggregated to a reddish-brown mass, leaving only a minute portion of the bases in solution. The purification of the crude mixed bases, and their separation, involved considerable difficulties, but eventually four fractions were obtained having respectively constant melting points. The bark appears to contain about 1·8 per cent. of these bases in a free state, and 0·6 per cent. that is extracted by alcohol. Galipine, $C_{20}H_{21}NO_3$, m.p. 115°·5, forms white silky needles, readily soluble in alcohol, chloroform, acetone, benzene and ether, sparingly soluble in petroleum spirit. The salts have a yellow colour, and crystallize in needles. Galipidine, $C_{19}H_{19}NO_3$, m.p. 111°, forms white laminæ, resembling in solubility the foregoing. The salts are yellow, freely soluble in boiling water, and have a bitter taste. Cusparine, $C_{20}H_{19}NO_3$, m.p. 89°, differs from the foregoing in the sparing solubility of its salts in water or alcohol. The salts are colourless. Cusparidine, $C_{19}H_{17}NO_3$. This also forms colourless salts, which are more soluble than those of cusparine, but less so than those of galipine or galipidine. The examination of the ethereal oil, bitter substance and glucoside of the bark is being continued by the authors (*Archiv der Pharm.*, ccxxix., 591).

Tu-chung Bark.

This curious Chinese drug was found by Professor D. Oliver to be the bark of a previously unknown tree growing in Northern China, which he named *Eucommia ulmoides* (*Pharm. Journ.*, [3], xxi., p. 738). Dr. Augustin Henry, who found the plant in Ichang, brought sufficient material for a microscopic examination, which has been made by Mr. E. L. Weiss, who read a paper on the subject at a recent meeting of the Linnean Society. According to this observer the curious silky threads of caoutchouc, which are rendered visible when the bark is fractured transversely, are contained in long unbranched cells in the cortex and in the secondary phloem, and accompany in large numbers the vascular bundles of the leaf and pericarp of the fruit. These cells differ from ordinary latex cells in not being derived from specialized cells of the embryo, for they originate in all new growths ; their formation can be seen in the pith, the parenchyma surrounding the bundle of the petiole, and in the cortex. They originate in pairs by the longitudinal division of a cell with granular contents, the two cells thus formed growing out into a long tube which forces its way along the intercellular spaces. Only one nucleus is found in each cell. The large granules of caoutchouc which make their appearance in the cells finally coalesce to form a solid mass, which presents the appearance of a silky thread when the tissue is broken. This unbranched mode of growth explains why the caoutchouc fibres do not form a film when the bark is broken longitudinally instead of transversely.

Ipoh Arrow Poison.

In the Kew *Bulletin* for February, 1891, an account was published of experiments made with this arrow poison, which tended to show that the specimen examined was inert, and that it was probably prepared from a variety or species of *Antiaris*, known as *Antiaris innoxia*, Bl., and which differs from *A. toxicaria* in not containing antiarin. The statement of Griffith, to the effect that the Malays remedy this defect by the addition of arsenic, was also mentioned. In the November number of the Kew *Bulletin*, recently issued, an interesting letter from Mr. Leonard Wray is published, in which he states that the juice of the tree used by the Semangs in Perak is certainly poisonous, and that crystals of antiarin can be readily detected under the microscope in the evaporated juice. The crystals are described as "diamond-shaped, many of which have the obtuse angles replaced." The Semangs recognize a difference between the two plants, the inner bark of the innocuous tree being blackish, whilst that of the poisonous tree is of a golden colour. The natives assert that the poison is not injurious to fowls, nor to the argus pheasant, although a cat is killed by it in about nineteen minutes. Mr. Wray confirms this assertion, and suggests that the Ipoh poison previously sent to Kew must have undergone a change in transit, as it was found to be poisonous to dogs before it was sent. The Semangs sometimes mix other poisons with the milky juice of the antiaris. One of these, named "likir," is the juice of the tuber of a species of *Amorphophallus*, of the Aroid family, and the other, called "gadong," is derived from a plant determined at Kew by Dr. Stapf to be the *Dioscorea hirsuta* of Blume. The Sakais living in the hills use a poison prepared from plants named respectively, "ipoh aker," "prual" and "lampong." The first is a species of *Strychnos* closely allied to *S. Maingayi*, Clarke ; prual is referred to a rubiaceous climber, possibly a *Lasianthus* or *Urophyllum* ; and lampong is a small-leaved species of *Strychnos*, doubtfully identified as *S. Maingayi*. The Ipoh aker is said to retain its virulence for years.

Medicinal Plants of Gambia.

During the Expedition for the Delimitation of the French and English Possessions on the West Coast of Africa in 1890, a number of plants were collected by Dr. Brown Lester, of Edinburgh, who was attached to the Expedition ; a list of the plants identified at Kew is given in the Kew *Bulletin* for November, pp. 268–275. Several of these are used in medicine by the natives, viz., *Argemone mexicana*, for coughs, in the form of an infusion of the leaves ; *Waltheria americana*, L., the leaves being employed as a poultice for boils ; *Parinarium macrophyllum*, Sabine, the powdered bark smeared over deep-seated pains ; *Combretum racemosum*, the young leaves for killing round worms in children ; *Oldenlandia senegalenses*, Hiern, employed as a vermifuge ; *Spermacoce globosa*, S. et Thonn., and *Mitracarpum scabrum*, Zucc, the dried

leaves for healing ulcers, the latter said to be very effectual; *Vernonia senegalensis*, the leaves chewed as an astringent; *Vernonia nigritiana*, O. et H., the pounded and boiled roots taken as a purgative; *Calotropis procera*, R.Br., the leaves applied warm for sprains, headaches, and other pains; *Heliotropium indicum*, used in infusion for gonorrhœa; *Phaylopsis parviflora*, the leaves used as a hot fomentation over the spleen in ague cake; *Ocymum basilicum*, an infusion of the leaves given in fevers.

Gambier.

Pharmaceutical visitors to the Kew Museum, as well as those interested in tanning materials, may now see a series of the apparatus and implements used in the Gambier industry at the Straits Settlements, which has recently been received at Kew, from Singapore.

Vanilla.

A fine collection of the commercial varieties of vanilla has been lately completed at Kew, including samples from Bourbon, Réunion, Mauritius, Seychelles, Bahia, Mexico, Java; also Vanillons. A species of vanilla from Patia, New Granada, which has until recently remained unnamed in the Daniel Hanbury Herbarium (at the Pharmaceutical Society), has been described by M. Rolfe, from this specimen, and from one in the Kew Herbarium, as a new species under the name of *Vanilla ensifolia*, Rolfe. It is probably the source of some of the vanilla occasionally imported from South America.

Spurious Drugs.

During the past year a good deal of spurious cubebs has appeared in the market, of the kind characterised by the mace-like odour, and which does not give with concentrated sulphuric acid the crimson colours so readily produced by the genuine article. Unfortunately these fruits appear to be mixed with the genuine drug, and are with difficulty recognized by the eye, except by the greyer tint and more wrinkled surface, the size of the two being nearly equal. *Pareira Brava*, very similar in appearance to the genuine drug, but with narrower rings, and of much lighter weight, has been in circulation recently. Coto bark also has been present in the market in more than one form. One of these spurious coto barks is astringent, has little pungency, and is thinner, and is thus easily detected; another resembles the Paracoto bark, but has a different flavour. Fuller details concerning these may be given later.

NOTES ON OLEUM ÆTHEREUM (HEAVY OIL OF WINE).*

BY PROFESSOR DR. FREDERICK B. POWER.

Having had occasion recently to undertake, on a small scale, the preparation of the so-called *Ethereal oil* by the process of our present Pharmacopœia, and as the yield of the final product was so small as to be exceedingly unsatisfactory, my attention was naturally directed to a consideration of the literature of the subject, in order to obtain, if possible, a clearer view of the composition of this compound and of the chemical reactions involved in its production. The hope was accordingly entertained that a somewhat closer inspection of the assumed chemical composition of the compound might lead to a more satisfactory process for its manufacture, but a review of the available literature has, on the contrary, only served to disclose the existing confusion of ideas regarding its formation and composition, and, in general, to demonstrate the very unsatisfactory state of our knowledge of the compound, whether it be viewed from a chemical or from a therapeutical standpoint.

The oleum æthereum of our Pharmacopœia is defined as "a volatile liquid consisting of equal volumes of heavy oil of wine and of stronger ether." The preparation is a unique one, in so far as it is recognized in an independent form by the Pharmacopœia of no other civilized country, although the British Pharmacopœia does indeed include its preparation as a part of the official process for compound spirit of ether, and it is only as a constituent of the latter preparation that it is designed to be employed in the United States.

The first question, therefore, that presents itself is: What is *heavy oil of wine?* The answer to this may at first seem sufficiently simple, but if an exact scientific definition be demanded it will soon be apparent that this is impossible.

On referring to Gmelin's 'Handbook of Chemistry,' vol. xiii., p. 177, we find that *heavy oil of wine*, or the so-called *sulphovinate of wine oil*, as distinguished from the *light oil of wine*, was discovered by Hennel in 1826, and that it is obtained in the following manner. "It passes over in the preparation of ether, towards the end of the distillation. It is formed, but in exceedingly small quantities, not only on distilling, but immediately on mixing alcohol with sulphuric acid (Marchand). It is also produced when ether is acted upon by anhydrous sulphuric acid in the preparation of isaethionic acid (Liebig), and by the dry distillation of the sulphovinates." With regard to the method for its preparation, the following is further recorded. 1. "When 1 part of alcohol is distilled with $2\frac{1}{2}$ parts of sulphuric acid a little ether passes over first, then a yellowish oil and an aqueous ethereal liquid; the former is separated from the latter, and freed from uncombined sulphuric acid and a part of the sulphurous acid, the alcohol, and the ether, by agitation with water (which, according to Liebig, should be ice-cold). The oil is then separated from the water, and placed over sulphuric acid under the receiver of an air-pump, which is slowly exhausted in order that the evaporation of the ether and sulphurous acid may not cause the liquid to boil violently (Serullas). 2. Crystallized sulphinovate of lime is dried carefully but completely in vacuo, and submitted to dry distillation. The distillate is purified as in the first method (Serullas)."

Fehling's 'Neues Handwörterbuch der Chemie, band I., p. 100, also contains a notice of heavy oil of wine, of which I here present the following English translation:—

"*Ethyl-sulphate of Etherol; Sulphate of Etherin; Heavy Oil of Wine*, or *Sulphovinate of Wine Oil.* Perhaps only a mixture of hydrocarbons with ethyl sulphate. Its formula is possibly $(C_8H_{18}S_2O_7)_n$. Examined by Hennel, Serullas, Marchand, and Liebig. It is reduced in the manufacture of ether, towards the end of the process, when sulphurous acid and ethylene are also formed; furthermore, by the dry distillation of salts of ethyl-sulphuric acid, especially the basic lead salt alone, or the potassium salt with freshly burned lime.

"The substance, purified by washing with water and drying in a vacuum over sulphuric acid, is a colourless, viscid oil, having an aromatic odour and a cooling taste. Its specific gravity is 1·135. At a high temperature it volatilizes without decomposition, and is readily soluble in alcohol and in ether. Potassium decomposes it only on heating. When heated with

* From the *Pharmaceutische Rundschau*, November.

water it is decomposed into a light oil. *etherol*, and ethyl-sulphuric acid (possibly also isaethionic acid).

"*Etherol, Oil of Wine, Light or Sweet Oil of Wine*, C_nH_{2n}, consists, after the so-called *etherin* has been separated in a crystalline form by cold, of a yellowish, thick oil. Its specific gravity is 0·921, boiling point 280° C., and it crystallizes at —35° C. It is readily soluble in ether, less soluble in alcohol, and insoluble in water. With sulphuric anhydride it appears to afford isaethionic acid. Whether the so-called *sweet* or *light oil of wine* which is produced by the manufacture of ether on a large scale is identical with etherol, can scarcely be stated with certainty."

In Watts' 'Dictionary of Chemistry' (1869), vol. ii., p. 507, the following notice of this subject occurs.

"When heavy oil of wine, the oily body which sometimes occurs among the residues of the preparation of ether, is warmed with water, a light oily liquid rises to the surface, which is a mixture of two substances, both polymeric with ethylene, viz., *etherin* and *etherol*. On decanting this liquid and leaving it at rest, the etherin crystallizes out while the etherol remains liquid. The etherin may be freed from etherol by filtration and pressure between paper, and then crystallized from alcohol or ether.

"*Etherin* forms transparent, colourless, shining prisms, moderately hard, very friable, and grating between the teeth; it has no taste, but when heated smells like etherol. Melts at 110° C. Boils at 260° C. without alteration. Insoluble in water, but soluble in alcohol, and still more so in ether.

"*Etherol* is a yellowish, viscid liquid of specific gravity 0·921 (Serullas), boiling at 280° C. By exposure to cold it becomes more viscid, but does not solidify even at — 35° C. It has a peculiar, aromatic odour, is insoluble in water, but dissolves easily in ether, less easily in alcohol. Potassium immersed in it retains its lustre undiminished.

"*Heavy Oil of Wine*, which passes over in the preparation of ether towards the end of the distillation, when sulphurous anhydride and olefiant gas are given off, is, according to Liebig, an *ethyl-sulphate of etherol*. On treating it with water, the etherol (holding the isomeric body etherin in solution) separates out, and ethyl-sulphuric acid remains in solution. An oil of similar character and composition is obtained by the distillation of perfectly dry ethyl sulphates, the best process, according to Liebig, being to distil the dry potassium salt with an equal weight of freshly burned lime. Marchand recommends the distillation of dry ethyl sulphate of lead. The crude product is freed from alcohol, ether, and sulphurous acid by agitation with cold water, and drying *in vacuo* over oil of vitriol."

In Hirsch's 'Universal Pharmacopæ,' band ii., p, 273, it is stated that "the so-called *heavy oil of wine*, of which one-half of the preparation (oleum æthereum) consists, is to be regarded as a solution of solid *etherin* and liquid *etherol* (both of the empirical formula C_2H_4) in sulphurous ether (ethyl sulphite), $(C_2H_5)_2O_3$, and sulphuric ether (ethyl sulphate), $(C_2H_5)_2SO_4$, in proportions which have not been more accurately determined, and which are also probably very variable."

Schmidt, in his 'Pharmac. Chemie,' band ii., pp. 201 and 202, states in connection with ether, that "if in the manufacture of the latter the supply of alcohol is deficient, or the temperature during the process rises above 145° C., or if finally the sulphuric acid becomes too hydrated, there is formed, besides sulphurous and carbonic anhydrides, ethylene, which, through polymerization becomes partly converted into solid *etherin* (melting point 110° C.; boiling point 260° C.), and into liquid *etherol*, both of the formula $(C_2H_4)_n$. Besides the latter bodies there also pass over in the manufacture of ether small amounts of ethyl sulphite $(C_2H_5)_2SO_3$, and ethyl-sulphate $(C_2H_5)_2SO_4$. A mixture of the latter ethers with etherin and etherol was formerly designated as *heavy oil of wine*."

The authors of the 'National Dispensatory,' iii. edit., p. 1043, in connection with the subject of oleum æthereum, state regarding the composition of heavy oil of wine as follows:—

"The analyses of Serullas, Liebig and others lead to the empirical formula $C_8H_{18}S_2O_7$. Serullas regarded heavy oil of wine as the double sulphate of ethyl and ethylene; Liebig as ethyl sulphate (sulphovinate) of etherol. The latter view appears to be the more correct one, if the decomposition with water is taken into consideration. Alkalies also decompose it into sulphovinate of the alkali, liberating etherol. Or it may be related to *sulphuric ether or ethyl sulphate*, discovered by Wetherill (1848), which is a yellowish oil of the specific gravity 1·120, has a peppermint-like odour and pungent taste, and the composition of which is expressed by the formula $(C_2H_5)_2SO_4$. *Sulphurous ether* or *ethyl sulphite* $(C_2H_5)_2SO_3$, which was discovered by Ebelmen and Bouquet (1845), has the specific gravity 1·17 at 0°, boils at 208° C., and is decomposed by potassa into potassium sulphite and alcohol.

"E. C. Hartwig* (1881) examined the oily liquid, which may be obtained by distilling the acid residue left in the distillation of ether. This oil has been sold as oil of wine, but is totally different from both the heavy and light oils of wine mentioned above, and consists of hydrocarbons, ethers and ketones, among them *ethyl-amyl ether* $C_2H_5—C_5H_{11}O$, which boils at 112° C.; *di-isoamylene*, $C_{10}H_{20}$, boiling at 157° C.; *ethyl-amyl ketone* $C_2H_5—C_5H_{11}CO$, boiling near 155° C.; *methyl-hexyl ketone*, and several others having a higher boiling point."

In the 'United States Dispensatory' the chemistry of this subject is also briefly reviewed, but without affording any further information than that which has already been presented in the preceding notices.

A concise but very comprehensive view of this subject is given by Roscoe and Schorlemmer, in their 'Treatise on Chemistry,' vol. iii., pt. 1, pp. 353–355. In connection with the normal ethyl sulphate $(C_2H_5)_2SO_4$, these authors present the following information:—

"*Normal Ethyl Sulphate* $(C_2H_5)_2SO_4$.—This compound was examined by chemists in the last century, but its nature has only quite recently been ascertained. Formerly this ether was prepared by distilling spirit of wine with oil of vitriol. This operation was conducted in a retort, heated in a sand bath, and as soon as the ordinary ether had come over, the receiver was changed, and normal ethyl sulphate, or as it was termed wine-oil or *oleum vitrolii dulce*, collected. Concerning the formation and composition of this body, very different views were held. Towards the end of the last century it was generally assumed that wine-oil is ether rendered impure by the presence of a large quantity of sulphuric acid, for Wiegleb stated that common ether is obtained in large quantities when this substance is distilled with caustic potash. In the year 1797 the the difference between wine oil and common ether was distinctly pointed out by Fourcroy and Vauquelin, who assumed that the first compound stood in the same relation to ether as ether does to alcohol. This view was generally adopted, until Hennell, in 1826, proved that the compound contains sulphuric acid, and that it is to be considered as a compound of this acid with carbon and hydrogen, in which the latter elements are present in the same relative quantities as in ether itself. He also showed that, when wine oil is heated with water or with alkalies, sulphovinic acid is formed, whilst a liquid hydrocarbon is liberated. This in some

* *Chemical News*, Sept. 2, 1881, p. 122, from *Journal für practische Chemie*, No. 10, 1881.

cases crystallizes, and possesses the composition of olefiant gas. These facts were fully confirmed by the subsequent investigation of Serullas,* Marchand† and Liebig.‡ Serullas found that, when wine oil undergoes distillation, it yields the salts of ethyl sulphuric acid, and Liebig gave to it the formula $(C_2H_5)SO_4+C_4H_8SO_3$, and termed it sulphovinate of wine oil.

"According to the recent experiments of Claesson,§ wine-oil consists chiefly of ethylsulphate, generally mixed with a larger or smaller quantity of the polymers of ethylene, a fact already observed by Hennell; this latter chemist distinguishing between wine-oil, a liquid boiling at 280° C., and etherin, a solid crystalline mass obtained when the wine oil is allowed to stand for some days.

"The first attempt to obtain pure, normal ethyl sulphate was made by Wetherill,‖ who passed the vapour of sulphur trioxide into ether or alcohol. He thus obtained a colourless liquid, smelling like peppermint, which decomposes on heating, and which, as Erlenmeyer afterwards showed, is a mixture of normal ethyl sulphate and

ethyl isothionate, $C_2H_4\begin{cases}OH\\SO_3C_2H_5\end{cases}$.

"Ethyl sulphate was first obtained in a pure state by Claesson in acting on alcohol with ethyl chlorsulphonate, $Cl—SO_2—OC_2H_5$. He also prepared it by the action of sulphuric acid on absolute alcohol. If ice and then water be added to the cold mixture and the liquid shaken up with chloroform, the sulphate is dissolved and left behind on evaporation. Ethyl sulphate is also formed when silver sulphate is heated with ethyl iodide to 150° C.,¶ Claesson obtaining a satisfactory yield in this way.

"Ethyl sulphate is a colourless liquid, insoluble in water, possessing a pleasant peppermint-like smell; it boils at 208° C., with slight decomposition, but may be distilled unaltered under diminished pressure. At 19° C. it possesses a specific gravity of 1·1837. It is only very slowly decomposed by cold water, but boiling water decomposes it more or less quickly according to the amount present, alcohol and ethyl-sulphuric acid being first formed. If ethyl sulphate be heated with alcohol, the following reaction takes place, resulting in the formation of ethyl-sulphuric acid ether.

$$(C_2H_5)_2SO_4+C_2H_5—OH=C_2H_5HSO_4+(C_2H_5)_2O."$$

The most important papers published in this country on the subject of Oleum æthereum or heavy oil of wine are the following:—

Dr. E. R. Squibb, *Amer. Journ. Pharm.*, 1857, pp. 192–204, 1861, pp. 57–61.

Professor J. M. Maisch. Ibidem, 1865, pp. 100–105.

Professor C. Lewis Diehl, Ibidem, 1865, pp. 126 to 134, from *Proc. Amer. Pharm. Assoc.*, 1864, pp. 309—316.

The proportions of alcohol and sulphuric acid directed in the process for oleum æthereum of our present Pharmacopœia (1880), viz., 24 parts by weight of alcohol, specific gravity 0·820, and 54 parts by weight of sulpuric acid, specific gravity 1·840, are the same as those adopted by Dr. Squibb many years ago as a result of quite an elaborate series of experiments (see *Amer. Journ Pharm.*, 1857, p., 197) and also those used by Professor Diehl (*Amer. Journ. Pharm.*, 1865, p. 104).

* *Ann. Chem. Phys.*, xxxix., 153.
† *Journ. pract. Chem.* xv., 8.
‡ *Pogg. Ann.*, xxi., 40.
§ *Journ. pract. Chem.*, [2], xix., 255.
‖ *Ann. Chem. Pharm.*, lxvi, 117.
¶ *Ber. d. deutsch. chem. Ges.*, xi., 514.

The authors of the 'National Dispensatory,' iii. edit., p. 1042, in commenting upon oleum æthereum make the following statement: "The production of heavy oil of wine evidently depends upon the absence of water and the generation of sulphurous acid, the latter being accompanied by the production of thiomelanic acid. An excess of sulphuric acid is required for this purpose, and this is directed in the above formula (evidently referring to the official formula), *the quantity of acid being about four times greater than is theoretically required for the production of sulphovinic acid.*"

A simple calculation will suffice to show that the latter statement is quite incorrect, and that on the contrary the proportions of alcohol and acid directed by our Pharmacopœia approximate very closely to the theoretical requirements for the production of sulphovinic or ethyl-sulphuric acid, as may be seen by the following considerations.

Sulphovinic acid, as is well known, is formed by the combination of equal molecules of alcohol and sulphuric acid, in accordance with the equation

$$C_2H_5—OH+H_2SO_4=C_2H_5HSO_4+H_2O.$$

It is true that under these circumstances the product always contains free sulphuric acid and unaltered alcohol, and the same is the case if an excess of either compound is used, or even when the heating is carried on for any length of time. Berthelot,* for example, in mixing equal molecules of sulphuric acid and alcohol of 94 per cent. strength, obtained the following yields:—

After	40 hours	56	per cent.
,,	90 ,, ...	57·4	,, ,,
,,	20 days	59	,, ,,
,,	147 ,, ...	58·8	,, ,,

When alcohol containing 20·7 per cent. of water was employed, the production of the acid went on much more slowly, and after a lapse of 147 days the liquid contained only 54·8 per cent. of ethyl-sulphuric acid. On the other hand, by using absolute alcohol, the yield can, according to Claesson,† be raised to 77·4 per cent. This last-named chemist heated a mixture of alcohol and pure sulphuric acid on the water-bath, and employing to 1 molecule of acid varying quantities of alcohol, expressed in molecules, obtained to 100 parts of sulphuric acid the yields as noted below:

0 5	1·	1·5	2·	2·5	3·	4·
73·1	57·1	59·6	65·	72·	77·4	77·4

From this it appears that, when equal molecules of acid and alcohol are employed, 57·1 per cent. of ethyl-sulphuric acid is formed. This yield increases, however, with an increase in the quantity either of acid or of alcohol (see Roscoe and Schorlemmer, 'Treatise on Chemistry,' vol. ii., pt. 3, p. 351). In other words, with 1 molecule of acid and 0·5 molecule of alcohol nearly the same yield of ethyl-sulphuric acid was obtained as with 1 molecule of acid and 3 or 4 molecules of alcohol, and in both cases considerably more than when equal molecules or the theroretical proportions were employed.

Equal molecules of alcohol and sulphuric acid would correspond to 46 parts by weight of absolute alcohol to 98 parts by weight of absolute sulphuric acid. If we calculate these proportions for official alcohol (containing 91 per cent. by weight) and official sulphuric acid (containing about 96 per cent. of absolute acid).

* *Bull. Soc. Chim.*, xix., p. 227.
† *Journ. pract. Chem.*, [2], xix , p. 246.

they will correspond to 50·6 parts of alcohol, and 101·92 parts of alcohol, or for 24 parts of alcohol, as directed in the present official formula for oleum æthereum, 48·3 parts of sulphuric acid, whereas 54 parts of acid are directed to be used.

If the alcohol and sulphuric acid used in the preparation of oleum æthereum were both absolute, the proportions given in the official formula would correspond a little more closely with the theoretical requirements for the production of sulphovinic or ethylsulphuric acid, for:

$$\underbrace{C_2H_5—OH}_{46} + \underbrace{H_2SO_4}_{98} = C_2H_5HSO_4 + H_2O$$

and 46 : 98 = 24 : x. x = 51·1, or the amount of absolute sulphuric acid required for 24 parts of absolute alcohol.

If, therefore, as stated in the 'National Dispensatory,' the quantity of sulphuric acid directed to be used in the official process were about four times greater than is theoretically required for producing sulphovinic acid, we should employ for 24 parts by weight of official alcohol about 193·2 parts of 96 per cent. sulphuric acid instead of 54 parts. None of the experiments relating to the preparation of heavy oil of wine have, however, so far as the writer has been able to observe, been based upon the proportions represented by this larger amount of sulphuric acid. In fact, the larger proportion of sulphuric acid, or 3 or 4 parts by weight of the latter to 1 part by weight of alcohol, is the proportion considered to be most favourable for the production of ethylene, rather than for heavy oil of wine.

In a short paper on the preparation of ethereal oil, by Dr. H. T. Cummings ('Proc. Amer. Pharm. Assoc.,' 1886, p. 58), the author has also fallen into error by considering that sulphovinic acid is a constituent of ethereal oil, for he remarks as follows:—

"But what is oleum æthereum? From the variety of nomenclature employed, it should seem that chemists entertain widely different views of its constitution. *But one thing is certain, that sulphovinic acid is an important constituent thereof, and it may not be irrelevant to our discussion to consider the formation of this compound.*"

The author then proceeds to consider in detail the formation of sulphovinic acid and the preparation of ethereal oil by the old and previously mentioned method of the distillation of dry sulphovinates.

In connection with the opinion expressed by Dr. Cummings that sulphovinic acid is an important constituent of ethereal oil, it needs only to be observed that nothing is less certain or more improbable, for this acid in its pure state is decomposed on distillation into ethylene and sulphuric acid* in accordance with the following equation:—

$$C_2H_5 - HSO_4 = C_2H_4 + H_2SO_4.$$

If water be present, as in the case of an aqueous solution of the acid, it is quickly decomposed, on heating, into alcohol and sulphuric acid.†

$$C_2H_5 - HSO_4 + H_2O = C_2H_6O + H_2SO_4.$$

If the proportions by weight of acid and alcohol directed in the U.P. Pharmacopœia be calculated into parts by volume, it will be found that they represent almost exactly equal volumes, for—

24 parts by weight of alcohol, sp. gr. 0·820 = 26·26 parts by volume.

54 parts by weight of sulphuric acid, sp. gr. 1·840 = 29·34 parts by volume.

The proportions of acid and alcohol directed by the British Pharmacopœia for the production of the ethereal oil to be used in the compound spirit of ether are approximately the same as the above, or 36 fluid ounces of sulphuric acid and 40 fluid ounces of rectified spirit, but the latter has a specific gravity of 0·838, and is therefore considerably weaker than our official alcohol.

In an experiment by the writer 500 c.c. of official alcohol and 500 c c. of chemically pure sulphuric acid were mixed, allowed to stand for twenty-four hours, and then subjected to distillation in a flask of such a capacity as to be nearly filled by the liquid, and which was provided with a good condenser. To the receiver a glass tube bent at right angles was attached, in order to conduct the liberated and uncondensed gases into water for their absorption. The first drops of distillate came over at 147° C. (barometric pressure 735 mm.), but the mercury soon rose to 150° C., and the distillation was conducted between 150 and 160° C. After about four hours the liquid in the flask became quite thick and was thoroughly carbonized. As no more liquid distilled over at the above mentioned temperature, and a strong current of sulphur dioxide was evolved, owing to the reduction of the sulphuric acid by the carbonaceous matter, the operation was discontinued. The ethereal distillate was treated as directed in the official process, when 2·45 grams of pure heavy oil of wine, or 0·597 per cent. of the weight of alcohol employed was obtained. This is somewhat less than Dr. Squibb has stated to have obtained in working upon a larger scale, for in a series of distillations with a total use of 1664 pounds of sulphuric acid and 686 pounds of alcohol he obtained 97 avoirdupois ounces of finished oil, or 0·884 per cent of the weight of alcohol employed (see *Amer. Journ. Pharm.*, 1861, p. 60). The yield obtained by Professor Diehl in the U.S. Army Laboratory seems to have been considerably higher (about 1·4 to 1·9 per cent.), although he employed the same proportions of alcohol and acid (equal parts by volume) as are directed in the present official formula (see *Amer. Journ. Pharm.*, 1865, pp. 100 and 126).

In the process of the British Pharmacopœia it is evidently assumed that the yield of heavy oil of wine shall be about 1 per cent. by volume at least of the alcohol consumed, for 3 fluid drachms of the oil are directed to be used, and this is to be obtained from 40 fluid ounces or 320 fluid drachms of rectified spirit. The yield stated by Dr. Squibb (*loc. cit.*) of 0·884 per cent. by weight, corresponds to 0·684 per cent. of the alcohol by volume.

From the foregoing review of the existing knowledge of so-called heavy oil of wine, it is clearly evident that the oleum æthereum of our Pharmacopœia is an exceedingly unsatisfactory preparation, not only with consideration of its small yield, but more especially on account of its indefinite and probably variable chemical character, and the complete lack of information as to which of its constituents represents its assumed medicinal virtues. If, for example, it be assumed to be a mixture of ethyl sulphate and polymers of ethylene, the question arises whether it be the former or the latter upon which its therapeutic value depends, or whether this is only completely represented by the peculiar combination of all its constituents.

On the other hand it has been shown that the heavy oil of wine or ethereal oil of commerce is for the most part a by-product in the manufacture of ether, and is a liquid of entirely different chemical composition from that produced by the process of our Pharmacopœia, consisting, as previously mentioned, of a complex mixture of hydrocarbons, mixed ethers and

* Schmidt's *Pharm. Chemie*, band II., p. 449.

† Roscoe and Schorlemmer, 'Treatise on Chemistry,' band III., pt. I., p. 352.

ketones. Of these bodies probably not a single one has been studied with regard to its physiological action in a pure and isolated condition.

In this connection it is of some interest to note that the character of the compound spirit of ether remains quite as unsatisfactory to-day as it was forty years ago, and the opinion expressed at that time by Professor Procter* is doubtless equally true now, that "whatever curative reputation the compound spirit of ether may have earned, it certainly belongs to the commercial spirit, and not to that of the Pharmacopœia, which is not to be had in the shops." Dr. Squibb,† a few years later, also remarked concerning this preparation as follows: "There can be but little doubt that the original character of the compound spirit of ether was based upon an intrinsic curative value, and that such value belonged mainly to the ethereal oil as the anodyne ingredient; and there certainly can be as little doubt now, that for some years past the preparation sold under the name of Hoffmann's anodyne has been forcibly dragged along by the materia medica list, supported alone by its unused formula and former character, and that in a few years more it must be dropped entirely or transferred to the class of diffusible stimuli."

With consideration of the preceding facts and observations the following conclusions may be drawn;

I. That the oleum æthereum of our Pharmacopœia is a preparation rarely, if ever, made by the pharmacist; for there are not only extremely few who possess the requisite laboratory facilities, but the commercial preparation, or the compound spirit of ether in which it is supposed to be contained, can be bought very much more cheaply, and has therefore become an accepted substitute for the true official preparation.

II. That the oleum æthereum of the chemical manufacturers, or the compound spirit of ether produced from the residues of ether distillation on a large scale, are preparations of totally different chemical composition from those afforded by the official formulas, and must therefore present a distinct and decidedly variable physiological action.

III. Our Pharmacopœia gives no test whatever for the determination of even the presence of the so-called ethereal oil in the compound spirit of ether, much less for the determination of the quantity it may contain; and even if we may assume to know the composition of the so-called heavy oil of wine, there would seem to be no simple or practical tests by means of which it can be differentiated from the solution of complex organic compounds which are commonly sold and used as a substitute for it. Neither specific gravity, taste, smell, the production of an opalescence with water, or other empirical tests are alone or collectively sufficient criteria of the quality or purity of the compound spirit, although the preparation may indeed frequently present such negative characters as to demonstrate its worthlessness.

IV. The synonym Hoffmann's anodyne, by which the compound spirit of ether is popularly known in this country and in Great Britain, is employed on the continent of Europe to designate the simple spirit of ether, a preparation which is recognized by all the Pharmacopœias except that of Great Britain, and which is probably quite generally dispensed by the German pharmacists of this country when Hoffmann's Anodyne (or "Hoffmann's Tropfen") is called for. This latter preparation is one of uniform and definite character, and is easily made by any pharmacist, although its quality when purchased can also be accurately controlled by appropriate tests.

From a medical standpoint this subject would seem to present a still more serious aspect, for the physician who employs the compound spirit of ether of the shops has probably no assurance whatever in the majority of cases that it contains the official ethereal oil, nor can he possess any knowledge of the chemical nature or precise action of its constituents.

With consideration of all these conditions, which must be admitted to exist, the writer would recommend that oleum æthereum, and with it the compound spirit of ether, be banished from the Pharmacopœia as preparations discreditable alike to American pharmacy and medical practice, for their retention can only serve to lend approbation and encouragement to an empiricism which should not be tolerated in a rational system of therapeutics.

If, however, it can be demonstrated that true ethereal oil possesses such pronounced medicinal virtues that it can not be substituted by more definite chemical compounds, and that it should therefore not be discarded from the Pharmacopœia, it would then seem quite imperative that its constituents should be accurately identified and subjected to a careful physiological study. The results of such an investigation, which would necessarily be more largely physiological than chemical, would then indicate whether the body possessing the desired therapeutic properties be ethyl sulphate, polymers of ethylene, or definite mixed ethers or ketones. On the basis of such experiments it would doubtless be possible for the chemist to devise a rational method for the preparation of the respective compound, and to establish standards for its identity and purity.

* *Amer. Journ. Pharm.*, 1852, p. 217.
† *Amer. Journ. Pharm.*, 1857.

THE HELLEBORES OF THE ANCIENTS.*

BY C. WOLLEY DOD.

Drugs prepared from hellebore were so famous amongst the ancients as a remedy for madness, and, indeed, for many other ailments, that the plant has acquired for itself a literary as well as a botanical interest. Pliny gives a list of them quite worth the notice of advertisers of patent medicines. We know that different species have been used in different countries for their medicinal properties, which are, perhaps, essentially the same in all of them, though varying in strength. The hellebore of the modern English Pharmacopœia is the root of *Helleborus niger*, the common Christmas Rose. In Germany, *H. viridis*, the green hellebore, is said to be preferred, and from its frequent occurrence in England in the neighbourhood of old ruins, we may infer that it was formerly used here. At Constantinople a popular drug, called Zoptane, is made from *H. orientalis*, which is common on the mountains of Eastern Turkey. In Gerard's time, our native *H. fœtidus*, the rankest of all the genus, was employed medicinally, though known to require great caution in using, and it is still retained in veterinary practice for outward application.

The physicians of ancient Greece, who for some centuries before and after the Christian era were famous throughout the civilized world for their skill, were very fanciful about the locality from which the herbs used by them were collected. The kind of herb might be the same, but when gathered on a particular mountain or in a particular forest it was thought to have additional virtue. Drugs of the same name were classified as first, second, third, or fourth quality, according to the source from which they came, and were priced and trusted accordingly. Hellebore was of two kinds, distinguished as black and white. The best black came from Mount Helicon and the best white from Mount Œta. The town most famous for its preparation was called Anticyra, but this name was ambiguous.

There is a well-known passage in 'The Art of Poetry,' written by the Roman poet Horace, in which he says, that to gain a reputation as a poet, a man must be so

* From the *Gardeners' Chronicle*, January 2.

mad that three Anticyras cannot cure him, and must never have his hair cut. Multiplying by three was a common superlative figure of speech in Latin, as in any other languages, and perhaps Horace meant no more than this; but, on the other hand, he may have known that there were in Greece three towns named Anticyra, and possibly they were all places where the drug hellebore was prepared. One Anticyra was on a narrow strip of the land of the Locrians, between Ætolia and the sea. Strabo, an ancient writer on geography, and Livy, a Roman historian, both mention it. It was taken by the Romans in the second Punic war, and given over to their allies, the Ætolians. We know nothing of it as connected with hellebore, though Pliny tells us that Ætolian hellebore, which was of bad quality, was used to adulterate the better Parnassian kind. There was another Anticyra in the south-eastern corner of Thessaly, three or four miles from the sea, near the base of Mount Œta and the famous pass of Thermopylæ, but we do not hear of this town as producing hellebore, except on the slight authority of the lexicographer, Stephanus of Byzantium, who lived in the sixth century of our era. The third Anticyra, the only one which we know to have been famous in classical times for the manufacture of this drug, was situated on the southern coast of Phocis, not far from the base of Mount Parnassus, and within a few miles of Mount Helicon. The position of it is well known, and it is now named Aspra Spitia; it was not an island, as Pliny and others have wrongly said, and never can have been so in historic times; but it stood on a peninsula and had a good harbour. In Horace's day it was a place of resort for insane or epileptic patients, who went there to take a course of hellebore under resident physicians. Hence, to say, "You should go to Anticyra," was a polite way of telling a man he was a fool. Amongst others who had gone through this medical course there, Pliny mentions the philosopher Carneades, who went there for intellectual training, before publicly declaiming against the dogmas of the Stoics, apparently supposing that a medicine which could make madmen sane would make sane men still wiser. Also Drusus, a famous popular leader of the Romans, was cured there of epilepsy. The same writer adds that this drug, which retained its virtue for thirty years, and once was thought so formidable, had now become so "promiscuous" in its use that students often took a dose of it to sharpen their intellect when they were puzzled by difficult passages in their reading—a valuable hint, by the way, for candidates before a competitive examination! I recollect a virtuous freshman at Cambridge, who, with a similar object, laid in a large stock of "Reading biscuits," which he saw advertised in a window!

The next question is, what were the kinds of hellebore called black and white, and found respectively on Mount Helicon and Mount Œta? We ought to be able to answer this, because Edmond Boissier has told us, in the preface to *Flora Orientalis*, that, thanks to the labours of the botanists, Orphanides and Heldreich, the flora of Greece is now better known than that of any other country within the scope of his work. The hellebore which is found to prevail on Mount Helicon, Mount Parnassus, and the neighbouring country, is one to which E. Boissier gives the name of *H. cyclophyllus*. It is intermediate between *H. viridis* and *H. orientalis*, having been confused with the latter both by Sibthorp and by Heldreich. Perhaps it is not in cultivation in England, but it is described as being taller and having larger flowers and broader segments to the leaves than the green hellebore, which in other characters it resembles.

As for the white hellebore, it is evident from the vague descriptions of Theophrastus and Pliny, that neither of them knew a living hellebore by sight, but Pliny says that he had been told that the leaf of the black hellebore was of the shape of a plane leaf, but divided into several segments, and that the white hellebore had leaves resembling those of the beet, and deeply channelled at the back. He attributes to it a bulbous root like that of an onion, with fibrous tunics. Ancient and modern botanists have generally identified this with *Veratrum album*, which is figured in Gerard's 'Herbal' as the white hellebore; but perhaps the best evidence is that of Heldreich, who explored Mount Œta in 1879, and found *V. album* growing there in abundance, confirming his previous opinion that this was the white hellebore of Theophrastus. The different effects of the two kinds of hellebore taken medicinally, as recorded by ancient authorities, corresponds with modern experience; the black is a powerful cathartic and the white a strong emetic. This is a summary of all that is known or likely ever to be known of the famous hellebores of the ancients.

A BACTERIUM WHICH FERMENTS STARCH AND PRODUCES AMYL ALCOHOL.*

BY L. PERDRIX.

The author has separated from Paris water a bacillus, *B. amylozymicus*, which ferments starch, with production of amyl alcohol. It is separated by cultivation on potatoes, and finally on gelatin. The bacillus is 2–3 μ long, and 0·5 μ thick; the rods are joined in pairs and chains, and in the absence of oxygen are motile, like *Vibrio butyricus*, Pasteur. The rods are readily stained; the spores are set free through the dissolution of the walls of the mother cell. The bacillus flourishes only in the absence of oxygen, readily, however, either in a vacuum or in hydrogen, nitrogen, or carbonic anhydride. The optimum temperature is 35°; it grows quite well at 20–25°; at 16–17°, fermentation commences at the end of four days. Its "maximum" is 42–43°. It will grow in all the usual cultivating media, ferments the sugar and starch, but does not attack cellulose or calcium lactate, differing in this respect from *Vibrio butyricus*, Pasteur. Acids are produced during the fermentations which it causes, and the presence of acidity, equivalent to 0·055 gram sulphuric anhydride, or of alkali equivalent to 0·08–0·11 gram in 100 c.c., is sufficient to arrest the process; the addition of calcium carbonate to the liquid enables the fermentation to become perfect. Glucose ferments to hydrogen, carbonic anhydride, acetic and butyric acids during the first three days; from the third to the ninth day, no acetic acid is formed. From saccharose and lactose, acetic acid is formed during the first five days. The greater the amount of oxygen present the more acetic acid is produced; it was also observed that at the time of the butyric acid formation all the cells contained spores. From the fermentation of starch a distillate was obtained, of which one-third was amyl alcohol, and from 100 grams of potatoes 2·3–2·5 c.c. of alcohol were separated. The sugar obtained from starch is very similar to glucose, but has a less rotatory action, and its phenylglucosazone melts 10° lower than that from glucose; 94 per cent. of the starch is converted into sugar, carbonic anhydride, ethyl and amyl alcohols, acetic and butyric acids, and 6 per cent. is converted into dextrin. The sugar formed by the bacillus from starch may be fermented perfectly with beer-yeast, either after sterilization or in the presence of the bacillus. If either the sugar obtained by fermentation of starch with this bacillus, or a sterilized mash, be fermented with a pure cultivation of yeast, no fusel oil is formed, and the author concludes that the fusel oil found in commercially prepared alcohol is formed by the action of bacteria. The *B. amylozymicus* remains uninjured for ten days at 50–55°.

* From the *Journal of the Chemical Society*, January.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, JANUARY 30, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE SALE OF MEDICATED WINE.

INQUIRIES are not unfrequently received in reference to the desirability of pharmacists taking out the licence which would enable them to sell the various so-called medicated wines which are so conspicuously recommended to the public in the advertisement columns of the papers. Though it is somewhat difficult to answer this question without a knowledge of the opinion which may be held by individual inquirers as to the position the pharmacist should seek to maintain, it may be stated in a general way that we have always endeavoured to discourage the taking out of a licence to sell wine as being inconsistent with the pharmacist's proper business. When that business is associated with other occupations of a more ordinary trade nature it may be expedient to take out a licence by which the sale of certain wines would be made lawful; but evidently the decision of this question must be more easily arrived at by those whom it concerns than by the aid of external advice. There is, however, a good deal of misconception prevailing in regard to the requirements of the law in connection with the sale of wine, and also as to the conditions under which the wine licence is required. In the paper read by Mr. CLARK at the evening meeting in Edinburgh, and in the discussion to which that paper gave rise, the prevalence of these misconceptions is illustrated to some extent. It may not, therefore, be out of place to refer to this subject for the purpose of removing such misconception.

In the first place it is necessary to point out that strictly speaking the law requires that a licence should be taken out for the sale of wine of any kind whatever. From the point of view of the Excise authorities wine is simply a form of alcoholic beverage, and as such it is not only subject to the payment of duty, but can only be sold by those who hold a licence for that purpose. The fact of wine being medicated does not really make any difference in that respect. It is from the neglect to bear this fact in mind that difficulty has arisen. From that point of view the wines of the British Pharmacopœia are not any exception to the general rule. But a mistake is often made in regard to this, and it is supposed that a Pharmacopœia wine, being an article of the official materia medica, is on that account free from the operation of the law. Thus Mr. CLARK assumes in his paper that all the "medicated wines recognized in the Pharmacopœia are exempt from licence." That view of the matter is very frequently entertained, and though it has just a shadow of truth in it, it is an entirely erroneous view. The truth is that the Excise authorities do make an exception in regard to medicated wines, but that exception is not based upon any consideration of what is recognized by the Pharmacopœia as a medicated wine. The criterion by which the Excise authorities are guided in their decision whether medicated wine may be sold without a licence is really an arbitrary one of their own, the only question considered by them being whether or not the wine is capable of being used as a beverage. If it be held that a medicated wine can be so used the sellers of the wine must have the requisite licence, or they will render themselves liable to a penalty for selling it, whatever may be its reputed medicinal qualities.

It will be evident from this that the exception made in regard to medicated wines is nothing more nor less than a concession on the part of the Excise authorities. They take cognizance of the fact that wine is used as a vehicle for the administration of medicine, and with commendable liberality consent to abstain from interfering with the practice. In doing so, however, one proviso is made, and that is the very reasonable one that the concession made shall not become the means of interfering with the exercise of their especial duties as collectors of revenue. In short, they demand as the characteristic feature of "medicated wine," that it shall not be capable of being used as a beverage. In this sense the exception made by the Excise authorities is not limited to the medicated wines recognized by the British Pharmacopœia, but it extends to every kind of vinous preparation which is so far medicated that in their opinion it cannot be used as a beverage. The question first arose in connection with the sale of quinine wine, which was some years ago conducted in such a manner as to constitute an evasion of the law. Eventually it was decided that the standard of medication sufficient to justify permission to sell the wine without a licence should be that of the Pharmacopœia, or 1 grain of quinine in every ounce of the wine. This adoption of the Pharmacopœia standard in the case of quinine wine has, no doubt, given rise to the idea that the Pharmacopœia recognition of that preparation was the ground of

exemption. But as already remarked that is a mistake, and on reference to the general order issued in 1878 it will be found distinctly stated that wine compounded with quinine in the above-mentioned proportions is no longer fit to be used as a beverage, and that for such reason no objection should be offered to its being sold by druggists without a licence. From what has been stated it will be evident that from the strictly pharmaceutical point of view there is really no necessity for a licence for the sale of "medicated wines." In regard, however, to the so-called medicated wines, many of which do admit of being used as beverages, no real distinction can be drawn between them and other alcoholic beverages, and thus their sale lies outside the scope of strict pharmaceutical practice.

LIABILITY FOR ADULTERATION.

SOMETIME ago a milkman was prosecuted under the Sale of Food and Drugs Act for selling watered milk, and though it was admitted that the milk sold was watered, the defendant contended that he was not liable, since the milk was taken from his premises in good condition, and had, without his knowledge, been afterwards watered by his servant, who was the actual seller. The question was thus raised whether the actual seller of the milk was the person amenable to the penalties imposed by the Act, or whether the master on whose behalf the milk was sold was liable. The magistrate held that the master was liable for the act of his servant, and convicted him, imposing a penalty of twenty pounds and costs. On application a case for appeal was granted, and it came before Justices HAWKINS and WILLS, in the Queen's Bench division of the High Court of Justice, last Monday. Counsel for the appellant contended that the whole scope of the Act of Parliament provided an escape for any person who was himself innocent of adulteration, and who took all the precautions which a prudent man could take to sell an honest article. On the other hand it was contended that under the Act the master was responsible for what had taken place, and that he had been properly proceeded against and convicted. Mr. Justice HAWKINS said he would consider the arguments, though there was no doubt of the view the Court would take. On Tuesday judgment was delivered, and Mr. Justice HAWKINS said that in regard to the question whether or not a principal in a milk business was liable for the sale of adulterated milk sold by a man in his employ he held that the master was responsible, and that the magistrate had rightly convicted him. He thought that a master must for all purposes be deemed "a seller" of the milk as well as the man who was in charge of the milk cans, and it was not at all necessary to prove that the master was cognizant of the adulteration to make him guilty of the offence of selling adulterated milk. The absence of cognizance might be a fact to be considered by the magistrate in imposing the penalty, but nothing more. The justices therefore affirmed the conviction and dismissed the appeal with costs, but sent the case back to the magistrate that he might, if he thought fit, exercise his discretion as to reducing the fine. This case is of interest as having been decided by the same judge who took part in the decision of the WHEELDON case, and it therefore serves to show that to the legal mind there is a wide difference between the two cases. Though a master may be held liable for the improper performance by his servant of an act which the servant may properly be deputed to perform, the liability for an act that is in itself illegal does not attach to the master but to the person who performs that act. Thus while a master is liable for the adulteration of milk sold on his behalf by a servant, the employer of an unqualified assistant who sells poison is not held liable for that offence because the act is one which the master cannot depute an unqualified person to perform for him, and, as in the WHEELDON case, the liability falls upon the person actually performing it. The judgment delivered in the case tried at Sheffield shows that this view of the matter is being generally taken, and certainly it appears to be one which should recommend itself to legally registered chemists and druggists.

JURY SERVICE.

IN reply to a question that has been asked in regard to jury service, it may be stated that the provision of the Juries Act in regard to registered pharmaceutical chemists who are actually in practice is that they are exempt from serving upon any juries or inquests whatsoever. It may, however, be useful to point out that those who desire to enjoy the full advantage of the exemption which the law accords them must be individually careful to ascertain that their names are not inserted in the lists of jurors. If that is not done their exemption from jury service may have but little practical value. In regard to this point the terms of the Act, "shall not be inserted in the lists," etc., are somewhat apt to mislead. In fact, it is the business of every individual who is exempt from jury service to take care that his name is not included in the lists of persons liable to serve as jurors, and if he does not do so by lodging a timely objection to the insertion of his name, the provision made in the Act as above quoted may be entirely disregarded. In such a case the summons to serve on a jury must be obeyed, and no greater consolation can be expected from a judge than to be told that if a person exempt from jury service allows his name to remain on the list of persons liable to serve, any inconvenience he may suffer in consequence is solely due to his own neglect to take care of himself and his privileges. The Society's Calendar gives full information as to the steps to be taken by any pharmaceutical chemists who may have their names inserted in the jury lists of their respective parishes.

COPPER IN PEAS.

IN connection with the disputed question of the deleterious effects of preserved peas coloured

with copper, some experiments have been made by Professor CHARTERIS and Mr. W. SNODGRASS. The results, published in the *Lancet* of the 23rd inst., show that by digesting such peas in dilute hydrochloric acid some copper is dissolved. By digesting the peas with a mixture of pepsin and dilute hydrochloric acid, copper was dissolved to the extent of 0·52 grain per pound of peas, equal to 2·05 grains copper sulphate. Artificially prepared compounds of copper with albumen and with casein were also submitted to the action of solutions containing respectively pepsin with hydrochloric acid and pancreatin with sodium carbonate, the temperature being maintained at 99° F. It is stated that at the end of an hour and ten minutes digestion was complete in the acid solution in the case of the albumen compound, and at the end of two hours in the alkaline solution; in the case of the casein compound digestion was complete at the end of two hours in the acid solution and at the end of one hour in the alkaline solution. Rabbits and pigs were supplied with food containing an admixture of copper albuminate or copper sulphate, and when the animals were killed copper was found in their liver and kidneys. When the quantity of copper sulphate given to a young pig weighing 9 pounds amounted to sixty grains it refused the food for twenty-four hours, but it readily took food containing ten grains, and continued to do so for four days, when it was killed. The experiment would probably have been more conclusive if the supply of coppered food had been continued longer and the pig had been allowed to live until the effects of the treatment had been manifested more definitely than by the mere presence of copper in the liver and kidneys.

We learn with much regret from a Jersey paper that Mr. George Ereaut, of St. Heliers, has fallen a victim to the prevailing epidemic of influenza. Mr. Ereaut had been a Member of the Pharmaceutical Society since 1853. In Jersey he occupied a prominent position as a member of the Jersey National Rifle Association, and at the time of his death held the rank of Lieutenant-Colonel. He was also a prominent member of the Royal Jersey Agricultural and Horticultural Society, and one of the most successful cultivators of chrysanthemums in the island.

* * *

At the moment of going to press information has been received that judgment has been delivered in the case of the Pharmaceutical Society *v.* Sales, a report of which appeared in last week's Journal at page 605. Judge Ellison held that it was clear the defendant was liable for the penalty for selling poison, but that there was not sufficient evidence to prove that he kept open shop or used the name of chemist and druggist. He might simply be the servant of Griffin. He therefore gave judgment for only one of the three penalties sued for.

* * *

We regret to announce that Mr. Wm. Skoulding, of Wymondham, who was elected an annuitant on the Benevolent Fund in December, 1890, died on the 21st instant. Mr. Skoulding was in his eighty-seventh year, and had been a Member of the Society for forty-four years.

Transactions of the Pharmaceutical Society.

FIRST EXAMINATION.

A meeting of the Board of Examiners for England and Wales was held on Thursday, January 28.

Certificates by approved examining bodies were received from the undermentioned in lieu of the Society's examination:—

Griffiths, Arthur Valentine ...Longton.
Hayward, Charles Edward ...Trowbridge.
Paterson, John .....Glasgow.
Rowe, John Westaway .....Wrexham.
Sheldrake, Albert Mason .....Colchester.

The Report of the College of Preceptors on the Examination held on January 12 was received.

Two hundred and ninety-four candidates had presented themselves for examination, of whom *one hundred and fifty-nine* had failed.

The following *one hundred and thirty-five* passed, and the Registrar was authorized to place their names upon the Register of Apprentices or Students:—

Allen, Frederick William .....Boston.
Allen, George William .....Ongar.
Allen, William Frederick .....Market Bosworth.
Anderson, Jean Maule .....London.
Ashwin, Alice Maud .....Stratford-on-Avon.
Ashworth, Whittaker.....Liverpool,
Barnaby, Frank Charles .....Manchester.
Bayne, Thomas .....Dublin.
Beattie, Edward .....Derby.
Bell, Henry Robert Kerr .....Newcastle-on-Tyne.
Bennett, William, junr.....Bath.
Berry, Harry Leopold Firth ...Newton Heath.
Black, John Oswald .....St. Andrew's.
Blaylock, William Waugh.....Poole.
Bowden, Harry Drysdale .....Oxford.
Brodie, John Dallas .....Broxburn.
Bruce, William.....Glasgow.
Burge, William George .....St. John's Wood.
Burke, William Dixon .....Birmingham.
Burnett, William Henry .....Barton-on-Humber.
Caddy, Richard Dewsbury ...Midhurst.
Calder, John Kinnaird .....Edinburgh.
Carr, James Augustus.....Sunderland.
Chorley, Cleasby, junr. .....Kendal.
Cocks, Ernest Albert .....Bromsgrove.
Conner, John Blair.....Greenock.
Cooper, John William .....Ebbw Vale.
Davies, Frederick William ...Louth, Lincs.
Davies, Lewis .....New Quay.
Davies, Tom Evans .....New Quay.
Dawson, Peter .....Glasgow.
Dickenson, Joseph Frederick..Hyson Green.
Dolman, Thomas Tustin .....Cheltenham.
Douglas, James Reid ..... Dundee.
Duncan, Charles Tocher .....Dundee.
Earnshaw, Richard Consitt ...Eastbourne.
Evans, Evan Lewis.....Blaenau Festiniog.
Findlay, William .....Dundee.
Fisher, George Francis Lewis..Plymouth.
Fotheringham, William .....Dundee.
Francis, Henry St. David .....Walthamstow.
Gale, Joseph .....Stamford.
Gibson, Harry .....Knutsford.
Graham, William.....Stanwix.
Grant, Joseph ....Banff.
Gray, William .....Upton Manor.
Green, Walter George .....Northampton.
Grindley, Thomas Foulkes ...Mold.
Hebden, John .....Padiham.
Hewitt, Silas .....Dukinfield.

Hindson, Edward William ...Leeds.
Hirst, Frederick Beaumont ...Batley Carr.
Holman, Henry .....Silverton.
Horn, John .....Penrith.
Houseman, James Edward ...Louth, Lincs.
Huck, Henry .....Leatherhead.
Hunt, William Albert Edward.Birmingham.
Hyslop, Thomas .....Dumfries.
Ives, George.....Colchester.
Jeffery, George Golder .....Tring.
Johnstone, Donald Forbes.....Inverness.
Jones, David .....Kentish Town.
Jones, Elizabeth Margaret ...Woking.
Jones, Thomas Pugh .....Talley.
Jones, Thomas Stephen.....Llanrwst.
Kent, Charles .....Brighton.
Kitson, George Thomson .....Worcester.
Kluge, Herman .....Swansea.
Langman, Herbert Ball.....Haddenham.
Leigh, George Herbert .....Weelsby.
Lewis, John Lambert.....Leeds.
Lockhead, Alexander Russell...Ayr.
Lumb, Henry Alexander .....Liverpool.
Lumsden, William James.....Gateshead-on-Tyne.
Macgregor, Duncan Macpherson..Glasgow.
McArthur, John Clark .....Dunoon.
McGillivray, Alexander.....Anstruther.
Mackray, George.....Ellon.
McMillan, Matthew .....Kilmaurs.
Mason, George Washington ...Colwyn Bay.
Mellor, Reginald John .....Hemel Hempstead.
Metcalfe, John Thomas... .....St. John's Wood.
Michelmore, Philip John Reap.Paignton.
Miner, William Harold .....Walsall.
Mitchell, Thomas Arthur ... ..Huddersfield.
Moore, John Edwd. Langford..Welshpool.
Morris, Robert Leitch ....Dunfermline.
Mowat, James Heatly.....Edinburgh.
Pickering, Francis .....Spennymoor.
Pickering, William Cowper ...Northampton.
Price, Ernest Edwin .....Abertillery.
Prichard, Richard John.....Brynderwen.
Pugh, William Henry Walker...Swindon.
Raywood, Vaughan Rycroft ...Harrogate.
Reavill, Sydney Percy .....Liverpool.
Reeves, Richard .....West Bromwich.
Richards, Ellis .....Sarn.
Richardson, Richard Conway..Liverpool.
Richardson, Walter B. .....Brixton.
Riley, Alfred .....Bradford.
Roberts, Frederick Walter ...Bexhill.
Roberts, Hugh Martin .. ..Millom.
Rogers, Albert .....Weston-super-Mare.
Russell, Walter George .....Leicester.
Scott, James Francis .....Lambeth.
Scott, William Atha .....West Hartlepool.
Senior, William Arthur .....York.
Sherlock, Robert Lionel.....St. Helens.
Shufflebotham, Ernest .....West Brampton.
Smith, Frank .....Bourne.
Speirs, Gilbert Blair .....Glasgow.
Steggall, Octavius Frederick...Bloomsbury.
Stephens, Annie Ethel .....Cardigan.
Steweni, George Henshall.....Sandbach.
Storey, Richard Park .....Cartmel.
Sturdy, Thomas Tyerman... ..Easingwold.
Taubman, Henry Allen .....Bloomsbury.
Taylor, John Edwd. Brownlow.Colwick Vale.
Thomas, Henry Sidney .....Talgarth.
Thomas, Thomas Henry..... Birmingham.
Thomas, William Henry .....Bristol.
Thorp, Ernest ....Southport.
Toy, Hubert George .....Birmingham.
Trembath, Frederic .....Penzance.
Upson, Charles .....Southampton.
Wait, Frederick William .....Newark.
Wallace, William Henry .....York.
Ward, Wm. Hy. Chancewell...London.
Watkins, Gerrard .....Boston.
Westley, George Ernest.....Walsall.
Williams, Julian Francis .....Coleford.
Woodruff, Herbert .....Manchester.
Woodward, Harrison .....Husthwaite.
Wright, Andrew, junr. .....Anerley.
Yeats, William George .....Hornsey.

The questions set at this examination were published in the *Pharmaceutical Journal* for January 16, p. 581.

The following is a list of the centres at which the examination was held, showing the number of candidates at each centre and the result:—

	Candidates.				Candidates.		
	Examined.	Passed.	Failed.		Examined.	Passed.	Failed.
Aberdeen	8	2	6	Leeds	13	8	5
Aberystwith	1	–	1	Lincoln	7	3	4
Birmingham	16	10	6	Liverpool	17	7	10
Brighton	5	2	3	London	37	20	17
Bristol	6	3	3	Manchester	23	9	14
Cambridge	4	1	3	Newcastle-on-T.	8	3	5
Canterbury	1	–	1	Northampton	3	2	1
Cardiff	6	3	3	Norwich	1	–	1
Carlisle	7	3	4	Nottingham	15	5	10
Carmarthen	10	5	5	Oxford	5	2	3
Carnarvon	8	5	3	Penzance	1	1	–
Darlington	3	2	1	Peterborough	5	3	2
Dundee	11	6	5	Plymouth	4	1	3
Edinburgh	17	7	10	Sheffield	1	–	1
Exeter	6	2	4	Shrewsbury	2	1	1
Glasgow	16	6	10	Southampton	6	3	3
Hull	4	1	3	Worcester	2	2	–
Jersey	1	–	1	York	10	4	6
Lancaster	4	3	1				

Proceedings of Societies in London.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting was held on Thursday, January 21, Mr. H. Garnett, Vice-President, in the chair.

Mr. Donington then read the following paper:—

Baking Powders.

BY R. S. DONINGTON.

That the supply of pure and unadulterated food is a matter of the first importance to the nation is evidenced by the very stringent and just provisions of the Act for preventing the Adulteration of Food and Drugs. And among other offences that of adulterating bread has received very particular attention. The subject was brought into very prominent notice owing to the custom prevailing some years back of adding large quantities of alum and other deleterious chemicals to the flour used in bread-making.

Opinions have differed as to whether the use of alum would be injurious, while, on the other hand, it is generally held that the bread produced is much whiter and finer in appearance if alum be present.

It was found that second-rate flour could be made to produce bread equalling in colour that yielded by the finest flour by the use of a careful admixture of alum.

This whitening effect is produced by preventing the cerealin reacting on the starch present in the flour to produce sugar and dextrin which would cause a darkening in colour.

Lime, sulphate of zinc, and copper sulphate have also been used, the latter, however, more generally on the Continent.

The first presents a marked advantage, that of preventing the souring of bread by retarding the fermentation of starch into lactic acid.

An examination of the various compounds now supplied for artificially aerating food stuffs may not be uninteresting.

The method of Dauglish has been recommended as yielding excellent results in the artificial aeration of bread.

Its distinctive feature lies in the application of a compressed atmosphere of CO_2 to the mass being worked at. This forces the gas into the pores of the paste, and when the pressure is removed, rapidly and effectually aerates the mass by its own expansion.

A mixture of hydrochloric acid and bicarbonate of sodium was used for some years, but the sticky nature of the bread made by the process caused it to be discarded. For the lighter articles made by the confectioners, carbonate of ammonium was and is still in considerable demand. It yields a very porous product. Allen has found 1 per cent. of plaster of Paris in muffins, and it is said to have occurred to the extent of 10 per cent. in a sample of oat-cake.

Tuson has found traces of As_2O_3 in baking powders, possibly through accidental contamination, or through the use of impure ingredients. Chemists appear to have spared no pains in searching for the best combination for evolving the necessary gas for bread and pastry making.

Works of reference give the following amongst other methods :—

Horsford's method, which has been much used, consists in working with separate quantities of flour, mixed with acid calcium and magnesium phosphate, and potassium chloride and sodium bicarbonate. By this means CO_2 NaCl and neutral phosphates are formed on adding water.

Delfonte uses a mixture of tartaric acid 4 ounces, alum 8 ounces, sodium bicarbonate 12 ounces, farina 1 pound, and ammonium carbonate 3 ounces.

Davis's powder is a mixture of acid phosphate of ammonium and carbonate of ammonium, while M'Donald's is found to contain acid sulphate of potassium or sodium with a bicarbonate.

Weitz prefers phosphoric acid and bicarbonate of sodium, and an American formula gives chalk and tartaric acid as the composition of an effective powder. Failures to produce a satisfactory result have occurred through the rapidity with which the gas generated is dissipated. This has caused otherwise useful processes to be worthless in dealing with large batches of material. The increased demand for bread containing the whole of the nutrient material of the grain will no doubt lessen adulteration to some extent, by removing the cause, a desire for an excessively white loaf.

Several powders closely allied to baking powders are now largely used for household purposes. Prominent among these is the so-called self-raising flour. This powder on mixing with water effervesced feebly and was found to consist of flour, mixed with a small proportion of tartaric acid and bicarbonate of sodium.

Egg powders are also frequently met with, and a sample which was examined proved to be a powder composed of rice flour, tartaric acid, and bicarbonate of sodium, coloured to produce the desired yellow shade by a small quantity of turmeric.

A well-known brand of custard powder was found to be free from mineral substances, and to consist of slightly coloured maize and potato starch, flavoured with a suitable quantity of essential oil of almonds.

Beasley gives the following formula as representing the composition of such a powder :—

Gum tragacanth	2 ozs.
Powdered turmeric	$2\frac{1}{4}$ drms.
Ess. lemon	1 drm.
Potato starch	1 lb.
Ess. oil almonds	$\frac{1}{2}$ drm.

One ounce of the powder boiled with milk producing one pint of custard. The baking powders which have been examined have been purchased from various quarters of London and the provinces. They present one striking feature, the similarity in the composition of the more expensive powders, which have been found to consist in the main of a mixture of tartaric acid and sodium bicarbonate and ground rice. The cheaper varieties also closely resemble each other, alum being found in all, while the acid constituent has been found to be the acid potassium sulphate. A slightly more detailed result of quantitative analyses is given below.

Sample 1 was found to effervesce freely in cold water, and was filtered when effervescence ceased; the filtrate after boiling was found to be alkaline, and effervesced on adding an acid, showing that the whole of the alkali present had not been neutralized, and that a carbonate was present. Tested for metallic constituents only potassium and sodium were found; this, and indeed all the powders examined, showing a total absence of poisonous constituents. The presence of tartrate leads to the conclusion that the acid portion of the powder consists of cream of tartar, tartaric acid, or a mixture of both.

Sample 2 was dissolved in water and gave after boiling and filtration a nearly neutral solution. It was found to consist of tartaric acid 6, bicarbonate of sodium 8, and ground rice 16. For the formula of this powder and the next examined I am indebted to the courtesy of the proprietors.

Sample 3 gave a very alkaline solution, much excess of carbonate being present. It differs in composition from the other powders examined in containing ammonium carbonate. The maker gives as the formula—tartaric acid 24, sodium bicarbonate 32, ammonium carbonate 4, ground rice 48.

Sample 4 is a much advertised article, and was found to closely resemble Sample 1 in its composition, but gave a nearly neutral solution after the expulsion of CO_2.

Sample 5 was an exact counterpart of Sample 2.

These may be classed as the better sort of baking powders. Three samples are manufactured by provincial chemists, while the others are widely advertised and well-known powders. The following samples were much commoner, in both outward appearance and composition, and the examination tends to show that profuse pictorial illustration and low quality go hand in hand.

Sample 6 gave an alkaline and slightly astringent solution. In this and the succeeding powders alum was found. The powder appeared to consist of a mixture of potassium alum with acid potassium sulphate and sodium carbonate or bicarbonate.

Samples 7 and 8 were apparently of similar composition to the above, sample 8 differing in containing a small quantity of turmeric. The commoner samples were found to commence effervescing very much more slowly than those previously examined, but on standing a copious evolution of gas was observed.

The basis of these various powders was found by microscopic examination of the matter insoluble in water to consist of ground rice.

Quantitative analyses of two typical powders will show the percentage composition of the various ingredients.

Sample A was found to contain tartaric acid 20, sodium bicarbonate 27, and ground rice 53 per cent.

Sample B contained alum 9·4, acid sulphate of

potassium 5·2, sodium bicarbonate 4·4, and ground rice 81 per cent.

In conclusion, it may be said that the baking powders sold at present appear to be remarkably free from injurious ingredients, alum being the only doubtful substance found.

The paper gave rise to a discussion, in which the Chairman, Secretary, Messrs. Browne, T. M. Taylor, F. A. Sturton, Fuge and Ringer took part.

A report on Botany by Mr. H. H. Sturch was then, in the author's absence, read by the Secretary.

The report was on the subject of Vascular Cryptogams, which, although now forming a comparatively small group of plants, once formed almost the entire vegetation of the earth, some of its members rivalling in size our modern forest trees. Several important works have lately appeared on this subject, and have thrown a good deal of light on these groups, which seem to form a connecting link between cryptogams and phanerogams.

The results of recent research as to the structure of these fossil plants and their position in our modern system of classification were collected and discussed. First the Calamariæ, which are found in large numbers throughout the carboniferous strata, were reconstructed as far as possible from their fossil remains, and found to closely resemble the Equisetums among present-day forms. Some, however, of the Calamariæ show large developments of secondary wood, and this has led Brogniart to separate them from the others, which are included among Equisetineæ, and refer them to the Gymnosperms. Opinions are, however, still much divided on this point. The next group described consisted of the Sphenophylleæ, which form one of the most remarkable among the genera of the middle and upper coal measures. These have slender, articulated stems, with leaves in whorls of six or a multiple of six; they have a primary triarch xylem strand, and from one to fifteen layers of secondary wood produced from an external cambium zone. They have no known analogues, but are placed by some in the neighbourhood of the Lycopods, by others in that of the Salviniæ. The Lepidodendreæ were very conspicuous in the carboniferous epoch, and were gigantic specimens of essentially the same type as the modern Lycopods. The Sigillariæ were described as having tall, ribbed, pillar-like trunks, spreading at the top into a few thick branches, clothed with long grass-like leaves. The roots were peculiar, starting from the stem in four main branches, then regularly bifurcating several times, and running out into extremely long cylindrical cables, apparently suited to anchor the plant in a soft oozy soil. By some authorities they are classed with the Cycads, by others with the Lepidodendreæ.

The report was illustrated by drawings of the various types referred to, and was followed by a discussion, in which the Chairman, Messrs. Fuge, Donington, Browne, and the Secretary took part.

After a reference by Mr. T. M. Taylor to a dispensing difficulty recently experienced, the meeting adjourned.

ROYAL INSTITUTION.

The Composition of Water.*

In this lecture a new determination of the atomic weight of oxygen was brought forward. The first determination was made by Dumas in 1842, and three years later by Regnault, the number in each case obtained being 15·96. Since then several investigators have taken up the subject and obtained numbers ranging from 15·869 (Cooke in 1889) and 15·949 (Keiser in 1888).

* A lecture delivered by Lord Rayleigh at the Royal Institution on Friday, January 22.

The importance of knowing accurately the atomic weight of this element cannot be over estimated. Few elements form stable and well-defined combinations with hydrogen, and consequently the *direct* determination of the atomic weight of only a few elements has been obtained. In the majority of cases the oxides are stable and form a good basis for such a determination, but unless the accurate atomic weight of oxygen be known an error creeps into these determinations, and this in the case of the larger numbers amounts perhaps to units.

The method adopted by the lecturer to ascertain the composition of water consisted in taking the specific gravity of oxygen, hydrogen being the unit. Now if two volumes of hydrogen combine with one of oxygen to form water, the composition by weight follows as an easy calculation. But unfortunately this has lately been contradicted. Scott found the ratio to be 1·964 : 1. Morley, however, by a series of determinations closely agreeing with one another found the ratio H : O in water 2·0002 : 1.

The practical difficulties of weighing hydrogen gas accurately were then referred to, namely, the small weight of the gas when compared to the glass globe containing it and the very great effect of atmospheric disturbances and humidity on successive weighings. These difficulties are more or less overcome by having a dummy as nearly as possible of the same size as the globe. In this case the dummy was made exactly the same size, by an extra volume piece; that is, a piece of glass tube wound round the dummy to make it exactly the same size as the globe in which the gas is weighed. But in spite of all care casual errors always occur; these, however, are eliminated in the mean of a number of determinations. What is to be dreaded is the systematic error, where the results closely agree, but yet are vitiated by this constant source of error. The lecturer in his determinations was bothered by such an error, which proved to be due to a leakage where platinum had been soldered into glass. A minor difficulty was the dampness of the room, and this was overcome by bringing in a dried blanket, allowing it to take up moisture, then drying again and repeating the process. It was found that the blanket took up over a pound of aqueous vapour.

The hydrogen and oxygen were generated by electrolysis from water. Owing to the fine state of division of the gas, part of the hydrogen escapes along with the oxygen and *vice versâ*. Further, both gases are soluble in water, which also causes the appearance of either oxygen or hydrogen, as an impurity. Lastly, aqueous vapour is always present. To get rid of the oxygen or hydrogen, present as an impurity, the gas was led over heated copper. If oxygen were the impurity it oxidized the copper; if hydrogen, the oxygen first oxidized the copper and then the hydrogen reduced it. The great advantage of this apparatus is that it need not be disconnected, but only the direction of the current changed according to the gas required. From the heated copper the gas was led over solid potash, at first coarse, then in fine division, then over phosphorus pentoxide, and lastly through a tube containing glass wool to stop any very fine suspended particles. Attached to this glass tube was the exhausted globe, and in connection with this a "blow-off tube," so that when the pressure in the globe exceeded that of the atmosphere by about two or three millimetres, the excess of gas was liberated and the contents of the globe brought to the same pressure as the atmosphere. The taps were then turned and the globe ready for weighing; where joints were necessary they were made with thick india-rubber tubing, and the whole joint sunk in mercury. One joint, namely that connecting the glass globe with the apparatus, could not be sunk, but the diffusion must have been extremely small, or even nil, inasmuch as the rubber was

thick and the two pieces of glass tube brought into close proximity with one another. Connecting the generator with the apparatus was a glass tap to which was attached a long lever. In this way a very slight movement of the tap could be made. This was necessary because the apparatus was under a vacuum, and could not therefore be put in communication with the generator. The results of these experiments were as follows:—

H.		O.
·15800	. . . . .	2·51724
·00056	. . . . .	·00056
·15856		2·51780

$$\frac{2{\cdot}51780}{{\cdot}15856} = 15{\cdot}879 = \text{atomic weight of oxygen.}$$

When the glass globe was exhausted it measured less in volume than when full. This is corrected by adding the constant ·00056 to each weighing.

It is here interesting to note that the first determinations by Dumas and Regnault gave a figure very nearly a whole number, and so confirmed Prout's law. The last determination by Lord Rayleigh is further away from an integer, and therefore if Prout's law be true, the constants of which all the atomic weights are integral multiples must be less than a whole number.

At the commencement of the lecture, Lord Rayleigh gave a brief sketch of the present position of the kinetic theory of gases and its development. The revival of this theory on a definite and scientific basis has been attributed to Clausius, and a statement to that effect is found in most of the text books and original papers bearing on the subject. It appears, however, that this statement is not correct, the honour belonging to J. J. Waterstone. In 1845 Waterstone communicated to the Royal Society a paper setting forth very clearly the essentials of what is now known as the kinetic theory of gases. This paper was rejected by the referees as being quite unfit, and indeed one referee was bold enough to say that the paper was nonsense from beginning to end; another and more cautious referee considered the matter too speculative. The result of this rejection was the delay in the general acceptance of this theory some ten or fifteen years. This the lecturer suggested conveyed an important lesson. Owing to the enormous quantity of published matter it is only possible to read what is well authenticated, and consequently much of great importance is passed over unnoticed. It would be well, therefore, when an unknown author sends in a communication, to take up some experimental point on a well defined subject, and to arrive at some definite result if possible differing from that generally accepted. It would be time enough to take up some speculative point when he became better known.

The subject of the lecture being a measurement, there was not very much scope for experimental illustrations. One experiment, however, was shown. A glass globe was suspended in a glass cylinder and counterpoised; carbon dioxide was then passed into the cylinder and the globe became apparently lighter. This showed very clearly the influence of the atmosphere when weighing large bodies such as a specific gravity globe. The whole of the apparatus described above for filling the globe was shown on the table, all connected up ready for an experiment.

Provincial Transactions.

BLACKPOOL CHEMISTS' DINNER.

On Monday evening, the 18th inst., the Blackpool chemists held their second annual dinner at the Winter Gardens. Almost all the chemists in the town were present. Representatives were also present from Lytham and St. Anne's-on-the-Sea. The evening was passed very agreeably, the greatest good humour and good fellowship prevailing throughout. The toast of the "Pharmaceutical Society" was proposed by Mr. Richardson, and in responding the Local Secretary made a stirring appeal on behalf of the Society, in which he was ably supported by Messrs. Taylor and Turver, showing that registered chemists would best advance their own interests and those of the trade by attaching themselves to the Pharmaceutical Society. These arguments apparently met with much sympathy, since four of those present at once gave him their names for election as associates in business. Of the twelve chemists in business in Blackpool nine will now belong to the Society.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The second half of the session was inaugurated on Thursday evening last, when the members assembled to listen to a new year's address entitled—

Young Pharmacists and their Work.

BY PETER MACEWAN, F.C.S.

The address was read in the unavoidable absence of Mr. MacEwan by Mr. John H. Thomson, of Lochee, Honorary Vice-President of the Association. The President, Mr. James A. Kinnear, occupied the chair, and there was a large and enthusiastic attendance.

In the course of the address the author set before his hearers a high ideal of work and duty, and of their aims, objects and possibilities in life. Much valuable advice was given, well calculated to assist students in their difficulties, and to encourage them in the routine work of the shop. Among other important points which the author wished to impress were punctuality, order, method, tact, and other personal qualifications. Precision in pharmacy work was an essential feature in the young pharmacist's success, and several striking examples were given to show how the position of pharmacy generally might be materially improved by attention to this matter.

The address was listened to with marked attention, and at the close Mr. Thomson was awarded an enthusiastic vote of thanks for the admirable manner in which he had read it.

Several of the members having expressed their personal appreciation of the address,—

The President proposed that the Secretary be instructed to convey the best thanks of the Association to Mr. MacEwan for his continued interest in the Association, and for the trouble he had taken in preparing specially such an excellent address.

GLASGOW CHEMISTS AND DRUGGISTS' ASSISTANTS' ASSOCIATION.

At the meeting held on Wednesday, January 20, Mr. James Robb, President, in the chair, an essay on "Fermentation" was read by Mr. Andrew Donald. The lecturer commenced by referring to the efforts now being made to gain a knowledge of the nature and action of ferments, especially in regard to their effects and uses in the animal economy, as shown by the investigations of Pasteur, Koch and others. A few months ago a modification of Koch's tuberculein was introduced to medical men by Dr. Hunter, of London, which can be used without risk of harm, and should this prove successful in the treatment of disease it will follow that chemists must stock it. In the future we may have to do with many similar products

of ferments. Proceeding to treat of the ferments in our bodies, it was shown that they may be divided into organized or living and non-organized. The non-organized ferments, such as the pepsin of the stomach, ptyalin of the saliva and diastase of germinating grain are all more or less soluble, and are produced inside living cells, either vegetable or animal. Organized ferments or microbes, such as yeast, bacteria and bacilli are found almost everywhere floating throughout the air, but they are especially abundant in moist places; they are not dissolved by water, but live in water, and are either of a vegetable or animal nature. Ferments produce their specific effects by their presence in putrescible or fermentable fluids. They themselves undergo no change, except in the case of organized ferments, which are found to have multiplied during the process of fermentation. Organized ferments are of a vegetable nature, minute unicellular bodies, destitute of chlorophyll; starch has been found in some, sulphur in others. They are present in the human body in great numbers under certain conditions of disease; at all times they are abundant in the digestive tract. The temperature of 35° C. is most favourable for their development; low temperatures do not kill them but lessen their activity, on the other hand high temperatures speedily destroy them. Mr. Donald then related the chemical and vitalistic theories of fermentation, and went on to refer to the action of ferments. Do they live on fermentable matter and oxygen, and are the products of fermentation to be regarded in the light of excreted and waste material, or do the organisms produce a kind of ferment which acts on the fermentable matter? Although this latter view is now generally held, as yet no substance has been separated from yeast cells capable of changing glucose into alcohol. In regard to the cultivation of ferments he remarked that whilst the bacillus of tuberculosis lives best on blood serum, a great many organisms preferred a boiled potato. The processes of fermentation taking place in the mouth, stomach, and intestines were then explained. The paper concluded with a brief reference to the processes of fermentation and the ferments which cause disease.

A discussion followed, and on the motion of the Chairman a vote of thanks was awarded.

Review.

ELEMENTARY SYSTEMATIC CHEMISTRY FOR THE USE OF SCHOOLS AND COLLEGES. By WILLIAM RAMSAY, Ph.D., F.R.S.*

So many of the smaller scientific text-books of the present day are written to meet the requirements of an examination syllabus, that it is a pleasure to make acquaintance with a book in which the subject is fairly and generally treated, and more regard paid to the student's ultimate benefit than to his temporary success in satisfying examiners. This book is intended to serve as an introduction to the study of chemistry for the use of schools and colleges, and for this purpose is not only divided into twenty-nine chapters but also subdivided into eighty-three lessons. The brevity of style, absence of illustrations, and terseness of the descriptions of experiments, give to the book, however, rather the character of a teacher's companion than of a student's manual, and its adoption in a school would necessitate the delivery of a very ample course of experimental lectures to avoid the danger of chemistry being voted a dry subject. The method of grouping and classification employed in this book is, moreover, somewhat novel, but a system adopted by the Professor of Chemistry in the University College, London, may be presumed to be a well-tried and satisfactory one; it certainly enables the author to present an enormous number of facts to the student in a connected form, and thus effectually vindicates the expression of a hope that this short sketch of the subject of chemistry may help to demonstrate the value of its study as a training in classification and as a means of developing the reasoning powers. The first part, comprising four chapters or fifteen lessons, treats of elementary physics, especially in its bearing upon chemistry, but it is the next eleven chapters on inorganic chemistry, or Part II., that principally invite critical attention. In the first four lessons the symbols and natural occurrence of the elements are described, together with the general methods of their preparation by means of electricity, by heat, or by displacement; in the following lessons the preparation of individual elements or groups of elements, arranged according to the periodic system, is considered in greater detail, and the principal metallurgical processes are also described. The laws of chemical combination and the atomic theory are then brought forward, followed by four lessons on the typical compounds, hydrogen chloride, water, ammonia, and methane, whilst the remaining chapters of the section are devoted to a description of the more important compounds, commencing with the halides and following a system which introduces the chromates and manganates early, and relegates ozone, sulphuric acid, and bleaching powder to the closing lessons. The fourteen chapters on the chemistry of the carbon compounds, which constitute the third part, are rather unequally written and are wanting in the admirable systematic arrangement which is the prominent feature of the earlier part of the book. Thus the terpenes are dismissed in a single page, and form the latter part of a lesson upon piperidine, conine, and atropine, whilst the "natural alkaloids" are reserved for a subsequent occasion. Other groups, however, obtain better recognition, notably the ureides and the carbohydrates, the information concerning both of which is well up to date, though some of the statements concerning the sugars are very doubtful if not actually incorrect.

* London: J. and A. Churchill. 1891. Small 8vo. Pp. 359.

Obituary.

Notice has been received of the death of the following:—

On the 4th of December, William Smith, Pharmaceutical Chemist, High Street, Abingdon. Aged 86 years.

On the 18th of December, John Thomas Tupholme, Pharmaceutical Chemist, Coleherne Terrace, Earl's Court, S.W. Aged 66 years.

On the 26th of December, Thomas William Lister, Chemist and Druggist, Scarborough. Aged 44 years.

On the 31st of December, Flora Herbert, Chemist and Druggist, High Street, Airdrie. Aged 70 years.

On the 6th of January, William Kendle Cooke, Pharmaceutical Chemist, Lingwood, Norwich. Aged 39 years.

On the 6th of January, Henry Neal Boothby, Pharmaceutical Chemist, Crawford Street, W. Aged 69 years.

On the 7th of January, Francis Williams, Chemist and Druggist, Bird Street, Lichfield. Aged 63 years.

On the 8th of January, Edward Fossey Bally, Pharmaceutical Chemist, Baldock, Herts. Aged 69 years.

On the 8th of January, Henry Edwin Huntley, Chemist and Druggist, Bramley Road, W. Aged 65 years.

On the 9th of January, Thomas Boness Fletcher, Chemist and Druggist, Melbourne Street, Nottingham. Aged 61 years.

On the 10th of January, John Morris Broad, Pharmaceutical Chemist, Hornsey. N. Aged 38 years.

On the 11th of January, Cecil Henry Wakefield, Chemist and Druggist, Malvern Wells. Aged 62 years.

On the 12th of January, John Blenkiron, Chemist and Duggist, Reeth, Yorkshire. Aged 77 years.

On the 15th of January, Jonathan Radcliffe, Chemist and Druggist, Artley Street, Dukinfield. Aged 75 years.

On the 16th of January, Edward Wilson, Chemist and Druggist, Church Street, Silverdale, Staffordshire. Aged 59 years.

On the 16th of January, George Brown Cooper, Pharmaceutical Chemist, Brightlingsea, Essex. Aged 67 years.

On the 18th of January, Abraham Cox, Chemist and Druggist, Blaenavon. Aged 63 years.

On the 20th of January, Henry Wells, Chemist and Druggist, Loughborough Park, S.E. Aged 78 years.

On the 22nd of January, Stephen Stokes Orpin, Chemist and Druggist, Tunbridge Wells. Aged 48 years.

On the 23rd of January, John Baily, Pharmaceutical Chemist, late of Margate. Aged 56 years.

BOOKS RECEIVED.

PROCEEDINGS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION at the Thirty-ninth Annual Meeting, held at New Orleans, La., April, 1891. Philadelphia, 1891. From the Secretary.

ELEMENTARY INORGANIC CHEMISTRY, Theoretical and Practical. By HUMBOLDT SEXTON, F.R.S.E. London: Black and Son.

MERCK'S BULLETIN FOR DECEMBER, 1891. From the Author.

MANUAL OF CHEMICAL TECHNOLOGY. By RUDOLF VON WAGNER. Translated and edited by William Crookes, F.R.S. From the thirteenth enlarged German edition, remodelled by Dr. FERDINAND FISCHER, with 596 illustrations. London: J. and A. Churchill. 1892. From the Publishers.

COOLEY'S CYCLOPÆDIA OF PRACTICAL RECEIPTS and Collaterial Information in the Arts, Manufactures, Professions, and Trades, including Medicine, Pharmacy, Hygiene, and Domestic Economy. Designed as a comprehensive supplement to the Pharmacopœia and general book of reference for the manufacturer, tradesman, amateur, and heads of families. Seventh Edition. Revised and greatly enlarged by W. NORTH, M.A. In two volumes. London: J. and A. Churchill. 1892. From the Publishers.

CHEMICAL CALCULATIONS, with Explanatory Notes, Problems and Answers. Specially adapted for use in colleges and science schools. By R. LLOYD WHITELEY, Assistant Lecturer and Demonstrator in Chemistry in the University College, Nottingham. With a Preface by Professor CLOWES. London: Longmans. 1892. From the Publishers.

T. H. White.—Your advertisement should have been sent to the agents, 11, New Burlington Street. See notice, p. 620.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Macfarlan and Co., A. Flett, P. Simpson, J. Lawric, A. Russell Bennet, J. C. Stead.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

PEPSIN WINE.

Sir,—With reference to the above preparation, although the Inland Revenue authorities in their communication to me intimated that wine containing 320 grains pepsin and 2 drachms hydrochloric acid in each imperial pint might be sold without interference, it does not follow that the sale of wine containing other proportions of those ingredients would be prohibited. This formula is my own, and was by no means dictated by Somerset House officials.

I rather inferred from the communication received that so long as pepsin wine was prepared as a *bonâ fide* drug its sale would not be prohibited, be the formula what it may. I am sustained in this belief from the fact that Mr. Nesbit, of Portobello, was allowed to sell wine containing a much smaller proportion of acid.

I agree with Mr. Clark, of Aberdeen, however (whose paper I read with both pleasure and profit), that uniformity in preparation is most desirable. But I also agree with Messrs. Ewing and Dott, that wine is not the best menstruum for pepsin, and that the preparation is no longer popular. Mr. Clark's formula, barring the wine, might be a good one for glycerinum acidum pepsinæ, a preparation in every way superior to vinum pepsinæ.

JOHN H. FISHER.

OFFICIAL IODINE PREPARATIONS.

Sir,—I have read with interest Mr. Mackenzie's "Note on the Official Iodine Preparations," and beg to give the method I have followed for some years, with the best results, in making lin. iodi and tr. iodi, no interference with the official formulæ being necessary.

Linimentum Iodi.—Weigh potassium iodide, reduce to fine powder, re-weigh and transfer to stoppered bottle, into which weigh glycerine, rotate to moisten iodide, allow to stand for a few minutes, then add iodine with a tenth of spirit required, set aside for short time, add remainder of spirit, and shake.

Tinctura Iodi.—The same process, following official formula.

LANARKSHIRE.

PICTET CHLOROFORM.

Sir,—Replying to Messrs. Pictet and Co.'s letter, published in the *Pharmaceutical Journal* of January 23, we beg to say that the samples of chloroform we examined and reported on were bought from Messrs. Raoul Pictet and Co.'s wholesale agents in London, Messrs. A. and M. Zimmerman; that the bottles had not been opened until they came into our possession; that they bore no marks of having been tampered with, and that we have every reason to believe we received them exactly as they left their agent's office.

The boiling points were determined with precautions to prevent overheating.

We think the statement regarding boiling points of home-made chloroform published in the *British Medical Journal* of January 2 requires confirmation before being accepted as correct.

93, *Abbey Hill.* J. F. MACFARLAN AND CO.

NOTICES OF MEETINGS.

School of Pharmacy Students' Association.—Thursday, February 4.—Papers: "Some Practical Hints on Photography," by Mr. J. M. Boucher, and a Report on Inorganic Chemistry, by Mr. Edmund White.

Newcastle-on-Tyne Chemists' Assistants and Apprentices' Association.—Wednesday, February 3, at 8.15 p.m.—Paper: "Botanical Notes," with lantern illustrations, by Mr. C. Ranken.

Chemists' Assistants' Association.—Thursday, February 4.—"Musical and Social." Chairman, Mr. A. H. Mason.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, FEBRUARY 6, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE COUNCIL MEETING.

AT the meeting of the Council last Wednesday it was announced that letters had been received from the son of the late Mr. MANNING WATTS and from the relatives of the late Mr. PASSMORE, thanking the Council for the resolutions of sympathy and condolence passed at the previous meeting. The PRESIDENT also mentioned that the General Purposes Committee had recommended that the late Mr. PASSMORE'S salary up to the end of the current year of engagement should be paid to his widow in consideration of his long services. The appointment of Mr. E. N. BUTT as an Auditor of the Society in the place of the late Mr. WATTS was proposed by the PRESIDENT and seconded by the VICE-PRESIDENT, both of whom referred to Mr. BUTT'S special qualifications for that office and to his general interest in the Society. The motion was carried unanimously. We have reason to believe that Mr. BUTT will accept the office, and the Society may be congratulated that this important position will be so well filled.

The lot was then taken in the usual manner for determining the seven members of Council who are to retire from office next May, and the names of Messrs. GOSTLING, GREENISH, HARRISON, MARTINDALE, NEWSHOLME, SCHACHT and WATT were drawn. Those retiring by rotation are Messrs. CARTEIGHE, EVANS, HAMPSON, HILLS, RICHARDSON, STORRAR and WARREN.

The elections to the roll of the Society comprised eight pharmaceutical chemist members, four chemist and druggist members, forty-eight associates and thirty-three students. Several persons were restored to their former status in the Society upon payment of the nominal fine, now required by the amended bye-law, and the subscription for the current year.

The report of the Registrar upon the numerical strength of the Society, the Registers, and the examination statistics was then presented. This report appears at page 632, and it is satisfactory to be able to point to the fact that notwithstanding serious losses by death during the past year, the Society is even stronger than it was last year.

In regard to the Society's general receipts and expenditure the report of the Finance Committee presented no unusual feature. In reference to the Benevolent Fund account, a further purchase of consols was recommended in addition to the £1000 so invested last month, since a donation of 100 guineas has just been received from Mr. W. K. HOPKIN as a commemoration of the fiftieth anniversary of his apprenticeship. Reference was made by the PRESIDENT to the satisfactory nature of the accounts of the North British Branch of the Society, as showing that the Assistant Secretary and Executive in Edinburgh devote much time and attention to carrying on the Society's work there with economy as well as efficiency. The only increase in the expenditure is in connection with the examinations, and arises from the larger number of candidates. A remark from Mr. EVANS led to some conversation as to the possibility of obtaining interest on the balance at the Society's bankers, in the course of which it was pointed out that any profit accruing to the banker in that way must be regarded as the payment for keeping such an account as that of the Society.

On the recommendation of the Benevolent Fund Committee, two grants of ten pounds each were made to applicants for relief, whose cases had been considered. The death of an annuitant was reported. Mr. HAMPSON, the Chairman of the Committee, referred to the probability of being able to increase the allowance to annuitants, and the PRESIDENT expressed the opinion that this point should be at once considered, judging from the views expressed in letters he had received. Mr. HILLS inclined rather to increasing the number of annuitants. On the motion of the PRESIDENT, seconded by the VICE-PRESIDENT, it was resolved that the Committee should consider the desirability of increasing the amount given to each annuitant. In the discussion of this motion Mr. RICHARDSON expressed approval of the increase and of a reduction of the casual grants. Mr. ATKINS was of the opposite opinion, Mr. CROSS thought the subject required quiet consideration, and Mr. EVANS suggested that if the wives of local secretaries would canvass for subscriptions a considerable addition to the Fund might be obtained. The PRESIDENT remarked that he had always held it to be the duty of each generation to take care of its own distressed brethren instead of investing money for the future; and though the Council objected for a time to act on that principle its adoption has been attended with success. In any attempt to increase the amount of the annuities he was for trusting to the generosity of subscribers as a course that would not involve any fear of endangering the finances or reducing the number of annuitants.

The discussion raised by Mr. SCHACHT'S motion in regard to the institution of a title of honour showed that much as the idea recommends itself at first sight there are, in the minds of some members of the Council, many attendant difficulties connected with its practical adoption, which will require careful consideration. The report of the Law and Parliamentary Committee did not offer an hope of amended legislation being likely at present. However, it appears from the report of the General Purposes Committee that the endeavours to enforce the law are being successful in many instances, and the action taken by the Board of Trade in regard to the export of poisons shows that the provisions of the Pharmacy Act may be made useful in the interests of the public.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, February 3.

Present—

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Messrs. Allen, Atkins, Cross, Evans, Greenish, Hampson, Hills, Leigh, Newsholme, Richardson, Schacht, Southall, Warren and Watt.

The minutes of the previous meeting were read and confirmed.

The Late Mr. W. Manning Watts.

The President announced that a letter had been received from the son of the late Mr. W. Manning Watts, thanking the Council for its resolution of sympathy and condolence. He also referred to his father's great interest in the Society, and said he would never hear anything said against it.

The Late Mr. Passmore.

A letter had also been received from the relatives of the late Mr. Passmore, thanking the Council for the resolution passed last month. He might state here that the General Purposes Committee had recommended, and he had no doubt the Council would adopt the recommendation, that in consideration of his long services the late Mr. Passmore's salary should be paid to his widow up to the end of his current year's service, viz., to June 1 next.

Absence of Members.

The President said he regretted to announce that both Mr. Martindale and Mr. Gostling were absent from ill health. Mr. Storrar and Mr. Harrison were also prevented from attending, but not through sickness.

Appointment of Auditor.

The President then moved that Mr. Edward Northway Butt be appointed auditor of the Society in place of the late Mr. W. Manning Watts. It was not necessary to point out the special qualifications of Mr. Butt for this office; he was not only a very able financier, and took a deep interest in the Society, but was an examined pharmaceutical member, and had done a great deal for the benefit of the Benevolent Fund. He had no doubt that Mr. Butt would accept the office if asked to do so.

The Vice-President seconded the motion. There was no man he knew better fitted for the office.

The motion was carried unanimously.

Members of the Council who Retire.

The lot having been taken in the usual manner to determine the seven members of the Council who should retire in May next, the following names were drawn:—

Gostling.	Martindale.	Schacht.
Greenish.	Newsholme.	Watt.
Harrison.		

The following, who remained in by lot last year, now retire by rotation:—

Carteighe.	Hills.	Storrar.
Evans.	Richardson.	Warren.
Hampson.		

The following seven remain in office another year:—

Abraham.	Bottle.	Leigh.
Allen.	Cross.	Southall.
Atkins.		

Diploma.

The undermentioned, being duly registered as a Pharmaceutical Chemist, was granted a diploma stamped with the seal of the Society:—

Merson, George.

Elections.

MEMBERS.

Pharmaceutical Chemists.

The following, who have passed the Major examination, having tendered their subscriptions for the current year were elected "Members" of the Society.

Blackman, Percy .....London.
Green, William Henry .....Nottingham.
Holt, Herbert Collins.....Manchester.
Morgan, William Ellis .....London.
Morley, Charles .....London.
Naylor, John .....Burley-in-Wharfedale.
Softly, Alfred Ernest..... ...London.
Sturton, Samuel Ainsworth ...Peterborough.

Chemists and Druggists.

The following registered Chemists and Druggists who were in business on their own account before August 1, 1868, having tendered their subscriptions for the current year, were elected "Members" of the Society:—

Barlow, Joseph .....Dudley.
Davies, Thomas Morris .....Rhyl.
Duncan, Samuel .....Greenock.
Goddard, Joseph.....Stockport.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Comer, Ernest Edward .....Woolwich.
Cooper, Harry Stanley .....Kingston Hill.
Copestake, Henry Hall .....Bagshot.
Cullen, Frederick Spencer.....Norwich.
Dodge, William .....Heaton Norris.
Hounam, Christopher .....Duns.
Hume, John William D. .....Lowestoft.
Johnston, John ....Forfar.
Leask, John ....Edinburgh.
MacAulay, Donald .....Gorebridge.
Mitchell, Walter Stuart .....Preston.
Morris, Daniel ....Portmadoc.
Newbould, Victor Emanuel .. Bishop Auckland.
Paris, Walter .....Glasgow.
Price, Frederick .....Birkenhead.
Rawling, William John .....Torquay.
Richardson, William Clarke ...Blackpool.
Sedgwick, John .....Blackpool.
Smith, Robert .....Dundee.
Withers, Herbert Percival.....Blackpool.

Modified.

Gregory, John .....Stockton-on-Tees.
Jones, Owen.....Lower Edmonton.

ASSOCIATES.

The following, having passed the Minor examination, and having tendered (or paid as students) their subscriptions for the current year, were elected "Associates" of the Society:—

Allen, James .....Wrington.
Blackie, Robert .....Dufftown.
Blakeley, Leonard .....Otley.
Boucher, John Mycroft.....Bristol.
Chettle, Herbert Tovey .....Trowbridge.
Cooper, William .....Warrington.
Cross, Edward Robert .....Scarborough.

Duncan, Arthur .....Glasgow.
Elgie, Simon Kelsie .....London.
Emery, Robert Gordon .....Burslem.
Hall, Herbert .....Manchester.
Herrod, Matthew .....Lincoln.
Leitch, David .....Greenlaw.
Marshall, Henry .....Dunfermline.
Monger, George James .....Folkestone.
Olds, George .....Farnborough Station.
Peters, George Henry .....Wrexham.
Pickering, James Skelton..... York.
Robb, James.....Newmill.
Roberts, William .....Holyhead.
Robertson, James Ambrose ...Portobello, N.B.
Sage, Charles Edward ... .Frome.
Small, John Andrew .....Edinburgh.
Thomas, James Morris .....Whitland.
Walden, William Herbert.....Reedham.
Williams, Rowland Henry.....Holyhead.

STUDENTS.

The following, having passed the First examination, and tendered their subscriptions for the current year, were elected "Students" of the Society:—

Barnard, George Bartlett .....London.
Calvert, Albert Boston .....Southwark.
Chalmers, Andrew .....Kinghorn.
Cook, Harry..... .....Doncaster.
Cooper, Burton Fredk. John...London.
Davy, Henry .....Worksop.
Durbin, Henry Eastman .....Stockwell.
Ellis, William Neale .....Peterborough.
Fairburn, Thomas White .....Northallerton.
Fielding, William Robert .....Halifax.
Gale, Joseph.....Stamford.
Goatcher, William John .....Arundel.
Godber, James.....Alfreton.
Goodall, Horatio Charles .....Lincoln.
Hart, Walter Richard.....Folkestone.
Harvey, William Whilton.....Derby.
Jenkin, Arthur Henry .....Southampton.
Johnston, John .....Carlisle.
Kissell, John Victor .....St. Mewan.
Lewis, John Lambert.....Leeds.
McArthur, John Clark .....Dunoon.
Mellor, Reginald John .....Hemel Hempstead.
Moore, John Edward Langford...Welshpool.
Nicholson, John Edward .....Durham.
Pilsbury, William .....Eccleshall.
Pinchbeck, Gerald .....Middlesborough.
Sherlock, Robert Lionel.....St. Helens.
Smith, Hedley Crossley.....Uxbridge.
Smyrk, Frank Alfred..... .. ...Evesham.
Steggall, Octavius Frederick...Bloomsbury.
Tute, James Scott .....Chigwell.
Wallace, William Henry .....York.
Williams, Roger Matthew ...Abergavenny.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and fine.

RESTORATION TO THE REGISTER.

The name of the following person, who had made the required declaration and paid a fine of one guinea, was restored to the Register of Chemists and Druggists:—

George Jeanes, 12, Emily Terrace, Putney.

THE REGISTRAR'S REPORT.

The Registrar laid upon the table his report on the numerical strength of the Society, and statistics of the examinations and Registers. The report is printed at pp. 632 and 633.

The PRESIDENT, in moving that the report be published in the transactions, said it would be noticed with satisfaction that during the last year not only had the losses by death been made up, but the Society was even stronger than it was last year. There were 6 more subscribing pharmaceutical chemist members, 74 more associates in business, 161 more associates not in business, and 52 more students. Roughly there were about 300 additional allies to the Society.

Mr. HAMPSON said he was gratified as Treasurer to find this addition to the number, which resulted in an addition of about £200 to the funds. He was sorry, however, to say that the number was still considerably below the mark reached in 1887, but he hoped that would soon be made up and even exceeded.

Mr. SCHACHT pointed out that under the new bye-laws the examination fee for pharmaceutical members would be reduced to three guineas, and it might be hoped this would be an inducement to many more to join the Society.

Mr. NEWSHOLME said it was gratifying to see that there had been a constant increase in the number of associates during the last five years.

The motion was unanimously agreed to.

REPORT OF THE FINANCE COMMITTEE.

The report of this Committee was of the usual character, recommending various accounts for payment, and the purchase of £100 consols, on account of the Benevolent Fund.

The PRESIDENT (as Chairman of the Committee) moved the adoption of the report and recommendations. Both the receipts and the expenditure were of the usual character. On the Benevolent Fund account various dividends and ground rents had been received. At the beginning of the month the donation account had £154 odd to its credit, and as resolved at the last meeting, the greater portion of that was used in conjunction with the £800 on deposit, in the purchase of £1000 consols. In fact there was only left yesterday morning a balance of five guineas on the donation account, but whilst still at the Committee he received a registered letter from Mr. W. T. Hopkin, enclosing a cheque for 100 guineas for the Benevolent Fund, which the donor thought was the best way of commemorating the fiftieth anniversary of his apprenticeship. He was sure the Council would all agree in thanking Mr. Hopkin for this handsome donation, and the Committee thought it would be as well to invest it at once, in the hope that good fortune would follow this prompt investment of donations. The accounts of the North British Branch had been examined by the Committee and passed; they were very satisfactory, showing that the Assistant Secretary and the Executive in Edinburgh devoted a great deal of time and attention to carrying on the work of the Society with efficiency and economy. The only increase in the expenditure was in a matter over which the Executive had no control, viz., the expenses of the examinations, and that was owing to the larger number of candidates. The utmost care was taken to keep the Society's premises in Edinburgh in proper condition, and to make the examinations in every respect as satisfactory as possible, so that practically the same standard should be maintained at both centres.

Mr. EVANS said he observed in the accounts of the North British Branch a small sum for interest on the balance of account at the Bank. Some years ago he brought up the question whether it would not be possible to arrange with the Society's bankers in London to pay interest on the current balances over a certain amount, when he was told that such an arrangement was not usual in London. He should like to know if corporations or societies in London were treated differently to what they were in the country, and if so whether it would not be possible to make arrangements with a country bank having an office in London so that the Society might receive interest on

REGISTRAR'S REPORT.

MEMBERS, ASSOCIATES, AND STUDENTS OF THE SOCIETY FOR THE YEAR 1891.

	Life Members.		Subscribing Members.		Associates in Business.	Associates not in Business.	Students.
	Pharmaceutical Chemists.	Chemists & Druggists.	Pharmaceutical Chemists.	Chemists & Druggists.			
Number in 1890	194	2	1457	582	1266	...	...
,, restored, 1891 ...	...	...	14	4	12	...	...
,, elected, 1891 ...	...	...	76*	9	146	...	...
	194	2	1547	595	1424	...	...
Deaths, Secessions, etc. ...	9	...	84	27	84	...	...
Total Strength of the Society	**185**	**2**	**1463***	**568**	**1340**	**1030**	**937**
Summary:—							
1890	194	2	1457	582	1266	869	885
1891	185	2	1463	568	1340	1030	937
Increase	...	...	6	...	74	161	52
Decrease	9	...	...	14	...	...	...

COMPARATIVE STATEMENT OF THE NUMERICAL STRENGTH OF THE SOCIETY FOR 5 YEARS: 1887-91.

MEMBERS.—PHARMACEUTICAL CHEMISTS.

	1887	1888	1889	1890	1891
Restored to Membership ...	4	2	5	11	14
Elected ,, ...	57	55	73	67	76*
(Total additions) ...	61	57	78	78	90
Deaths, Secessions, etc. ...	88	99	92	80	84
Increase ...	...	...	...	...	6
Decrease ..	27	42	14	2	...
Total Number of Subscribing Members	**1515**	**1473**	**1459**	**1457**	**1463***

MEMBERS.—CHEMISTS AND DRUGGISTS.

	1887	1888	1889	1890	1891
Restored to Membership ...	1	3	...	3	4
Elected ,, ...	9	8	9	13	9
(Total additions) ...	10	11	9	16	13
Deaths, Secessions, etc. ...	40	32	42	42	27
Decrease ...	30	21	33	26	14
Total Number of Subscribing Members	**662**	**641**	**608**	**582**	**568**

ASSOCIATES IN BUSINESS.

	1887	1888	1889	1890	1891
Restored	3	8	3	7	12
Elected	100	130	94	123	146
(Total additions) ...	103	138	97	130	158
Deaths, Secessions, etc. ...	114	127	152	90	84
Increase ...	...	11	...	40	74
Decrease ...	11	...	55	...	...
Total Number of Associates in Business	**1270**	**1281**	**1226**	**1266**	**1340**

ASSOCIATES NOT IN BUSINESS.

	1887	1888	1889	1890	1891
Increase ...	7	35	...	...	161
Decrease ...	...	...	21	51	...
Total Number of Associates not in Business	**906**	**941**	**920**	**869**	**1030**

STUDENTS.

	1887	1888	1889	1890	1891
Increase ...	...	...	...	...	52
Decrease ...	69	102	115	23	...
Total Number of Students ...	**1125**	**1023**	**908**	**885**	**937**

LIFE MEMBERS.

	1887.	1888.	1889.	1890.	1891.
Pharmaceutical Chemists	**211**	**209**	**206**	**194**	**185**
Decrease	5	2	3	12	9
Chemists and Druggists	**2**	**2**	**2**	**2**	**2**

* *One* of these paid as an Associate in Business, but afterwards passed the Major examination, and was elected a Member.

ST BARTHOLOMEW'S

ANALYSIS OF EXAMINATIONS FOR THE YEAR 1891.

FIRST EXAMINATION.

Number of Candidates during the Year.	Number of successful Candidates during the Year.	Number of Rejections during the Year.	Number of Examinations during the Year.	Average number of Candidates at each Examination.	Average number of Rejections at each Examination.	Percentage of Rejections.
1455	700	755	4	363·75	188·75	51·89

Number of Certificates received in lieu of the First Examination 140

MAJOR, MINOR, AND MODIFIED EXAMINATIONS.

ENGLAND AND WALES.

Number of days on which the Board met for conducting the Major, Minor, and Modified Examinations 39
Average attendance of the Members of the Board of Examiners at each meeting ... ... 15·79

Examinations.	Number of Candidates during the Year.	Number of Successful Candidates during the Year.	Number of Rejections during the Year.	Number of Examinations during the Year.	Average Number of Candidates at each Meeting.	Average Number of rejections at each Meeting.	Percentage of Rejections.
Major	142	78	64	6	23·66	10·66	45·07
Minor	1070	423	647	6	178·33	107·83	60·46
Modified	3	2	1	2	1·50	0·50	33·33

SCOTLAND.

Number of days on which the Board met for conducting the Major and Minor Examinations 33
Average attendance of the Members of the Board of Examiners at each Meeting ... ... 8·27

Examinations.	Number of Candidates during the Year.	Number of successful Candidates during the Year.	Number of Rejections during the Year.	Number of Examinations during the Year.	Average Number of Candidates at each Meeting.	Average Number of rejections at each Meeting.	Percentage of Rejections.
Major.....	15	13	2	4	3·75	0·50	13·33
Minor..... ...	446	258	188	4	111·50	47·00	42·15

THE REGISTERS OF PHARMACEUTICAL CHEMISTS AND CHEMISTS AND DRUGGISTS, 1891.

Additions during the year:—

Number of persons who have passed the—		
Modified Examination	2	
Minor „	681	
Major „	91*	
Persons restored to Pharmaceutical Register and Chemists and Druggists' Register ...		2
Number of persons restored to the Register on payment of a fine		21
Erased in error, 1890		1
		707

* These having already been included in the number who passed the Minor, do not increase the numbers on the Register.

Erasures during the year:—

Deaths:—		
Notices from Registrars	171	
Other sources	67	
Erased at the request of registered persons themselves		12
Increase of numbers on the Register		457
		707

Number of Pharmaceutical Chemists on the Register, December 31st, 1891 2,214
„ Chemists and Druggists 12,444
14,658

its balance. He had recently been concerned with a corporation in the country in which tenders from three banks were received offering certain terms for keeping the account.

The PRESIDENT said the custom in the country, and especially in Scotland, was different to that in London in these matters. Some years ago, when there was great competition amongst London banks, interest was allowed on any amount over £200, but after a certain commercial crisis the matter was reconsidered, and practically the whole of the banks decided not to allow interest on current accounts. The practice was for customers, when they were able to do so, to transfer a certain portion of their current balance to deposit account, on which interest was paid, and that was what the Society did. Some of the larger banks at the present moment actually declined to take money on deposit, there was so much seeking investment. It was well-known that the profitableness of an account to a banker depended to a great extent on the amount of trouble which it involved, and the Society's account was very troublesome. There were an enormous number of small cheques and very few large ones, but whenever there was a considerable balance the banker was willing to receive it on deposit, and he did not think any better plan could be adopted. In all probability a country bank, with an office in London, would follow the London practice with regard to London business.

Mr. ATKINS said his experience with regard to a large county bank with which he had to do business as treasurer of a society, was similar to what had been mentioned by the President. He was told that the profit on the current account was the payment to the bank for the trouble of keeping the account, but money would be received on deposit at 2½ per cent. interest.

The resolution was then put and carried.

REPORT OF THE BENEVOLENT FUND COMMITTEE.

The report of this Committee included a recommendation of the following grants:—

£10 to a founder of the Society, aged 70. He has been in business for many years, but it has dwindled away to nothing. (Kent.)

£10 to the widow of a registered chemist and druggist (aged 45). Applicant has had five previous grants of like amount; is earning something by teaching music and letting apartments. Has three children dependent on her, two of whom are mentally incapable. (London.)

One case was deferred for further inquiries and one was not entertained.

Death of an Annuitant.

The Secretary had reported the death on January 21, of Mr. William Skoulding of Wymondham, in his eighty-seventh year. He had been an annuitant since December 1890.

Mr. HAMPSON (as Chairman of the Committee) moved the adoption of the report and recommendations. There was nothing in the applications requiring special notice, but he might mention that the Committee had some conversation on the subject of increasing the allowance given to the annuitants, and he felt that they were getting nearer to the time when the question would be ripe for decision.

The VICE-PRESIDENT having seconded the motion,

The PRESIDENT said he had received a number of letters on this subject; one from a gentleman who said annuitants should have at least £80 annually, and that he and others would be willing to increase their subscriptions if such a change were made. He (the President) saw no reason why the Committee should not at once deal with the matter, and he would suggest a resolution being passed that the question whether the amount of the annuities should be increased should be considered by the Benevolent Fund Committee.

Mr. HILLS thought it was a debateable question whether the amount of the annuities or the number of annuitants should be increased, and that was a question of principle. No notice had been given of such a resolution as was now suggested.

The PRESIDENT said he was entitled to bring forward a motion without giving notice, but, if it were preferred, he would give notice for next meeting.

Mr. HAMPSON thought it better, as a rule, that notice should be given of any resolution of importance.

Mr. EVANS was not aware of any standing order under which the President could bring forward a motion without giving notice.

The PRESIDENT, having referred to the standing orders, said he would give notice if it were desired; if he did it would be to the effect that the annual amount given to annuitants be increased.

Mr. SOUTHALL pointed out that the number of annuitants was not fixed, it was determined annually by the Council.

The resolution for the adoption of the report having been adopted,

The PRESIDENT moved that the Benevolent Fund Committee be requested to consider the desirability or otherwise of increasing the amount given to each annuitant.

Mr. RICHARDSON thought it would somewhat strengthen the hands of the Committee, if the members of the Council expressed their views upon it. He was entirely in favour of increasing the annuities, and at the same time of reducing the casual grants.

Mr. ATKINS said be was entirely at variance with Mr. Richardson on this point. He was not in favour of increasing the amount of the annuities at present, but he was strongly in favour of increasing the number of annuitants, and of maintaining the present outlay on casual grants. No doubt the question was ripe for discussion, but he did not think the members of the Committee were all agreed about it.

The VICE-PRESIDENT seconded the motion.

Mr. CROSS suggested that it would be more courteous to the Committee not to discuss the matter until the report was presented. There were several questions involved, and they would all be better prepared to discuss them after a little quiet consideration.

Mr. EVANS suggested that a considerable addition might be made to the Fund if the wives of the local secretaries could be induced to take up the matter and canvass for subscriptions.

The PRESIDENT reminded the Council that when it was proposed some years ago to increase the number of annuitants beyond those whose support was secured by the interest on invested capital, the majority of the Council for many years objected to the innovation; but after a time they were persuaded to trust to the subscribing members of the present generation to take care of their distressed brethren. He believed it was the duty of each generation to take care of its own poor, and not necessarily to invest large sums of money for the benefit of future generations. Hitherto this system had proved successful; there were a considerable number of annuitants whose incomes were practically guaranteed by the annual subscriptions, and he saw no reason why the same thing should not continue, even if the amount of the annuities were increased to such an amount as would fairly keep a man—a man who sometimes had a wife dependent on him. It could not be said that £35 a year was enough for that purpose. He thought the time had now come when the subject might fairly be considered, without endangering either the number of annuitants or the finances. If the Committee approached it with the idea that the increased amount must be made secure by investments, he did not think they would be suc-

cessful, but if they trusted to the generosity of the subscribers he thought there need be no fear.

Mr. EVANS asked if there was any objection to having two classes of annuitants.

The PRESIDENT said the Committee might make any recommendation it thought fit, and that question might fairly be considered. At present those above a certain age received £5 more than those under it.

The resolution was then agreed to.

REPORT OF THE LIBRARY, MUSEUM, SCHOOL AND HOUSE COMMITTEE.

Library.

The report of the Librarian had been received, including the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
December	Day . .	492	39	0	20
	Evening .	172	22	5	11
Year 1891	**Day . .**	**5701**	**41**	**0**	**20**
	Evening .	**2148**	**23**	**1**	**10**

Circulation of books.	Total.	Town.	Country.	Carriage paid.
December . . .	201	102	99	£1 6 0
Year 1891 . . .	**2281**	**1180**	**1101**	**£13 10 9½**

Donations to the Library had been announced (see p. 582), and the Committee had directed that the usual letter of thanks be sent to the respective donors.

The Committee recommended that the undermentioned works be purchased:—

For the Library in London—
Richter, Organic Chemistry, new ed.
Hempel, Gas Analysis.

For the Library in Edinburgh—
Kew Bulletin of Miscellaneous Information.
Deschanel, Natural Philosophy.

Museum.

The report of the Curator had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average
December	Day . .	487	36	1	20
	Evening	54	11	1	2

Donations to the Museums of the Society in London and Edinburgh had been reported (see page 582), and the Committee recommended that the usual letter of thanks be sent to the respective donors.

Meetings at Provincial Centres.

The Sub-Committee appointed to deal with this question, reported that a conference had been held with a certain number of the Executive of the British Pharmaceutical Conference, and further consideration of the matter was deferred.

The PRESIDENT moved the adoption of the report and recommendations, saying that the report of meetings in provincial centres would probably be ready next month.

The motion was adopted unanimously.

DIVISIONAL SECRETARY.

Mr. WM. J. BOWLES was appointed Divisional Secretary for South Kensington, in the place of the late Mr. Tupholme.

LOCAL SECRETARY FOR KING'S LYNN.

Mr. WM. JOHNSON PALMER was appointed Local Secretary for King's Lynn.

TITLES OF HONOUR.

Mr. SCHACHT moved the following resolution, of which he had given notice:—

"That the Research Committee be requested to formulate a scheme for the institution of a 'Title of Honour' to be conferred upon such pharmaceutical chemists as have, in the opinion of the Council, advanced pharmaceutical knowledge by original research."

He said although the notice stood in his name the idea was not exclusively his own, but had been floating about for some time, and had come into his hands partly because in discussing the terms of the certificate to be given to those who had worked well in the Research Laboratory he had expressed himself as not altogether satisfied with the amount of recognition given by the Council to research work done there or elsewhere. It seemed to him that the Pharmaceutical Society took cognizance of the training of young pharmacists up to a certain point, first by imposing a Preliminary examination and afterwards by requiring the attainment of a certain amount of technical knowledge before they were declared to be qualified. After that, again, there was a certain degree of honour conferred by the title of pharmaceutical chemist, which encouraged a man to pursue his studies a little farther than was absolutely necessary, and showed that he was something more than a mere chemist and druggist. At that point he was practically left; there were two or three medals which were awarded to pharmaceutical chemists on the result of examinations—but those examinations were merely in current knowledge—in what was already known to the world. It seemed to him a pity that the Society should stop there; there was a further step yet to be taken, and which might very properly be taken now that an Institution had been established, which would give the training necessary for the higher work of investigating into the unknown; a process quite apart from learning that which was already known, and demanding different faculties. He thought the Society in the exercise of its great function of the promotion of good scientific knowledge, should include this in its programme, and that in conferring such a title as he proposed it would be simultaneously conferring honour on itself and upon those on whom the title was conferred. He wished to draw a distinction between what was already done and that which he hoped would be done. The certificate to be given to those who had worked in the laboratory was for good work done there under the superintendence of the director; and it was very right that such should be given; but they said nothing as to the capacity of the man to do original work. A man might be a perfect master of poetic language and yet quite incapable of writing a poem. The poetic faculty was creative, and that of the discoverer was essentially similar. Only one here and there possessed it, and it was surely right that that faculty should be properly recognized; and it seemed to him the proper way to recognize it was by a title of honour. He anticipated this suggestion would be generally approved, and could only imagine one or two points of difficulty being raised. There might be a fear that this new title would in some degree diminish the value of the title "pharmaceutical chemist," but if it were limited to those who were already pharmaceutical chemists that objection could not apply. Then it might be said that an empty title was very small encouragement, but he thought in such a case the honour conferred should be as nearly as possible an unsubstantial one. It was not payment in any way for work done, but simply a recognition of the superior and special quality of the recipient's work, and he thought more appropriate than even a gold medal. There was one other difficulty which he had not succeeded in overcoming, to his own satisfaction, and that was the selection of a proper title, but that he should prefer to leave to the Committee or the Council. He had made one or two suggestions, but was not perfectly satisfied with anything that had occurred to him. If possible he should like the title to imply exactly what it was, a "discoverer in pharmacy," and if he were not hampered in any way he should simply prefer that term, but he was afraid it did not sound very well. Its abbreviation might perhaps be

rather awkward, "dis. in phy." Still he thought the English language was capable of expressing a great deal, and he did not see why one should necessarily go to the Latin language to convey what was meant. "Pharmaceutical chemist" was very fair English, "chemist and druggist" was more English, and if in addition to that they had the title of "Discoverer in pharmacy," he did not think it would be any outrage on classical instincts. "Master in pharmacy" had been suggested, and it would be a very nice title, only unfortunately it did not imply anything in the way of discovery. A "Master in pharmacy" might be a man who had achieved all that was already known, but it did not imply that he was a discoverer or investigator in the realms of the unknown. That point, however, might be left to the Research Committee. If any gentleman had any other objection to offer he should be glad to hear it, but he would conclude by moving the resolution.

Mr. HAMPSON, in seconding the motion, said Mr. Schacht had treated it mainly from the point of view of the person engaged in research, but he would rather direct attention to the probability of its producing more research and establishing the Research Laboratory on a firmer footing. It would tend to bring into the Laboratory more students and more ambitious men, and the result could not fail to be beneficial. The Research Laboratory having been founded at great cost it was desirable to do everything possible to consolidate the work there and make it more important. It had always been considered that the main source of influence of the Society depended on its work in education and the advancement of science. This title would emphasize the traditions of the past and carry them farther into the future, and it seemed to him a very wise step to take. He could not see how the institution of this new title could withdraw the least tittle of its importance from that of "pharmaceutical chemist," the men engaged in research who would receive this title being themselves "pharmaceutical chemists." It was a new departure, and the Committee would doubtless consider it from every point of view. It would have to be carefully safeguarded, and due precaution taken that no one should receive the title who was not thoroughly worthy of it.

Mr. NEWSHOLME asked if this title was only to be conferred upon those who worked in the Research Laboratory, as he rather gathered from Mr. Hampson's remarks.

The PRESIDENT said no.

Mr. Hampson said those who wished to obtain this title must in the first place be pharmaceutical chemists and in the next have done some original work.

Mr. ALLEN asked must that work have been done in the Research Laboratory of the Society.

Mr. HAMPSON said he had not considered that question at all, but he assumed from Mr. Schacht's description that it could only be given to those who had worked in that Laboratory. As far as he had at present proceeded the idea looked in that direction.

Mr. SCHACHT said that was not in his mind at all. He referred to the Laboratory as a portion of the argument of what the Society had done in the thorough complete training of men of science. The Laboratory having been established it would be used by many with the advantage of probably leading to discoveries, but he did not think the title ought to be limited to those who had worked in any particular laboratory.

Mr. EVANS asked if the title adopted were "Master of Pharmacy" whether those who received it would be entitled to call themselves "M.P."

Mr. HILLS asked whether it was intended that this title should be retrospective.

Mr. SCHACHT said no.

Mr. HILLS said he presumed it was only to be given to those coming on now for work to be done in the future.

Mr. SCHACHT: Yes.

The VICE-PRESIDENT said he presumed Mr. Schacht would include both sexes.

Mr. RICHARDSON presumed that nothing would be done until the Research Committee had reported to the Council.

The PRESIDENT said that would be so. This idea had been in the minds of some members for a long time, and the notion was that with regard to the Research Laboratory itself this would be an encouragement for a man to go on working there and do original work. On the other hand there were others who might get the same title for discoveries in botany. He knew of one young man, a pharmaceutical chemist, who had done original work in botany and another in materia medica, but who had not done any original work in chemistry or physical science, but who probably would come within the category proposed. The Committee would probably take a broad view and recognize originality of work in any branch of scientific knowledge covered by the charter. It was not to be restricted to any person, though, no doubt, those who went through the Research Laboratory would have a considerable advantage. After they had finished their course they would have opportunities of carrying on original work without the assistance of the director, and if they succeeded in doing good substantial work would probably be awarded this title of honour.

Mr. CROSS said he agreed with the motion for a reason which had not yet been mentioned, and that was that it would tend to stimulate work in the Research Laboratory being done on pharmaceutical subjects.

Mr. ATKINS said he should like to support the idea, but he was not quite clear on one or two points. He was willing that the Society should give something more in the way of honour than the title "pharmaceutical chemist," but always felt great difficulty what that title should be. Mr. Schacht had been emphatic that this degree or title should be conferred simply for discovery; and, as he understood, no amount of good work upon known existing material would qualify. The candidate must be a pioneer, an emigrant into new territories as it were, and must also be a pharmaceutical chemist. That was a very important point, otherwise it would open a very wide field, especially amongst two learned societies which were connected with chemistry. It seemed to him that the tone of Mr. Schacht's remarks pointed to the work being done in the Research Laboratory, but whether that was so or not it must promote and stimulate discovery there, and in that respect would be useful.

Mr. HILLS said it appeared to him that it must be work not done in the Research Laboratory, because he understood that most of that done there was under the superintendence of the director, and would, therefore, not be considered original work.

Mr. SCHACHT said he certainly did not mean that it should be confined to those who had passed through the Research Laboratory. What he wished to indicate was that the Society prepared men to do pharmaceutical work, and having given them that preparation, it ought to recognise any good results which came from the training they had obtained. But they might get their final training where they pleased if they became pharmaceutical chemists. A chemist and druggist, or a pharmaceutical chemist might obtain his education where he pleased, and in the same way a man might learn the process of research either in the Research Laboratory or elsewhere; it should not be limited in the least degree. The only restriction should be that the man was a pharmaceutical chemist, and that he made a

really independent discovery, and his work should be published. It would be remembered that the Research Committee included some of the highest scientific brains in the kingdom, and they would be perfectly competent to determine whether any particular research was really original.

Mr. HILLS asked if workers in the Research Laboratory could conduct any independent inquiries without such aid from the Director as would prevent their work being considered original.

Mr. SCHACHT said every scientific man was quite sufficiently jealous of his own reputation not to let anything with which he had the chief concern go out in the name of another. Professor Dunstan would never allow a pupil or assistant of his to publish a discovery or note, except with the association of his own name.

The PRESIDENT said any person properly qualified was allowed to work on his own lines in the Laboratory.

Mr. RICHARDSON thought this was a step in the right direction, but it should be thrown open as widely as possible. There was a great deal more original research in Germany than in England. He understood that the whole matter would be left to the Research Committee.

Mr. ALLEN said he was quite willing to refer the question to a Committee, but he was not quite prepared to commit himself to an approval of the scheme at present. He might be supposed to be rather narrow-minded, but it did seem to him that the Society had two very important titles given to it by the Government, those of chemist and druggist and pharmaceutical chemist, and he could hardly conceive of any title of honour being given by the Society above that of the highest qualified men. If anyone possessing the title, by original research either there or elsewhere, qualified himself for a title of honour, certainly he could attain it in connection with certain other institutions which had lasted for many years and conferred such titles. There had been many pharmaceutical chemists who obtained either courtesy or other honorary titles from other bodies, and who reflected great honour on the Society, but he should be sorry to do anything in a hurry which would appear to throw any reflection on the title of pharmaceutical chemist.

Mr. GREENISH said this seemed to be such an important new departure, that he really was not prepared to discuss it without more time for consideration.

Mr. HILLS said this remark of Mr. Greenish's came like a bombshell upon him. He was going to support the resolution, one of his reasons being that the Research Committee had discussed it directly or indirectly, and were all of one mind in the matter. So far as he was concerned, he should support the motion with full confidence in the Research Committee. He would remind Mr. Allen that by adopting the resolution the Council committed itself to the principle, although matters of detail might be discussed afterwards.

Mr. EVANS asked if any persons except pharmaceutical chemists were allowed to work in the Research Laboratory.

The PRESIDENT said yes.

Mr. EVANS said he did not think there could be any objection to the title, as reflecting on that of "pharmaceutical chemist," because those who would receive it would be so very few.

The PRESIDENT thought Mr. Greenish was a little unduly alarmed. In fact, he believed he was himself the originator of the idea. The members of the Research Committee would recollect that when the certificate was being discussed Mr. Schacht rather hesitated about it, because it did not go far enough, and Mr. Greenish also said it was incomplete, that there ought to be some means of recognising original work. That was the idea which was now put forward, and when the scheme was formulated he thought it would meet the views which Mr. Greenish had often expressed. Anyone who was a pharmaceutical chemist might go to Germany if he liked for two years to the laboratory of one of their honorary members, come back to England, become a working pharmacist, and in due course of time do original work, and surely Mr. Greenish would not deprive such a man of his claim to recognition.

Mr. GREENISH said it was a new idea which the Committee had not yet considered.

The PRESIDENT said he was sorry to differ from him. It was impossible to know what form of language would convey the same meaning to another as it did to the speaker, but certainly he should have gathered that this idea exactly met Mr. Greenish's views. However when the scheme was put before the Council, if it did not sufficiently safeguard the title of pharmaceutical chemist, or was objectionable in any other way, it need not be adopted, but he believed all were agreed that the Society should encourage original work in pharmacy. Now, pharmacy included a great deal more than the pharmacy of the British Pharmacopœia. Some of their best men had been encouraged by other societies, whilst their own Society had no blue ribbon to give them. The Bradys, Groves, and Hanburys would have been glad to have some equivalent for the Pereira medal which was offered to students. The tendency of things was in favour of university teaching affiliation, and he was not certain whether, before many years elapsed, the universities would not be glad to make use of what that Society was doing tentatively and create a distinct title in pharmacy. At any rate the Society was doing collegiate work and preparing for the possibility of becoming affiliated with some of the institutions which under one name or another would become the teaching university of London. Though the resolution involved the adoption of the general principle, he felt sure they were all agreed upon that, and if the scheme was defective in detail when submitted it could be amended.

Mr. SOUTHALL said he hoped the Committee would not narrow down the scheme, as there seemed a decided inclination to do. There was no doubt it would do good to the Research Laboratory, but that was not the only object in view. The title ought to be open to anyone who had made, in his own time and in his own laboratory, researches and discoveries. He was not certain that it was wise to confine it even to pharmaceutical chemists. During the last few years that title had not been thought so much of, at any rate the numbers had not increased, and some remarks had been made suggesting that it should be dropped, or that the chemists and druggists should all be elevated up to it. A man not having passed the higher examination, perhaps he might not have thought it worth while; still he might later on, if he had time at his disposal, go in for original research, and it would be rather hard on him to say that he should not be eligible for this special honour which would only be conferred on a very few. He did not think such a man ought to be excluded.

The resolution was then put and carried unanimously.

REPORT OF THE LAW AND PARLIAMENTARY COMMITTEE.

This Committee reported that it had further considered the question of pharmaceutical legislation during the ensuing parliamentary session, and having regard to the present condition of Parliament, and to its possible early dissolution, was of opinion that it would be inexpedient to attempt to introduce a Pharmacy Bill into the House of Commons this session.

The PRESIDENT moved that the report be received

and adopted. He said there had been two previous meetings, but the matter had been again discussed and a good many reasons given, some of which were not desirable to state, why the recommendation had been arrived at. He was anxious, however, to inform active members and associates in business, and divisional and local secretaries, that although it was not proposed to introduce a Bill this session a good deal of work might be done, and it would be their duty when the general election came to take such steps as might enable some of them to approach candidates with the view of impressing upon them this at least, that the question of pharmacy laws in the future Parliament deserved consideration. There might be difficulty in asking them to pledge themselves to anything in particular, but without that an immense deal of good might be done. Every man in the House wanted educating with regard to what pharmacy was, the conditions under which the business was carried on, and its responsibilities. Every member of parliament he had to see on behalf of the Society he had to educate before he could understand the object in view. If this process of education were taken in hand generally *con amore* before the next general election there would be much greater hope of success in a future session.

Mr. RICHARDSON suggested that some means should be taken to educate local secretaries and show them how to educate members of Parliament.

The PRESIDENT said something of that sort was under consideration.

REPORT OF THE GENERAL PURPOSES COMMITTEE.

The report of this Committee included the usual letter from the Solicitor, stating the progress made with cases which had been placed in his hands. One defendant had paid into court previous to trial six penalties and costs, another four penalties, and several others two penalties. In another case judgment had been obtained and one case was still standing over for judgment.

The Committee considered a number of other cases of alleged infringement, and recommended that proceedings be taken in several cases.

The Committee recommended that Mr. J. Humphrey, of Sheffield, be appointed Sub-Editor of the Society's Journal.

The Council, as usual, went into committee to consider the above report.

On resuming, the report and recommendations were adopted.

THE EXPORT OF POISONS.

The PRESIDENT said some two or three months ago a communication was received from the Privy Council and also from the Board of Trade with regard to the law as to the export of statutory poisons. These communications came in consequence of arsenic having been sent out some time ago to the Australasian colonies in considerable quantities, when some of it got mixed with flour or meal, and several accidents occurred. The colonial authorities were very indignant, and wrote to the Board of Trade, saying some restriction ought to be placed on the export of such articles. A letter was sent to the Privy Council referring to the provisions of section 17 of the Act of 1868, and a letter had now been received from the Board of Trade thanking the Council for the communication, and enclosing a notice which was being sent to ship-owners, masters and others as to the marking of poisons packed for export. A letter had also been received from the Privy Council thanking the Council for what had been done. It was very satisfactory to find that the Council had been able to render any assistance in this matter, and he might also say as a member of a city body he had received a communication in very flattering terms with regard to what had been done in this matter. In fact, it appeared that some wholesale people in the city and exporters appeared occasionally to be a little difficult to reach; and he had known for a long time that the export of certain poisons had been carried on in a way which was, to say the least, very lax. It was open to the Board of Trade or any individual to prosecute an exporter who did not observe the provisions of section 17.

Mr. RICHARDSON said arsenic would not come under the cognizance of wholesale druggists, but would be exported by the makers. He hoped it would not be thought that the wholesale drug trade were in the habit of sending poisons about in this loose manner.

The PRESIDENT said he used the word "exporter" as distinguished from selling in this country. In many cases the articles were not labelled at all by the manufacturer, and many of the wholesale people did not seem to know the state of the law and the danger they were running, The section covered a great many things besides arsenic.

REPORT OF EXAMINATIONS.

January, 1892.

SCOTLAND.

	Candidates		
	Examined.	Passed	Failed.
Major (21st)	1	1	0
Minor (21st)	11	6	5
,, (22nd)	9	7	2
,, (28th)	19	10	9
,, (29th)	15	8	7
	—54	—31	—23
	55	32	23

First Examination.

12*th*.—Candidates examined, 294. Passed, 135. Failed, 159.

28*th*.—Five Certificates by approved examining bodies were received in lieu of the Society's examination.

EXAMINATIONS IN EDINBURGH.

January 21, 22, 28 and 29, 1892.

Present on each day—Messrs. Boa, Dott, Gibson, Jack, Kinninmont, Maben, Nesbit and Stephenson.

Professor Sir Douglas Maclagan was present on the 21st on behalf of the Privy Council.

MAJOR EXAMINATION.

21*st*.—*One* candidate was examined, and was declared qualified to be registered as a Pharmaceutical Chemist:—

Merson, George .....Fraserburgh.

MINOR EXAMINATION.

21*st*.—*Eleven* candidates were examined. *Five* failed. The undermentioned *six* passed, and were declared qualified to be registered as Chemists and Druggists:—

Brookes, George Henry .....Llandudno.
Bryce, John .....Glasgow.
Robertson, Alexander.....Elgin.
Robertson, James .....Edinburgh.
Robertson, James Ambrose ...Portobello, N.B.
Shand, James Sellar ..... Huntly.

22*nd*. — *Nine* candidates were examined. *Two* failed. The undermentioned *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Dick, Alexander Anderson ...Lasswade.
Drackley, Thomas .....Coventry.
Duncan, Arthur .....Glasgow.
Elder, Alexander.....Edinburgh.
Hall, Herbert ....Manchester.

Hall, Robert.....Market Rasen.
Hay, Ernest Atkinson .....Sunderland.

28th.—*Ninteen* candidates were examined. *Nine* failed. The undermentioned *ten* passed, and were declared qualified to be registered as Chemists and Druggists:—

Aitcheson, John Tait .....Berwick-on-Tweed.
Duke, Alexander Charles .....Burntisland.
Keith, Albert William .....Methlick.
Kilvert, Bertrand Walter .....Shrewsbury.
Lindsay, Robert McIntosh.....Dundee.
McBain, James ....Aberdeen.
Marie, Louis Xavier .....Edinburgh.
Neil, Henry ..... Stirling.
Petrie, John Stephen .....Forfar.
Robb, James.... ....New Mill.

29th.—*Fifteen* candidates were examined. *Seven* failed. The undermentioned *eight* passed and were declared qualified to be registered as Chemists and Druggists:—

Brownbill, Edward .....Wakefield.
Rose, James Dudfield.....Jarrow-on-Tyne.
Sagar, Robert Thompson .....Halifax.
Stavert, Walter .....Selkirk.
Swindells, Fred .....Hyde.
Swinton, Thomas Henry .....Crewe.
Thorp, Edward Fredk.William.Sheffield.
Waddington, John Alfred.....Blackburn.

Resignation of Mr. William Gilmour.

At the meeting of the Board on the 29th, it was resolved that—

"This being the first meeting since Mr. William Gilmour intimated his resignation, the Board desires to put on record an expression of their personal esteem, their high appreciation of the services rendered by him during the twenty years he has been a member of the Board, and their great regret at losing him as a colleague."

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At the meeting held at 103, Great Russell Street, on Thursday, January 21, Mr. Frank A. Rogers, Vice-President, in the chair, the following papers were read:—

Tea and Coffee.

BY J. E. WHITLEY MCFALL, PH.C.

Tea is the dried leaf of *Camellia Thea* or *Thea sinensis*. It was formerly thought that tea was obtained from different species of *Thea*, but it is now accepted as being obtained from the one plant, or at most from varieties. The names by which teas are most familiar are green and black. The difference depends more upon whether the leaves are young or old, and the treatment they undergo in their preparation, than upon any botanical variation. Green teas are so called because in them the green colour is preserved. They are prepared by drying the leaves over a wood fire, within an hour or two after being gathered, and rolling them as quickly as possible. Black tea leaves, after being gathered, are allowed to lie exposed to the air in heaps for ten or twelve hours, when they undergo a kind of fermentation. They are then very slowly dried over a charcoal fire. The numerous varieties of these two teas seldom reach the consumer unmixed, owing to the blending of tea by the wholesale dealers, by means of an intimate knowledge, of which they are able to greatly improve the tea, as far as aroma, taste and colour of infusion are concerned. What is known as "tip" consists of unexpanded leaf buds and is a favourable indicator of the quality of tea. The great bulk of tea is at present produced in China, although Japan produces a considerable quantity. In India and Ceylon, also, the cultivation is carried on with great success.

The important constituents of tea are essential oil, to which the peculiar odour is due, theine, legumin, and a substance similar to tannin. The strength of tea is rather determined by the amount of astringent constituent present than the amount of theine. The leaf structure of tea is fairly well marked, indeed quite enough to distinguish it from adulterations, in cases where the leaves are unbroken or nearly so. The margin is serrated nearly, though not quite, to the short petiole. The apex is slightly emarginate. The venation is slightly unicostate. The primary veins do not go quite to the margin of the leaf, but leave a distinct space between.

Some adulterations are the leaves of beech, hawthorne, sloe and *Chlorænthus Inconspicuous*. The flowers of this plant are also used in scenting tea. These leaves may be pretty easily told by shape and structure.

In tea the stomata are very numerous, while the long branched cells termed "idioblasts," which seem to act as pillars, are very characteristic. The young leaves of tea may be told from the old ones by size and by the presence on the undersurface of young leaves only of numerous hairs. Experiments have shown that these hairs contain caffeine. A good process for examining the structure of opaque leaves such as tea is given by A. W. Blythe. He recommends the leaf to be slightly pressed between two cover glasses and heated with alkaline permanganate, afterwards treating with HCl to remove manganese oxide. By this means the structure may be made out. Tea is sometimes faced, although the practice is rapidly decreasing, with Prussian blue, indigo and lime salts. These attach themselves to the leaves and give the appearance of green tea. An average of sixteen analyses by König is given as—

Water	11·49
Nitrogenous substance	22·22
Theine	1·35
Ethereal oil	·67
Fat chlorophyll-wax	3·62
Gum and dextrin	7·13
Tannin	12·36
Other nitrogen free matters	16·75
Woody fibre	20·30
Ash	5·11
	100·00

Tea is very little adulterated in this country. Additions of astringent matters and sand take place abroad, but not to any great extent. After the general and microscopical characters have been considered, the facts relied upon to detect adulteration are:—

The ash, which should not exceed 6 or 7 per cent. (with at least 3 per cent. soluble); an excess shows adulteration. The percentage of extract obtained by boiling with water. This ranges from 30 to 40 per cent. The addition of exhausted leaves lowers the percentage. The amount of tannin. Exhausted leaves also lower this.

The amount of theine varies from 1·5 up to 4 per cent., being generally greater in China and Indian than in Japan tea.

A tea costing 2*s.* 4*d.* per lb., and described as a mixture of Ceylon and China, gave on examination:—

	Per Cent.
Moisture	6·13
Theine	1·02
Watery ext.	36·90
Tannin.	13·06

Ash	Sol. in H_2O	0·204 gr.	
	,, ,, acids	0·093 ,,	
	Silica	·020 ,,	
		·317 ,,	6·08

The sources of coffee are principally *Coffea Arabica* and *C. liberica*. The best coffee that reaches England is cultivated in India, Java and Ceylon, a little "Mocha" coming from Arabia, though India principally supplies us with this. The part of the plant used is the seed, two of which occur in each berry, facing one another by the flat surfaces. These fresh specimens show the seeds embedded in the fruit. The seed or bean is the only part imported into this country, the outer coats being removed in the preparation of coffee for the market.

In the roasting of coffee prior to use a pyrogenated oil is developed having a fragrant aromatic odour, which gives to coffee its peculiar flavour; much sugar is changed into caramel, and the bean swells from the extrication of gases. The experiments of Dr. Paul prove that there is practically very little caffeine lost in the roasting of coffee.

In the microscopical examination of a sample it is best to bleach with chlorinated lime, when the structure is seen more plainly. The tissues are never entirely obliterated by roasting, and excepting that they are partially charred still preserve their characteristic structure. A radial section of coffee shows the cells with a peculiar knotty appearance, but cut at a tangent they have not this characteristic. The important constituents are: essential oil, fat, caffeotannic acid and caffeine. The amount of caffeine in moderately roasted coffee may be fixed at 1·3 per cent. (Dr. Paul).

An average of analyses by Payen is:—

Cellular tissue	34·00
Moisture	12·00
Fat	13·00
Starch, sugar, dextrin and veg. acids	15·50
Legumin	10·00
Chlorogenate of K and caffeine	3·5 to 5·0
Nitrogenous portion	3·00
Free caffeine	0·80
Thick insol. ethereal oil	0·001
Aromatic oil	0·002
Mineral constituents	6·697

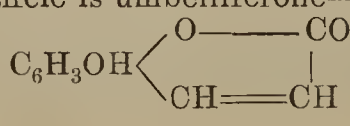
The substances principally used in the adulteration of coffee are: chicory (and its adulterations), dandelion and various seeds. Torrefied date stones have also been used to mix with coffee. Prior to roasting sugar is sometimes added to the coffee, which produces caramel and gives colour to the infusion. Chicory may be legally sold mixed with coffee when the mixture is so labelled.

A simple test for chicory in coffee is to sprinkle a few grains of the substance on the surface of a glass of water. Chicory or added caramel will soon colour the water, while coffee does not for some time.

In discovering adulterations of coffee the microscope is mostly relied upon. When identified the density of a filtered infusion is made use of to tell the proportion of the adulterant. The low specific gravity of an infusion of pure coffee distinguishes it from most of its adulterations.

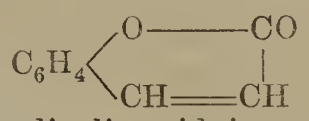
Chicory possessing no alkaloid decreases the amount of caffeine, also of tannin, fat, and gum, while it increases the proportion of sugar. A sample of coffee recently examined gave 1·10 p.c. caffeine and 4·65 p.c. ash.

Caffetannic acid from the berries is a gummy, easily soluble mass. It gives caffeic acid—di-hydroxycinnamic acid—$C_6H_3(OH)_2CH{\cdot}CHCO_2H$, when heated with KOH solution. The anhydride of umbellic acid isomeric with caffeic is umbelliferone—



allied to coumarin, the anhydride of coumaric acid = monohydroxycinnamic acid, $C_6H_4OH{\cdot}CH{\cdot}CHCO_2H$.

Coumarin—



bears a relation to salicylic acid, in so much that it is identical with acetosalicylal, minus one molecule of water.

The alkaloid caffeine, to which both tea and coffee owe their activity, occurs also in Paraguay tea, guarana, and the kola nut (2 per cent.). Formerly nearly all the caffeine used was obtained from Germany, principally because the duty required to be paid upon tea came to as much as the alkaloid was worth. But since permission was granted to use damaged tea free from duty to prepare caffeine much has been made in England.

Caffeine may be best determined by the method given by Paul and Cownley (*Pharm. Journ.*, Nov. 19, 1887); 5 grs. of tea or coffee is moistened with hot water, mixed with Ca2OH and dried on a water bath, then percolated with strong alcohol, the alcohol evaporated and dilute sulphuric acid mixed with the remaining aqueous solution; this separates $CaSO_4$ and a little colouring matter. The solution is filtered and shaken in a separator with five or six successive quantities of chloroform till 200 c.c. in all have been used. The chloroformic solution is then shaken with dilute NaOH solution and separated, the chloroform evaporated off leaving pure caffeine.

Dr. Paul has since shown (*Pharm. Journ.*, March 28, 1891) that alcohol is to be preferred to $CHCl_3$ in the determination of caffeine by this process. When chloroform is used the lime tends to retain some of the caffeine.

A paper on the salts of caffeine by H. Snow (*Pharm. Journ.*, June 27, 1891) has been published, in which he showed that it was a simple matter to prepare salts of caffeine with the stronger inorganic acids, but not so easy to prepare some of the salts with organic acids. Caffeine itself gives no alkaline reaction with litmus; salts of it are acid.

Salts of caffeine on being dissolved in water undergo a peculiar decomposition into free acid and caffeine, which may be separated even in the presence of excess of one of the stronger acids by shaking with chloroform. It has been stated by Dr. Liessen that the compound of caffeine with oxalic acid does not undergo decomposition with water. He says it is a very stable salt.

Some reactions of caffeine are different to those of the alkaloids. It is not precipitated by Mayer's reagent. although it is by tannic acid, the precipitate at first not redissolving, but on the addition of considerable excess of tannin a clear solution is obtained.

Perchloride of platinum has really the composition $PtCl_4.2HCl$, or in other words is chloroplatinic acid H_2PtCl_6. This can combine with K, NH_4, etc., to form $PtCl_4 2KCl = K_2PtCl_6$, etc.

In the case of amines, *e.g.*, ethylamine, it forms:—

$PtCl_4 2(NH_2C_2H_5HCl)$
$PtCl_4 2(NH(C_2H_5)_2HCl)$
$PtCl_4 2(N(C_2H_5)_3HCl)$

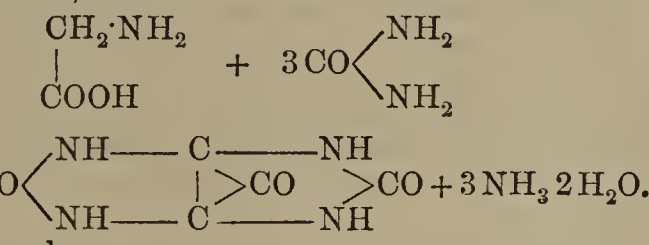
From this it would appear that $PtCl_4$ can combine with two atoms of nitrogen, but the compound formed does not depend on the amount of N, but on the *bivalence* of the chloroplatinic acid or $PtCl_4 2HCl$. Hence caffeine forms with $PtCl_4$ the compound $PtCl_4 2(C_8H_{10}N_4O_2HCl)$ difficultly soluble in cold water and alcohol, separating from hot water in small yellow crystals on cooling. With chloride of gold it forms with concentrated solutions a splendid yellow mass, which is deposited from alcoholic solutions in long orange-yellow needles ($C_8H_{10}N_4O_2HClAuCl_3$); for the same reason $AuCl_3HCl$ being univalent.

Caffeine has a reducing action on a mixture of

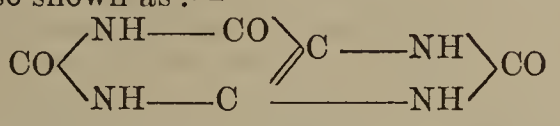
sulphuric acid and $K_2Cr_2O_7$. The best test is the murexide test. It is conducted by adding to a portion of caffeine a crystal of chlorate of potassium and a drop or two of HCl evaporating to dryness and getting a reddish residue, becoming purple on the addition of ammonia. The reaction is similar to the one with uric acid, the probable composition of the product with caffeine being tetramethyl murexide

$$C_8(CH_3)_4N_5O_6(NH_4).$$

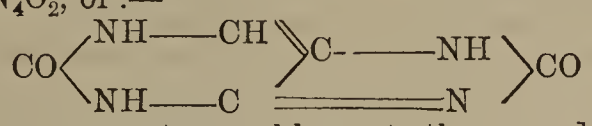
Caffeine chemically is trimethyl xanthine. Xanthine is closely allied to uric acid, differing by one atom of oxygen. The syntheses of uric acid shows its constitution fairly well, although no satisfactory formula has been proposed. It has been formed by heating together to a temperature of about 200° glycocine and excess of urea, thus :—



It is also shown as :—

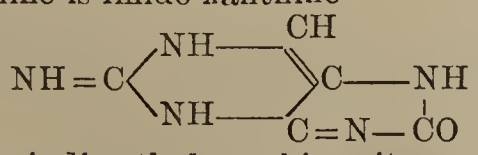


It may be as well to mention here the characteristic behaviour of uric acid with nitric acid, as a similar test is used in the recognition of caffeine. A small portion is treated with HNO_3 and dissolves with slight effervescence. An addition of excess of ammonia after evaporation, gives the deep red tint of ammonium purpurate $C_8H_4(NH_4)N_5O_6$, better known as murexide, so called from the dye obtained from a species of murex. Hence the name of the test for caffeine. The empirical formula for uric acid is $C_5H_4N_4O_3$, while that of xanthine, which may be prepared by the action of sodium amalgam on uric acid, is $C_5H_4N_4O_2$, or :—

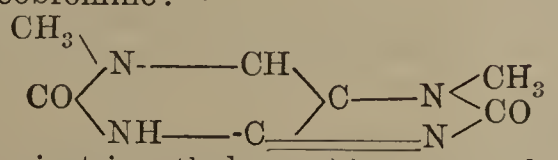


which bears a great resemblance to the second formula given for uric acid.

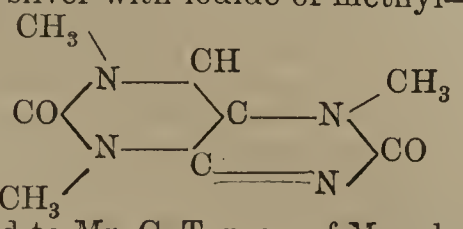
The relation between caffeine and guanine, an alkaloid obtained from guano and theobromine occurring in the seeds of theobroma Cacao may be very well shown here. Guanine is imido xanthine



Theobromine is dimethyl xanthine ; it may be obtained from a compound of xanthine and silver by the action of iodide of methyl. A base has been obtained from tea called theophylline, similar to, but differing in many respects from theobromine, and producing caffeine on the silver compound being heated with methyl iodide theobromine :—



Caffeine is tri-methyl xanthine or methyltheobromine; it may be obtained from theobromine by heating theobromine silver with iodide of methyl—



I am indebted to Mr. C. Turner, of Manchester, whom, I believe, will shortly issue a work on the alkaloids, for some of my facts regarding caffeine.

The Chairman (Mr. Frank A. Rogers) said the subject had been previously brought before the Association by Mr. Stokes, but in the more popular manner, and not so fully from the chemical standpoint as by Mr. McFall. He understood from what had been said that green tea was stronger than black and less liable to decomposition by fermentation. He would like to know why the popular taste inclined to Ceylon teas, as he had always understood that they were harsher in taste and contained more astringent matter than the other varieties. Did Mr. McFall say that tea tasters estimated the value of the tea by the amount of its astringency. He thought that tea now-a-day was so cheap that it would scarcely pay to adulterate, but the Legislature regulating the sale of coffee ought to in some way restrict the amount of chicory contained in mixtures of coffee and chicory. At present the mixtures sometimes contain as much as 80 per cent. of chicory, the only requirement being that the labels must show that they are mixtures.

Mr. Sage drew attention to artificial coffee beans now fabricated in America, and asked Mr. McFall if he knew the percentage of caffeine they contained.

Mr. Morris said that the leaves of the coffee plant had been lately recommended for making beverages ; he would like to know the amount of caffeine contained, if any.

Mr. McFall, in reply, said, with reference to tea tasting that the valuations of teas by different tasters were remarkable for their coincidence. Caffein did occur in the leaves of the coffee plant, and at present experiments were being made as to their qualities.

The Action of Light on Mixtures of Salts of Mercury and Compounds Containing Iodine.

BY GEORGE ROE.

In the *Pharmaceutical Journal*, vol. xvii., p. 883, notice is called to a reaction between calomel and iodoform under the influence of light.

Last year I brought before this Association a note on the same subject. Since that time I have been investigating the effect light has on other salts of mercury mixed with iodoform and compounds containing iodine, the results of which are recorded below.

When mercurous chloride and iodoform mixed together are exposed to light reaction takes place after a few hours, which is proved by scarlet spots appearing on the part exposed to light, but when mercuric chloride is used instead of the mercurous salt no such reaction takes place even after six months exposure, but the cork is blackened and dark spots, apparently of iodine, appear on the upper part of the bottle above the powder, which after a few months disappear and short acicular crystals take their place.

Mercurous chloride with iodoform does not blacken the cork, nor is the characteristic odour of iodine perceptible, as when the perchloride and sulphate are used, but acicular crystals much longer than those in the powder containing the mercuric salt are present.

Green iodide of mercury mixed with calomel changes to scarlet after a few days ; the same reaction occurs if the mercurial salt be mixed with iodoform.

When grey powder and iodoform are mixed and exposed to light for a few days the effect is very striking, bright scarlet spots appearing on the light grey powder.

Ointments of mercurial salts with iodoform are effected in the same way, but, as will be observed, after a longer exposure to light, oleate of mercury and iodoform changes first to green and then to scarlet; it is interesting to notice that ointments made with lanolin are not nearly so prone to change as those made with either vaseline or lard ; this is particularly so in the ointment of mercury preparations.

Iodol with calomel and mercuric sulphate changes after a few months.

	Seven Days.	One Month.	Six Months.
Hydrarg. subchlor., sodium sozoiodol.	No change.	Changing to scarlet.	Same.
Hydrarg. subchlor., Di-iodo-salicylic acid.	Darker.	Same.	Same.
Hydrarg. subchlor., sulphur iodide. Pink when mixed.	Odour of iodine, red-brown colour.	Same.	Lighter.
Hydrarg. subchlor., cadmium iodide. Yellow when mixed.	Grey, with light scarlet spots.	Same.	Colour fading.
Hydrarg. subchlor., argent iodide. Yellow when mixed.	Darker.	Light scarlet spots.	Colour fading.
Hydrarg. subchlor., cupri iodide. Pink when mixed.	Grey.	Changing to scarlet.	Nearly grey.
Hydrarg. subchlor., Plumbi iodi. Yellow when mixed.	Darker.	Light scarlet.	Same.
Hydrarg. subchlor., antim iodi. Brown when mixed.	Grey, changing to scarlet.	Same.	Caked together and covered with colourless crystals.
Hyd. creta, iodoform.	Scarlet spots.	Same with back of bottle black.	Becoming grey again.
Hyd. iodi. viride, iodoform	Scarlet.	Same.	Same.
Ung. hydrarg., iodoform.	Changing to scarlet.	Darker.	Scarlet colour fading.
Ung. hydrarg., lanolin base, iodoform.	Very slight change.	Same.	Same.
Ung. hyd. ox. flav., iodoform.	Dark brown.	Scarlet and black.	Same.
Hydrarg. perch. iodoform.	No change.	Odour of iodine, black spots on upper part of bottle.	Spots gone, acicular crystals take their place.
Hydrarg. sulph. iodoform.	Scarlet.	Same.	Colour fading.
Hydrarg. sulph. iodol.	No change.	Changing to scarlet.	Same.
Hydrarg. oleas. iodoform.	Green and scarlet.	Scarlet.	Same.
Hydrarg. subchlor. iodoform.	Scarlet.	Same.	Fading, acicular crystals on bottle.
Hydrarg. subchlor. lard and iodoform.	Scarlet changing to brown.	Darker.	Lighter.
Hydrarg. subchlor. lanoline iodoform.	Brown colour.	Same.	Changing to scarlet.
Hydrarg. subchlor. vaseline and iodoform.	Dark brown.	Black and spots of scarlet.	Same.
Hydrarg. subchlor. iodi. viride.	Grey, changing to scarlet.	Large scarlet spots.	Same.
Hydrarg. subchlor. iodol.	Same.	Changing to scarlet.	Same.
Hydrarg. subchlor. am. iodi. Light green when mixed.	Grey.	Black with scarlet spots.	Lighter.

Most of the iodides change colour when mixed with either chlorides of mercury.

Iodide of lead and calomel change after a few weeks.

Iodide of antimony and calomel become caked together, and on the bottle are numerous well formed, colourless crystals, the nature of which I have not at present been able to decide.

The above decompositions are of an interesting character, which is considerably increased by the fact that after about six months' exposure to light the scarlet colour seems to be gradually disappearing, and the mixtures have a decided tendency to resume their original state. In all the reactions iodine appears to be first liberated, which in the mercuric chloride and sulphate blacken the cork and have the odour of iodine. The powder becomes at first brown and then scarlet; no doubt other products are present, but I have not been able to ascertain the nature of them.

If the mixture of calomel and iodoform is put in either amber, blue, or green coloured bottles the same change takes place; therefore when dispensed it should be done in such a manner as to exclude light.

Mr. Frank A. Rogers said that last year, on the occasion of Mr. Roe's first paper on this subject, he drew particular attention to the fact that the mercurous compounds were more prone to undergo change when mixed with compounds of iodine than mercuric compounds are. Was the lanoline employed by Mr. Roe in his experiments the ordinary preparation or the anhydrous, as he imagined the presence or absence of water would make a considerable difference. The failure of yellow or amber glass bottles in preventing the decomposition was disappointing, and the question arose as to the best way of sending these mixtures out. He had noticed that compound liquorice powder when kept in bottles always aggregated on one side of the bottle; possibly this was also due to the effect of light. From the results of Mr. Roe's experiments, it appeared to him that it was not advisable to use iodoform gauge with mercury preparations, or *vice versa*, in dressing wounds.

Mr. Helbing said that some two and a quarter or two and a half years back, he had prepared some ointments with lanoline, which had been shown previously at a meeting of the Association. He had thought it well to show again the two remaining samples, which were ointments of red iodide of mercury and white precipitate respectively. Though made for such a long time, no change had taken place, neither on exposure to the light, nor while in the dark. The difficulty of preserving these two ointments, when made with lard, was well-known. The anhydrous base had been used for those particular samples, but the use of hydrous lanoline made little difference. He would like to hear if the author had had any experience of the effect of lard and vaseline in such ointments?

Mr. Sage asked if the mixtures had been kept in the dark as well as being exposed to the light.

Mr. Roe in reply said that in his experiments anhydrous lanoline had been used. He found that if kept in a covered jar the preparations kept well. When vaseline was used the mixture exposed to light went all colours, finally becoming black. He had made parallel experiments in all cases, carefully excluding the light, and in these he had found no change whatever.

Note on Tincture of Guaiacum.

BY E. A. ANDREWS, F.C.S.

Tincture of guaiacum, when mixed with ozonic ether and in the presence of blood, produces a blue coloration. This reaction, as no doubt most of you are aware, is made use of to detect blood in urine.

About a year ago a sample of tincture of guaiacum came under my notice which when used in this manner did not react as usual, and the explanation offered was, that it had been made some time, and it was necessary for it to be freshly prepared to give satisfactory results; also, it should be made from the inner part of the resin.

Very often this tincture is in the test case for months without being used; so it seemed to me that it would be of interest to find out how long it might be kept before it ceased to be reliable. Accordingly a sample was obtained freshly made on June 13 last. This gave the usual reaction. Since then it has been examined at intervals, the last time a few days ago, and up to the present still gives the coloration, although the last time it seemed rather slower in its action; still, after being made seven months it can hardly be said to be recently prepared.

The result of this experiment induced me to try

another. Some powdered guaiacum which had been in stock for the past two years was taken, and one part added to seven of rectified spirit. This was allowed to digest for half an hour with occasional agitation. It was then filtered and some of the filtrate used in the usual manner with blood and ozonic ether, when the blue colour was obtained.

On the face of it this seems to dispose of the assertion that care should be taken to exclude the outside part of the resin; but I have not had an opportunity of comparing the sensitiveness of the above with a tincture made in the correct manner. However, I am working it out, and will have much pleasure in communicating the result at some future meeting.

Messrs. Rogers, McFall, Roe, Morley and Stead joined in the short discussion which followed this paper.

Moss and its Adaptability to Pharmaceutical Purposes.

BY S. A. WALTON.

The moss order, from a botanical point, is one full of interest to the student, comprising as it does over 1250 species, and its uses are so varied and numerous that it would take a far greater time than I have at my disposal to enumerate them. I therefore desire to draw your attention to some of the uses it is put to pharmaceutically and medically only, and to the suborder, Sphagnaciæ, the bog moss, I wish to confine my remarks this evening,

Until within a comparatively short time since no particular attention has been devoted to this plant from a medical point. In 1884 a summary of its properties and qualities as an antiputrescent was given in the *Pharmaceutical Journal*, and in 1887 Mr. Lediard, the Surgeon of the Cumberland Infirmary, contributed a paper to the *British Medical Journal* respecting the results he had obtained in using it as a wound dressing and absorbent. It is chiefly though to Drs. Hagedorn, Liesrink, Mielek, and Rudolphi that its use as an antiseptic and absorbent dressing of a high degree has been established, and it was owing principally to these gentlemen the Prussian Minister of Interior Affairs in 1888 recommended its use to the hospital staffs wherever practicable, and it is to a German house which has placed the moss on the market in a suitable condition for medical use that our thanks are due.

In preparing it for commercial use the moss is first carefully gathered, dried at a low temperature, and compressed into sheet of various sizes, and in this form is known as "moss pappe" or "moss paste." A second variety is the "moss felt," in which the moss is not so closely compressed, and in this form is more suitable for bandages and pads than the first named. A third variety is the "moss siftings," being the small dried moss in a loose condition, the principle use for which is the disinfection of closets and similar purposes. Specimens of these I have here, and you will better understand their suitability for various purposes by an inspection of the different kinds.

The antiputrescent property of peat moss has long been known, though probably the only account to which it has yet been turned to by pharmacists has been the preservation of leeches. It is to the further development of this property my attention has been directed, in the attempt to utilize it as a means for disinfecting, odorizing and deodorizing. I have referred to its use as a perfuming agent in a previous paper, and I am of opinion that if judiciously used we have one of the finest means for purifying or perfuming the atmosphere that has yet been introduced.

As a means for roughly drying precipitates the moss paper is especially useful. The filter containing the washed precipitate being placed upon a sheet of this compressed moss, the moisture is abstracted to a very sensible degree, thus materially lessening the amount of time necessary to obtain a dry product.

Its use in leech jars (before referred to) or for sending leeches through the post, is no doubt well enough known to need any repetition on my part.

In conclusion, I would draw the attention of members to the vast use an intimate knowledge of botany is to the pharmacist, and I feel sure there yet remains a very large field open for the utilization of natural products, and which if we only examine will repay us both mentally and monetarily.

Messrs. Rogers, Morris, McFall, Stead and Helbing joined in the short discussion which followed the reading of the paper.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The annual meeting of the forty-third session was held at the Royal Institution on Thursday, January 28. The President, Mr. J. S. Ward, F.C.S., occupied the chair.

The report of the Council was read, and the Honorary Treasurer's statement of accounts was presented.

A resolution was passed, thanking the donors to the Library and Museum, and the authors of papers during the past session.

A vote of thanks to the officers and council for their services during the past session was also passed unanimously.

The following were elected members of the Council:—Messrs. A. C. Abraham, A. A. Barrett, H. D. Dutton, I. Overton, R. Parkinson, J. J. Smith, and J. Smith.

Mr. A. H. Samuel read a communication on "The Formation of Paraffin Oil;" and subsequently the President delivered an address, in which he dealt with the subject of "Pharmaceutical Testing," and described some of the methods which have recently been recommended.

He dealt with this subject under the headings qualitative tests, volumetric estimations, estimations and standardizations of tinctures and other pharmaceutical products, electro-chemical analysis, and the microscopical testing of crude drugs.

Among the qualitative tests he mentioned the method recently suggested by Mr. Cowie in a note read before the Edinburgh Chemists' Association and reported in this Journal at page 442, for recognizing an oxide by heating with a solution of ammonic chloride in a tube, the mouth of which is covered with filter paper wetted with solution of phenolphthalein. The evanescent purplish-red colour produced on the paper shows the presence of insoluble oxides, such as those of magnesium, zinc, iron, lead, and mercury. This test is a distinct advance upon the use of litmus paper, which is often acted upon by heating ammonic chloride in the absence of an oxide.

By reversing Thresh's test for alkaloids, as suggested by Mr. Harold Wyatt, jun., a very convenient means of ascertaining the presence of bismuth is obtained by the formation of an orange-coloured precipitate on adding a solution of quinine and potassic iodide in hydrochloric acid.

When a solution containing cocaine is evaporated over a water bath with a little strong nitric acid and the residue treated with alcoholic potash, the development of an odour like peppermint has been pointed out by M. de Silva as characteristic of that base.

Tartaric Acid, warmed to about 120° C. with strong

sulphuric acid containing 1 per cent. of resorcin develops a reddish violet colour, and Mohler proposes this reaction as a test for tartaric acid.

A solution of ammonium molybdate with a few drops of peroxide of hydrogen gives a bluish colour with tartaric acid when heated over a water bath, and this test is recommended by M. L. Crismer, as capable of detecting a very minute proportion of the acid in citric acid.

According to Stark resorcin and its isomers are readily detected by the violet colour, passing into red, produced when mixed with a solution of chlorinated soda, B.P. Hydroquinone gives a brownish yellow to a yellow, and pyrocatechin at first green and ultimately yellow.

Dr. Muter has stated that sweet spirit of nitre of commerce made from methylated spirit may be detected by the deep yellow to orange-red colour produced on dissolving a piece of caustic soda in the sample.

At the Pharmaceutical Conference at Leeds, Mr. Linford stated that the test given in the New Dutch Pharmacopœia is a reliable and convenient one. It consists in treating the sample with iodine and ammonia, which forms iodoform with the spirit of nitre made from methylated spirit.

Crismer recommends Nessler's reagent as a very delicate test for aldehyde in spirit or ether. According to the amount present, it gives a pale yellow to a brown or even black precipitate.

Tocher finds a solution of pyrogallol in pure hydrochloric acid a delicate test for sesame oil.

For testing olive and other oils, Brullé recommends heating 12 c.c. of oil with 5 c.c. of 2½ per cent. solution of nitrate of silver in 95 per cent. alcohol in a water bath for twenty minutes. Olive oil gives a green colour and remains clear; cotton black, sesame deep red brown, nut oil green and turbid, colza and poppy oils yellowish-green and becomes turbid.

To test for cotton oil in lard, Bechi heats the lard with an alcoholic solution of nitrate of silver over a water bath for ten minutes. When cold, pure lard is colourless, while cotton seed oil gives a brown or black colour.

In connection with volumetric analysis the advances made by the introduction of new indicators, especially phenophthalein and methyl-orange, were described, and reference was made to the paper read before the Midland Counties Chemists' Association by Cripps. See *ante*, p. 510.

The ingenious process of acidimetry and alkalimetry dependent upon iodometry, recommended by M. Gröger, was also described. It is based upon the fact that when a mixture of iodide and iodate of potassium is treated with a mineral acid, free iodine is liberated. This is estimated with standard thiosulphate solution, and from the amount of iodine found the amount of acid may be calculated.

In applying this reaction to alkalimetry, the alkaline solution is first rendered acid by the addition of a known quantity of standard acid solution; the excess of acid is then determined by iodometry, and from these data the amount of alkali present is calculated. One great advantage claimed for the process is that it may be employed in many cases of dark-coloured liquids, when the change in litmus or methyl-orange could not be seen. It can only be employed, however, for mineral acids; organic acids in some way interfering with the reaction.

Messrs. Messinger and Vortmann have also employed a method of iodometry for the estimation of phenol, thymol, naphthol and other phenols. They find that phenols warmed with excess of sodic hydrate and a decinormal solution of iodine, form insoluble compounds, consisting of 1 molecule of the phenol and 6 atoms of iodine. The precipitate is separated, and the excess of iodine in the liquor determined by titrating with decinormal thiosulphate solution. They also found that the method could be employed for the estimation of salicylic acid.

The Nitrometer was mentioned as a convenient apparatus for the examination of many substances besides nitrites; *e.g.*, when peroxide of hydrogen is mixed with an acid solution of permanganate of potassium, it yields free oxygen, which can be measured in a nitrometer.

Again, the amount of carbonate of ammonium in aromatic spirit of ammonia may be conveniently determined by the nitrometer; but it is in this case preferable to charge the apparatus with mercury instead of brine.

Urea is also readily determined by measuring off the volume of nitrogen yielded when urine is treated with hypobromite of sodium. See Smith—*Pharm. Journ.*, [3], xxi., 294.

The standardizing of compounds of opium, cinchona and nux vomica in the B.P. of 1885, was spoken of as an important step towards more accurate and scientific pharmacy; and the work done by Messrs. Farr and Wright in reference to "The Solvent Action of Alcohol and the making of Pharmacopœial Tinctures," was mentioned as laying pharmacy under a deep obligation to them.

Electro-chemical analysis was mentioned as promising to become useful when carried out in the manner described in Mr. Ellwood's paper, read before the London Chemists' Assistants' Association. Lastly, the microscopical testing of crude drugs was spoken of as being now not only as a branch of knowledge most important to the chemist, but also a necessary for the qualifying examination.

NEWCASTLE-ON-TYNE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The fifth meeting of the present session was held in Lockhart's Café, St. Nicholas Square, on Wednesday, January 20, Mr. G. F. Merson, President, in the chair.

Mr. Hedley Pattinson read a paper on "Some Low Forms of Plant and Animal Life."

Far down the ladder of life we are confronted with the lowest forms of animals and plants, consisting of a single cell. A step or two up the ladder shows us organisms in the scale which are simply aggregations of these cells. The importance of carefully examining and studying the lives and characters of these low forms is readily seen when we consider for a moment that every animal and plant, no matter how highly developed and complicated they may be, begin life as a semi-fluid mass of living matter, called a cell. As we gradually rise to the top of the ladder these cells, forming aggregations, become greatly altered in their properties as well as form, and readily show whether the animal or plant they have built up is high or low in the scale of creation. Thus the higher we get in life, be it animal or plant, be it to man, the occupier in the highest step in the ladder, or to a tree firmly rooted in the earth, the more highly developed and complex they will be found to be when compared with more humble inhabitants in both kingdoms, the most humble of which is only revealed by the powerful lenses of the modern microscope. However varied and modified these cells may be in the higher forms of life each one has originated from a simple primitive cell. This forcibly illustrates the importance of examining and looking minutely into the characters of these unicellular organisms. These pages of 'Nature's Book' contain the history of a world unknown and unattractive to many. The majority of people rarely look or, perhaps, glance only for a moment at them, passing idly on with calm indifference. Yet every page in this book has a wonder and a beauty of its own, instructing us in strange and

curious stories. To those engaged in our calling those pages reveal to us the history of minute organisms, generally known as microbes and ferments. Here we are confronted with structural simplicities, which have caused biologists much trouble in attempting to decide whether they should be classed in the animal or vegetable kingdom.

Microbes, signifying small living organisms, without indicating to which kingdom they belong, are now—speaking generally—being freely discussed. Our daily papers are devoting articles to their consideration, even arguing as to whether they are animals or plants. A leading London daily journal has described them as inhabitants of the animal kingdom, and a few days later a local morning paper takes the responsibility of reminding the former that they are plants; yet surprisingly few of those who love to use the term give us any account of the parts played by these microbes. They concern all; the hygienist, the agriculturalist, the doctor, the chemist; particularly since these germs are the cause of so many serious diseases, and also perform many useful functions. Here the author touched upon the microbe theory of influenza, and showed the parts played by these low forms of life, how they clear the earth of refuse matter and return the wanderers to new and useful combinations.

The characters of several unicellular organisms were also minutely examined, viz., Torula, Protococcus, the Amœba, several Diatoms, etc., the distinctions between the Torula and the Amœba being given, each a unicellular organism, one in the vegetable the other in the animal world. The reasons why several of these low forms of life are classed in the respective kingdoms were fully entered into.

Higher up the ladder, when with the naked eye we see a donkey moving about in a field seeking for food and compare it with a tree firmly rooted in the ground, the difference is obvious even to a child, if we content ourselves with the comparison. But these are highly developed in the two kingdoms, readily distinguished by the dullest comprehension. But several of the lower representatives so closely resemble each other that an intermediate kingdom "Prolista" asks to be allowed to claim this great unknown. The reproductions of some of these minute organisms were here discussed, along with the kind of surprisingly active lives which they live, reproducing themselves in such enormously rapid manners. Protoplasm, the physical basis of life, the cell-wall and cell-sap were also touched upon; the manufacturing of proteids from such simple materials in plant life, differing from animals and showing how the latter depend upon the former for existence.

The paper was illustrated by numerous slides shown under the microscope, which were much appreciated by those present. An interesting discussion followed, and upon the motion of the Chairman a hearty vote of thanks was awarded to Mr. Pattinson.

EDINBURGH CHEMISTS' ANNUAL BALL.

The Edinburgh Chemists' ninth Annual Ball took place on the evening of Thursday, January 21, in the Masonic Hall, George Street. Among those present were Mr. J. Laidlaw Ewing, Chairman of the Executive of the North British Branch of the Pharmaceutical Society, Mr. Robert Dick, Mr. G. D. Mackay, Mr. A. Kennedy, Mr. T. Thompson, Mr. R. Aitken, Mr. P. Boa, Mr. J. R. Young, junr., Mr. R. I. McDougall, Leith, Mr. J. P. Thompson, Penicuick, and Mr. D. MacLaren, Convener of the Committee. Dancing commenced at 9 p.m. and proceeded with enthusiasm till after 3 a.m. There were about eighty couples present, and Messrs. R. Butchart and J. Brown acted efficiently as masters of the ceremonies. Music was supplied by Dambmann's band. The assembly was generally spoken of as a decided success, and all the arrangements were carried out smoothly and satisfactorily. The President of the Pharmaceutical Society sent a letter regretting his inability to be present.

Parliamentary and Law Proceedings.

Prosecution under the Pharmacy Act.

The Illegal Sale of Poisons.—Judgment in the Sheffield Case.

At the Sheffield County Court on Thursday, the 28th ult. (as was briefly recorded in our last issue), his Honour Judge Ellison gave his decision in the case of the Pharmaceutical Society, by their Registrar, Mr. Bremridge, against William Sales.

Mr. Stroud, of the firm of Flux, Son and Co., London, appeared for the Society, and Mr. A Muir Wilson for the defendant.

His Honour said: This is a case in which the Council of the Pharmaceutical Society of Great Britain, by Richard Bremridge, the Registrar of the Society, by authority of the said Society, sued as plaintiff William Sales, of 59, Gower Street, in this town, described as shopkeeper, for three sums of £5 each, and they are claimed by the plaintiff as penalties for three different offences set forth in the particulars. The first penalty, it is claimed, was incurred by the defendant on August 14, 1891, in selling a poison, to wit, a preparation of opium known as laudanum, contrary to the provisions of the Pharmacy Act, 1868, 31 and 32 Vict., c. 121. The second penalty was claimed for that on August 14 the defendant kept open shop for the retailing, dispensing, or compounding of poisons, to wit, a preparation of laudanum; and then the third penalty is for taking, using or exhibiting the name or title of chemist contrary to the provisions of this statute. All these penalties are claimed under the 15th section. His Honour read the section, and then said: Therefore it is a highly penal statute, and ought to be strictly looked at before these penalties are allowed to be recovered. With regard to the first penalty I think there is no doubt whatever that it is fully proved he did sell the poison mentioned in the particulars. There is a little difficulty in the wording of the Act of Parliament, because it is "any person who shall sell poisons." Now this individual did not sell poisons in the plural; as far as I know he sold them in the singular, but I think that is sufficient to make him liable for the penalty. With regard to the other two offences for which penalties are claimed by the plaintiff, I think there is no evidence to support the case in respect to those. The evidence that I have before me is simply this, that the defendant was acting in the shop, selling this poison and selling other chemicals. But the evidence went on further to state that the name over the shop is the name of somebody or another, I forget the name ——

Mr. Wilson: Griffin.

His Honour: Who was, I believe, at one time carrying on business in Sheffield, but who had gone to some other part of the country, and there carried on the business of a chemist and druggist. His name is still over the door, and there is no evidence before me to show who is really the tenant of the premises, or who is really keeping open shop. The presumption, I think, from the fact that Griffin's name is over the door, would be rather in favour of Griffin being the tenant of the shop, and the defendant in this action being simply the assistant or servant of Griffin. I do not know how that is, and therefore I say the case is not proved with regard to those other two penalties. There will be a

verdict for the plaintiff for the amount of £5 in respect to the first penalty which is claimed.

Mr. Stroud asked his honour to grant a certificate for costs on the higher scale, on the ground that it was a case of public interest. His honour had power to do so under the 119th section.

Mr. Wilson submitted that it was not a case where costs on the higher scale should be allowed. He had won on two points, and ought to have his costs on them. If there had been three issues joined against him at assizes, and he was successful on two of them, he should have been entitled to his costs upon them.

His Honour: I think that as you succeeded in getting clear of two penalties that have been attempted to be enforced against you, I ought not to make any special order in favour of the plaintiff as to costs. I think the case must take the usual course.

Mr. Stroud: Perhaps your honour will allow certificate for counsel.

His Honour: I do not object to that.

Poisonous Weed Killers.

Cramb and others *v.* Caledonian Railway Company, etc.

At the Edinburgh Court of Session, Outer House, Tuesday, January 26, before Lord Stormonth Darling.

At the hearing of evidence in the action against the Caledonian Railway Company and M'Ewen and Co., grocers, Bridgend, Crieff,

Frederick Cramb, one of the pursuers, said the effect of the sugar on him had been that his walk was affected, he being paralysed in his legs. Dr. Young, who attended him for about two months and was still attending him at intervals, gave him galvanic shocks. He did not feel the same man as before his illness. He was not able to lift heavy weights now, his arms being sore and benumbed. His sight was affected. His father had never less than two horses, and each horse would earn about 9s. a day. He had to employ a man now.

By the Solicitor-General: That man did what his father did before. When ill he did not try to get any one to help him with the horses.

By Mr. Aitken: His father was able to do a full day's work up till his illness. The horses belonged to his father.

By the Court: It cost him £2 every week to keep these two horses at his own place.

William Roy, carrier between Crieff and Comrie, said he did the carting for the railway company, and that some of the tins containing the weed-killer leaked in his cart on account of the rubber of the washers being insufficient.

Charles Robertson (39), grocer, Comrie, spoke to having received the weed-killer, and that he found one of the tins nearly empty. He made no complaint to the railway company, because he had two paltry claims against them, and knew he could recover the value from the Boundary Chemical Company. After the experience of this case, he would be suspicious of any bags of sugar which showed signs of wet.

David Taylor, lorryman in the employment of Alex. Heron, Caledonian Railway carting agent, Crieff, said that he delivered five bags of sugar to Mr. M'Ewen on March 10, 1891. There was nothing on the delivery sheet to show that anything was wrong. Witness did not remember having told Mr. Goold, Mr. M'Ewen's shopman, that a mark on one of the bags was caused by water from his tarpaulin.

Dr. Alexander Thom, Crieff, was called for the purpose of speaking to the symptoms exhibited by those who suffered from the illness caused by partaking of the sugar. There were about 100 cases altogether, and two deaths. All the sufferers showed signs of arsenical poisoning. Witness wrote an account of the affair, which appeared in the *Lancet* of 18th April, 1891. Frederick Cramb had now recovered, but up till October last he was ailing. Helen Cramb had suffered from a severe nervous shock caused by the death of her parents, but was now able to resume work.

James Murray, who was sergeant of police at Crieff, gave evidence as to obtaining and sending samples of the sugar to the authorities for analysis.

George Duncan M'Dougall, Fellow of the Institute of Chemistry, said he was City Analyst for Dundee, for Perthshire, and for other places. In April 1891 he had sent to him for analysis sugar and weed-killer in connection with what was known as the Crieff poisoning case. He was asked to state the amount of arsenic in half a gallon of the fluid, and the result of his experience was that he found the solution to be a concentrated solution of arsenic containing 6,790 grains in half a gallon. A fatal dose of arsenic was supposed to be two grains, but he was not a medical man. He would undertake to kill three thousand people with that half-gallon. As the result of his experiments with a jute bag, similar to what was used for the carriage of sugar, he found that the weed-killer plus sugar left a very dark stain.

W. Wilson, goods agent for the Caledonian Railway Company at Stirling, said that when the goods were transferred at Stirling from the North British to the Caledonian Railway it was marked on the invoice that there was a leakage.

David Ritchie, W.S., the pursuers' agent, stated that the chemical company had agreed to pay the pursuers 200 guineas to settle the case.

James Livingstone, under foreman at Stirling goods station, said he was at the goods shed there on 10th March last, and gave evidence as to the method of transferring goods from the North British Railway to a train for Crieff. However slight the leakage was it would be quite proper for the checker's attention to be called to it in order that it might be marked on the invoice. Although the checker was told the case was leaking, he would not in ordinary course necessarily know what the case contained if it was not in the invoice. He was not acquainted with climax weed-killer. It was the duty of the checker to examine goods closely to see if they were damaged. There was no particular regulation as to what they were to do with a leaking case.

By the Court: He never heard of weed-killer at all.

John Allardyce, foreman of one of the shifts of porters at Stirling Station, said he had never seen any written rules about leaking or damaged goods. It was the practice to repair a case if it was damaged, but in the case of a package which was not damaged, and fluid was escaping, they would not, as they would have to break up the case.

James Anderson, head goods porter at Crieff, said that in March last he was on duty. Shown invoice of sugar from Greenock of so many bags, he said the writing in pencil "wet with dip" was his. That showed he must have been acting as checker on that occasion. He might not necessarily have looked at it himself. He never heard about weed-killer until this case. It was a very common thing to find bags of sugar handed out with wet marks on them. He did not remember whether he saw the leaking himself, or whether it was the man in the waggon. It was his general practice to look at these things. He would not like to take sugar that had been mixed with sheep dip. He did not tell the stationmaster, because he did not think it was anything out of the common run. Did not think anything about it. Further questioned, witness said the object of the marking on the invoice was simply to keep him straight with the sending station. It was no part of his duty to give

notice to the carter who was to take the goods as to any damage. There was a sort of general instruction that where any consignment of goods got damaged, that if the damage was noticed they were to repair it; that anything broken they would handle as carefully as they could. He did not know for a certainty that it was sheep dip on the bag. But for the invoices he would have no recollection at all of what happened at the time. Thought sheep dip had wet the bag, as tins containing it were invoiced in the same waggon, and it was impossible to say that there was anything else in that waggon that could have done damage to the sugar. I cannot remember finding any of the cans of sheep dip leaking. The wooden box was all he could see was leaking. Took it to be sheep dip in the case as well as in the tins. Did not remember ever seeing the brand "weed-killer" upon the case which was leaking. If he had seen that, it is possible there might have been sheep dip inside, put in an old box. It was the invoice that led him to think that "the case" contained sheep dip.

Dr. A. P. Aitken, chemist to the Highland and Agricultural Society, said he had analysed some of the climax weed-killer, and found it contained 20,400 grains of arsenic to the gallon—that was equal to about three pounds, and would kill about 7,000 people. A fatal dose of arsenic was $2\frac{1}{2}$ to 3 grains, and 8 to 10 drops of the weed-killer would be fatal.

Thomas Kelly, ironmonger, Edinburgh, was of opinion that the washer of the tin which leaked was defective.

The case for the other defenders, M'Ewen and Co., was proceeded with.

Thomas Goold said he was M'Ewen's assistant, and took delivery of the bags of sugar from Taylor, the carter. The bags were taken from the lorry and emptied into the tierce in the back store. Witness noticed a stain on one of the bags, and spoke of it to Taylor, who said that it was caused by rain from the tarpaulin. The day was wet. Witness did not mention the incident to Mr. M'Ewen, who signed the delivery sheet as having received the sugar in good order. When put into the drawer witness noticed that the sugar was damp, but it was not discoloured.

Thomas M'Ewen said he received 10 cwt. of sugar from a Glasgow firm in March, 1891. The sugar was received in the ordinary way at the back door. When he was asked to sign the delivery bill no explanation was made to him about one of the bags being marked with damp. The sugar often came with damp marks on the bags. The sugar was put into a tierce and sold to customers for three weeks. He saw nothing wrong with the sugar during that period. It was not coloured. No more of the sugar was sold after the complaints were made, and he sent round to customers to whom he had sold any and got back what they had. After attention had been called to the sugar, he examined the bag and found on it a dark stain such as water would make. He had shown the sugar to several people, who could see nothing wrong with it. When he examined the bag in April he was quite satisfied that the mark was too deep in colour to be caused by water. Witness asked Goold why he did not tell him about the matter on the day of the arrival of the sugar, and Goold said the railway carter told him it was caused by rain from the tarpaulin, and that had quite satisfied him.

Elizabeth Mackenzie, dairy keeper, near Crieff, Margaret Taylor, North Bridge Street, Crieff, and David Miller, farmer, near Crieff, gave evidence as to the effects of the sugar, but said that to all appearance there was nothing wrong with it.

Dr. Stevenson Macadam, consulting analytical chemist, said he had experimented with a sample of blue-coloured climax weed-killer, as he could not get a colourless sample. The matter of colour did not affect the poisonous character. As the result of his analysis, he found 20,758 grains of arsenic to the gallon. That was very nearly 3 lb. of arsenic in the gallon. It was explained to him that the poisoning had occurred through a bag of sugar having become saturated with some leakage from a tin of climax weed-killer, and he made experiments upon jute sacking filled with sugar. He found there was nothing to raise suspicion in the mind of a person who had not the knowledge of the circumstances under which the stain had been made on the bag. It was quite a reasonable explanation to receive that the bag had been stained with water.

After hearing counsel on the 28th ult. his lordship reserved judgment. In the course of the discussion, counsel for the pursuers, after alluding to the settlement with the Boundary Chemical Company, Liverpool, said the amount now claimed against the railway company and Thomas M'Ewen, jun., and Company was £1,200.

Sale of Spirit Without a Licence.

Important Prosecution at Dudley.

Last Wednesday. at the Dudley Borough Police Court, before the Mayor, G. H. Claughton, Esq., and Mr. J. H. Smith, Joseph Raybould, trading as Fletcher, Raybould and Co., Reform Works, Dudley, was summoned for selling spirits without a licence.

Mr. J. B. Davis, supervisor of Inland Revenue, prosecuted, and Mr. Barfitt, barrister, instructed by Mr. E. P. Jobson, defended.

Mr. Davis, in his opening statement, said that the defendant carried on business in Wellington Road, and manufactured baking powders, egg powder, furniture polish, and household requisites. For some time past the officers of Inland Revenue had noticed in the local hucksters shops a dark compound exposed for sale, which was labelled "Indian Brandee," and described as being more useful than brandy, rum, or whisky when spirits were required to be taken. Mr. Garfield, supervisor, instructed an officer to purchase some of the compound, which was sent to the Inland Revenue laboratory for analysis, and found to contain a large proportion of alcohol. The present proceedings were then instituted under the Spirits Act, 1880, 3rd clause of the 24th chapter.

The Mayor: Is this a test case, or an isolated instance?

Mr. Davis: There have been a great many purchases, but this is the first prosecution. You may take it as a test case or not, as you please.

Edward John Butterfield was then called, and stated that he was an officer of Inland Revenue stationed at Dudley. Mr. Garland instructed him to visit the defendants' works and ask for a pint of "Indian Brandee." He went to the works and saw the warehouseman, who he asked for a pint of "Indian Brandee," to which he replied they did not sell it by the pint but the pound. Witness asked how much it was a pound, and was told 2s. 8d. He ordered a pound, and whilst the warehouseman had gone to fetch it Mr. Raybould entered the office and inquired what he, witness, wanted, and when told that he wanted "Indian Brandee," asked the witness where he came from and what he required "the Brandee" for. Witness told him that he wanted it for pains in the back, and that he came from Brierly Hill. Witness paid Mr. Raybould the 2s. 8d., and handed the compound to Mr. Garland, supervisor, who was waiting outside the works.

In answer to the Mayor the witness said that the reason he did not tell the truth as to why he wanted the brandy was that he had not concluded the bargain when questioned.

Cross-examined by Mr. Bayfield: He had no reason to think but what the defendant really thought his sale was a *bonâ fide* one.

Mr. Garland proved receiving the bottle produced, dividing its contents, and sending half under seal to the Laboratory at Somerset House. The result of the analysis showed that it contained 41·6 of spirits. Witness went to Mr. Raybould, and told him that he had made himself liable for selling spirits without a licence. The formula given by Mr. Raybould as to the quantities of the "Brandee" was 8 parts of syrup, 2 parts of water, 5 parts of spirits of nitre, and about 2 drops of tincture of capsica in each ounce. Mr. Davis said that it could not be sold for any other purpose than a beverage, and a person would have to have a licence for the sale of spirits.

In answer to Mr. Barfitt, the witness Garland said that he had no doubt that Mr. Raybould thought what he was selling was a medicinal mixture. The defendant was liable if he sold it two over proof spirit.

Mr. Davis pointed out that this was the department regulation in respect to botanical beers, a case upon which had been recently decided at Nottingham.

Geo. Lewin, fellow of the Institute of Chemistry, and analyst at the Laboratory, Somerset House, said on the 16th of October he received a parcel marked Fletcher, Raybould and Co. He analysed it and found it to contain 41·3 of spirit, proof strength, which was one-half the strength of public house whiskey. The basis was treacle, 46½ per cent. of sugar and water, capsicum, and a small quantity of oil corresponding to aniseed. It contained no spirit of ether. It did not contain spiritus ætheris nitrosi (æther. hyponit.), which was the term used by the Pharmacopœia. The spirit in the compound was ordinary alcohol, and was directly opposed to the formula given by Mr. Raybould.

In answer to Mr. Barfitt the witness persisted in stating that the result of his analysis showed that there was neither spirit of ether in the compound, or sweet nitre, but only alcohol was used.

At this stage of the proceedings Mr. Barfitt consulted with his client, the result being that Mr. Barfitt said the evidence given by Mr. Lewin had come as a surprise upon himself and Mr. Raybould. He could not dispute this evidence, as they had not been given the remaining half of the contents of the bottle in order that it could have been analysed and Mr. Lewin's evidence tested.

Mr. Smith: Did your client ask for the other half?

Mr. Barfitt: No, sir.

Proceeding, he had no wish whatever to say anything as to the manner in which the prosecution had been conducted, for it had been most fair. His client had placed himself entirely in the hands of the magistrates as he, Mr. Barfitt, could not now resist a conviction.

Mr. Lewin stated that he could not give the formula of Somerset House.

Mr. Barfitt said that it would be only fair that this should be given, for the benefit of wholesale chemists, who did not understand complicated acts of parliament, and make men liable who had no intention of infringing the law. He thought they should know what portion of spirit they were allowed to put in their mixtures. In this case Mr. Raybould, who had carried on his business with success for a number of years, thought he was acting *bonâ fide*, and he asked the Bench, as this was the first prosecution of its kind, to inflict a small penalty.

The Mayor said under the circumstances the defendant will be fined £10 and 10s. costs, which we think will meet the case.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Chemists' and Physicians' Prescriptions.

Sir,—I shall feel much obliged if you will kindly allow me the use of your columns for drawing the attention of your pharmaceutical readers to an objectionable habit which obtains amongst some of them, and to ask them to set their faces against it.

I allude to the way in which some chemists criticise physicians' prescriptions which are handed to them by patients to be made up. I only yesterday received a letter from a patient of mine who resides in L——, in War—— -shire, in which he says:—

"The chemist warned me of the unusual strength of the pills, he thought they would make me feel very shaky, which made me somewhat uneasy. However, I did as advised by you, and the only effect the pills have had on me to arouse uneasiness at all has been on two occasions out of six days, when the pill seemed to cause a tightness on the chest, with slight difficulty of breathing, like a weight on the chest."

I may say that the pills contained an ordinary medicinal dose of phosphide of zinc and strychnia.

Now, I consider such behaviour on the part of the chemist inconsistent with the honourable professional relations which ought to exist, and almost invariably are found to exist, between members of the medical and pharmaceutical professions. I should not have spoken on this subject except that it is not by any means the first time that such a report has reached me. Those who know the power of auto-suggestion—and who does not?—will readily understand that a warning thus conveyed may set the patient on the watch for unpleasant feelings, and possibly bring them about, more especially if he be of a nervous disposition. It may also cause the patient to lose his confidence in the physician who is prescribing for him. I therefore trust that this friendly note of warning may be taken in a friendly spirit by your readers, and that the habit may be discontinued by those amongst them who may have given way to it.

Julius Althaus, M.D.

48, *Harley Street, Cavendish Square, W.*

NOTICE OF MEETING.

Chemists' Assistants' Association.—Thursday, Feb. 11.—"Aqua Destillata," by Mr. J. C. Hyslop.

G. S. Jones.—Your letter has been handed to the advertisement agents.

F. W. Towan.—Your advertisement, which arrived too late for insertion in last week's Journal, has been handed to the agents.

A Puzzled Student.—Your letter has been forwarded to the Editor of the work referred to for an explanation.

F. Rideal. R. P. Roe.—Your advertisements should have been sent to the agents, 11, New Burlington Street, W.

Communications, Letters, etc., have been received from Messrs. J. C. Stead, W. Poppelreuter, J. R. Hill, M. T. Evans, F. A. Cory, Dr. Althaus, A. C. Buck, A. R. Bennett, R. G. Jones, G. E. Shaw, T. H. Powell, W. L. Williams, Jensen and Co., J. Smith, E. S. Peck, W. N. Evans.

EARLY BOTANY AND MATERIA MEDICA IN ENGLAND.

IV.—PARKINSON'S 'THEATRE OF PLANTS,' 1640.

(*Continued from page* 591.)

John Parkinson, whose name with that of Gerard is familiar to all students of the literature of horticulture, was born in 1567. Like his friend, Thomas Johnson, he was an apothecary of London, and was highly esteemed by his contemporaries for his knowledge of plants, Dr. Clayton, the Regius Professor of Physic at Oxford, going so far as to term him "England's chiefest herbarist."

Parkinson's first work, dedicated to the Queen of Charles I., was published in 1629, and was avowedly horticultural in its scope, being, indeed, the first English work in which garden flowers are separately described and figured.

The heading of the first edition may be seen in Pulteney's 'Anecdotes of Botany.' The edition consulted for the purposes of this paper is the edition bearing this title, PARADISUS IN SOLE, PARADISUS TERRESTRIS, or, A choise Garden of all sorts of Rarest Flowers, with their Nature, place of Birth, time of flowering, Names and Vertues to each Plant, useful in Physick or admired for Beauty. To which is annext a Kitchin-Garden furnished with all manner of Herbs, Roots, and Fruits for Meat or Sawce used with us. With the art of planting an Orchard of all sorts of fruit-bearing Trees and Shrubs, shewing the nature of Grafting, Inoculating, and Pruning of them. Together with the right ordering, planting, and preserving of them, with their select vertues. All unmentioned in former Herbals. Collected by John Parkinson, Apothecary of London and the King's Herbarist. *The second Impression much corrected and enlarged*, 1656.

"This speaking garden" has for its frontispiece a representation of the Garden of Eden, among the flowers of which the cactus, lily, sunflower, and tulip are clearly recognizable. Its arrangement follows the lines indicated in the title, but, copying Gerard, after the description of all the species are given the place, time of flowering, synonyms, and virtues. The figures, many of which are copied from De L'Ecluse and De L'Obel, were cut in England for this work and are far inferior in execution to those of Gerard's Herbal.

Parkinson intended when he published his 'Paradisus' in 1629 to supplement it with a treatise on medicinal herbs under the title of "A Physical Garden of Simples," but with "the revolution of time," as he quaintly says, he "changed the note (from a Physical Garden of Simples to a Theatre of Plants) yet not the nature."

Before examining in detail this work, which is really a digest of the botany of the time, it seems advisable to notice the additions made to the literature of materia medica through the discovery of the new world. Orta, physician to the Viceroy of Portugal, Monardes, an eminent physician of Seville, and Christopher à Costa wrote text-books on the drugs of the East and West Indies, which were quickly made accessible by translations.

James Frampton, an English merchant resident for some years in Spain, on his return from that country, turned Monardes' work into English in 1577, and an enlarged edition was produced in 1580 under the following title, 'JOYFULL NEWES *out of the new found world*, wherein are declared the rare and singular vertues of divers and sundrie Herbs, Trees, Oyles, Plants and Stones, with their applications, as well to the use of Phisicke, as Chirurgery; which being well applied bring such present remedy for all diseases as may seeme altogether incredible; notwithstanding by practize found out to be true; also the portrature of the sayde herbes, very aptly described.' There is an interesting passage in Frampton's "Dedication," in which he alludes to the popularity of the new remedies. "Returning, right worshipful," he says, "home into Englande out of Spaine, and now not pressed with the former toiles of my olde trade, I tooke in hande to translate out of Spanish into English the three bookes of Doctor Monardes of Sevil, the learned Phisition, treating of the singular and rare vertues of certaine Hearbes, Trees, Oyles, Plants, Stones and Drugges of the West Indias, for that the same booke is of high commendation in Spaine and other countries in such sort that indeed it might bring in tyme rare profite to my country folks of Englande, by wonderfull cures of sundry great diseases that otherwise than by these remedies were incurable. . . . Since the aforesaid Medicines mentioned in the same worke of Doctor Monardes are now by Marchants and others brought out of the West Indias into Spaine, and from Spaine hither into England by such as doe daily traffic thither, and that the excellencie of these Hearbes, etc., have bin knowen to be so precious a remedie for all manner of diseases that may happe unto Man, Woman, or Childe, they have left off and forsaken very much the olde order and manner of Phisicke which was used before that this was knowen, as things not of so present remedie for all manner of diseases, as these nowe late founde out, and which by greate experience made in Spayne and other countries were thoroughly and effectually prooved and experimented to woorke the effectes which are contayned in this Booke."

Among the drugs most highly praised by Monardes are "sarcaparillia," sassafras, "tabaco," cinnamon, ginger, and balsam of tolu. Some interesting details are given us of the pharmacy of the time. Thus, we are told, "at the beginning" the apothecaries "took of the Sarcaparillia much quantity, more than halfe a pounde and did cut it small and breake it, and cast it into a quantitie of water, and being well wet they beate it in a Morter a good while in such sorte that it was made like a Jellie, and then did straine it, pressing it very well, for there came out of it the likenesse of a thick drinke. Of that, in the morning, hot, the pacient tooke one good cup full, and then clothed himselfe well and sweet two houres. After this sorte I gave it in the beginning, and surely it wrought great effects." "Another fashion" then came in of administering a decoction of the drug obtained by boiling it in water, and Monardes notes that he "used a syrup of sarcaparillia with much effect for the pox" and gave the drug as a powder in "women's diseases and reumes."

Of more general interest are the virtues ascribed to tobacco. The leaves were heated and "layde hotte to the griefe" in colds, catarrh of the stomach, rheumatism, calculus, venomous wounds, old sores and headache, and for toothache from cold. A

little ball made of the rolled up leaf was placed in the carious tooth. Another popular medicine was sassafras used as a preventive against pestilent and contagious diseases, "to give appetite," and as a remedy for headache, toothache, calculus, gout, and the pox. So enthusiastic was Monardes with regard to the virtue of balsam of tolu, which he employed as a remedy for "shortness of breath, rheums, palsie, and consumption,"—that he advised its use externally as an ointment as well as internally.

The translation Pulteney mentions of the work of à Costa by James Garet, a druggist in Lime Street, and valued correspondent of De l'Écluse, is not preserved in the British Museum, but the treatises on the new drugs of à Costa, Orta and Monardes in a French rendering, are bound together under this title: Des Drogues et medicamens qui naissent aux Indes; Traduict d'Éspagnol en Latin, abregé et illustré de quelques Notes par Charles de l'Écluse; Et de nouveau mis en François par Anthoine Colin, Apothicaire Juré de Lyon, Et par luy augmente de plusieurs figures. Lyon, 1619."

To return to Parkinson's 'Manlike Worke of Herbes and Plants,' in which frequent use is made of the researches of these authors,—the great work of his life was published in 1640. It is a thick, closely printed folio, whose title page, besides the figures of Adam with his spade and Solomon, contains a small portrait of Parkinson. The title runs: "Theatrum Botanicum; or, Theater of Plants, or an Herbal of a Large Extent: Containing therein a more ample and exact History and declaration of the physical Herbes and Plants that are in other Authors; encreased by the access of many hundreds of new, rare, and strange Plants from all parts of the world; with sundrie Gummes, and other physical materials, than hath been hitherto published by any before: and a most large demonstration of their nature and virtues. Shewing withal, the many errors, differences and oversights of sundry authors that have formerly written of them, and a certayn confidence, or most probable conjecture of the true and genuine Herbes and Plants: Distributed into sundrie Classes or Tribes, for the more easy knowledge of the many Herbes of one nature and property, with the chief notes of Dr. Lobel, Dr. Bonham and others inserted therein. Collected by the many yeares travaile industry and experience in this subject of John Parkinson, Apothecary of London and the King's Herbarist."

Johnson's edition of Gerard attempts the description of 2850 plants; Parkinson's digest has nearly another thousand, and its descriptions in many instances are new. The "Theatre of Plants" is also more exact in pointing out the places of growth and in the enumeration of synonyms; but the illustrations, cut in England, like those of the 'Paradisus,' are very inferior in execution to those of Gerard, borrowed from the herbal of Tabern Aemontanus, and cut at Frankfort.

In arrangement Parkinson's Herbal is confused and purely empirical, being avowedly founded on the known or supposed qualities and virtues of the plants described. He makes seventeen tribes:—(i.) *Plantæ odoratæ*, sweet smelling plants; (ii.) *Carthartice*, purging plants; (iii.) *Venenatæ*, *Narcoticæ*, *Nocivæ*, *et Alexipharmicæ*, venemous, sleepy, and hurtful plants, and their counterpoisons; (iv.) *Saxifragæ*, saxifrages, or break-stone plants; (v.) *Vulnerariæ*, wound herbs; (vi.) *Refrigerantes et Intubaceæ*, cooling and succory-like herbes; (vii.) *Calidæ, et Acres*, hot and sharp biting plants; (viii.) *Umbelliferæ*, umbelliferous; (ix.) *Cardui et Spinosæ*, thistles and thorny plants; (x.) *Filices, et Herbæ capillares*, ferns and capillary herbes; (xi.) *Legumina*, pulses; (xii.) *Cerealia*, corn; (xiii.) *Gramina*, *Junci*, *Arundines*, grasses, rushes, and reeds; (xiv.) *Paludosæ*, *Aquaticæ*, *Marinæ*, *Musci et Fungi*, marsh, water, and sea plants, mosses, and mushrooms; (xv.) *Miscellaneæ*, the unordered tribe; (xvi.) *Arbores et Frutices*, trees and shrubbes; (xvii.) *Exorticæ et Peregrinæ*, outlandish plants.

The evils of a classification partly dependent on medicinal virtues, partly on the habit of the plant, and partly on place of growth are quaintly shown by Parkinson's naïve comment on "the unordered tribe." "In this tribe, as in a gathering Campe, I must take up all those straglers that have either lost their rankes, or were not placed in some of the foregoing Orders, that so I may preserve them from losse and apply them to some convenient service for the Worke." We get thus classed together among others, the stitchwort, eyebright, milkwort, columbines, liverwort, orchis, etc.

Under each genus Parkinson gives, first, the Latin and English name of each plant, then its description, place of growth, time of flowering, synonyms, virtues, and uses. When he comes to the consideration of "those outlandish plants that are called spices and drogues in our apothecaries' shoppes," he borrows largely, sometimes without acknowledgment, as in the discussion of "the gumme which the West Indians call tacamahaca," but more often with an express mention of the obligation. Thus he tells us that à Costa advises the use of cloves as an astringent, quotes Orta's description of the cinnamon tree, and cites Monardes on balsam of tolu.

As an enthusiastic florist Parkinson enumerates some garden flowers, *e.g.*, the tulip, in his 'Theatre.' "By the assistance of his correspondents and some of Lobel's posthumous writings which he purchased he was enabled to enlarge not only the catalogue of British plants but to introduce many exotics before unknown."

NOTES ON PHARMACEUTICAL MICROSCOPY.

It is matter for congratulation that at last the Board of Examiners of the Pharmaceutical Society has decided to require from the candidates evidence of some knowledge of microscopy. While we are not prepared to claim, as do some of our American brethren, scientific rank for microscopy, we do consider that it is an aid to pharmacy and analytical chemistry which the accomplished pharmacist cannot afford to neglect. The microscope has probably done more to advance general science than any other single instrument known, and every one interested in biological knowledge, botanical or zoological, ought to have a general knowledge of the best methods of manipulation, together with the modes of preparing specimens for examination. In order to assist pharmacists in the acquirement of such a knowledge we propose to publish from time to time notes upon microscopical technique and vegetable histology which may appear to have a

more or less direct bearing upon pharmacognosy. It is not intended to strictly limit their range, as we shall make use of old as well as recent microscopical literature, and shall also draw, when necessary, upon our personal experience.

Inulin is a carbohydrate which has been variously named *Alantin*, *Menyanthin*, *Elecampin*, *Dahlin*, and *Datiscin*. It possesses the same percentage composition as starch ($C_6H_{10}O_5$), and appears to replace it in the tuberous roots of many of the *Compositæ*. Chemically it differs from starch by being entirely converted into levuloses when boiled with dilute acids, and by not forming an explosive compound when treated with nitric acid. It has been found in plants belonging to the natural order *Compositæ*, and to the allied orders *Campanulaceæ*, *Lobeliaceæ*, *Goodeniaceæ*, and *Candolleaceæ*. It has also been found in the roots of *Ionidium Ipecacuanha* belonging to the *Violarieæ*. The quantity found in different roots of the *Compositæ* and at different seasons is very variable. Dragendorff obtained 10 per cent. from arnica root; from elecampane 44 per cent. was obtained in October, but only 19 per cent. in the spring; dandelion root yielded 24 per cent. in October, and 1·74 per cent. in March. In the cell of the living plant it exists in a state of solution; in sections of fresh tissues, therefore, its presence is not evident until water has been abstracted from the cell-sap, either by desiccation or the use of a dehydrating agent, such as alcohol. Usually it suffices to place sections of such tissues in alcohol or in concentrated glycerine. Inulin varies in its appearance according to the method employed for separating it from solution and the rapidity of the precipitation. If a section of a fresh dahlia root be allowed to dry and then be examined in a drop of glycerine the inulin will be seen to have formed mammillated masses in the cells; if placed in glycerine, without the preliminary drying, it will be seen as oily drops, which gradually become converted into sphæro-crystals made up of numerous radially arranged needles; alcohol applied to a fresh section causes an immediate deposition of inulin in the form of minute spherules. Sphæro-crystals may be obtained by placing a piece of a dahlia root in alcohol and leaving it for several days; the size of the crystals will vary in proportion to the quantity of alcohol used. The crystals thus produced are frequently incomplete, appearing as segments of discs attached either to the cell walls or to each other. It is not uncommon for portions of a sphæro-crystal to be found in adjoining cells, the cell-walls cutting it into so many segments. Inulin is not, or only very faintly, coloured by iodine; it is soluble in hot water, from which it is deposited upon cooling; it is soluble in solution of potash and dilute mineral acids; it is insoluble in cold water, cold glycerine, and alcohol. The sphæro-crystals of inulin must not be confounded with those of hesperidin produced in the unripe fruit of the lemon and orange by the influence of alcohol; these crystals are insoluble in hot water. M. E. Rodier has recorded (*Comptes Rendus*, cviii.) the occurrence of sphæro-crystals in the stem tissues of *Senecio vulgaris*; they are easily soluble in cold water and are destroyed by solution of ammonium oxalate, crystals of calcium oxalate taking their place. In some species of *Bignoniaceæ* and a few other plants Dr. P. Baccarini has noticed the precipitation of sphæro-crystals on the addition of alcohol (*Malpighia*, ii.). He has made a careful examination of them, from which it appears that they are insoluble in hot water; they may by this means be distinguished from inulin.

Anatomy of the Malvaceæ.—G. Kuntze (*Bot. Centralbl.*, xlv.) states that all the *Malvaceæ* examined have the following characters:—Small, usually brown, capitate hairs; strong bast bundles in the cortex; mucilage in the cortex and pith, as well as in the epidermis of the upper surface of the leaves. Leaves are bilateral, with palisade cells on their upper surface only; crystals, solitary and clustered, are common, but never raphides; hairs usually stellate, and occasionally chambered. Mucilage is found in all the organs and results from the disintegration of cell-walls. The *Bombaceæ* differ from typical *Malvaceæ* in rarely possessing stellate or tufted hairs; the wood is generally less lignified and contains larger vessels; mucilage receptacles occur generally on the under side of the larger veins.

Turpentine for Microscopical Use.—C. C. Faris (*The Microscope*, x., 179) treats turpentine in the following manner:—A pint of common turpentine is mixed in a quart bottle with 4oz. of 98 per cent. alcohol. It is well shaken and allowed to stand until separation takes place. The turpentine being removed from the alcohol it is then thoroughly agitated with a pint of clean water and again allowed to stand. When separation has taken place the turpentine is decanted, mixed with about an ounce of powdered starch and filtered through paper. He thus secures a pure, limpid, brilliant turpentine.

ARTIFICIAL HUMAN MILK.

BY T. MALTBY CLAGUE.
Pharmaceutical Chemist.

During the last four years experiments have been made at intervals, the record of which will be of sufficient interest to pharmacists to warrant pub lication.

Attention was first given to the subject through the request of a medical practitioner, who desired to obtain a supply of food for young infants which should as nearly as practicable resemble the mother's supply when that supply was deficient or absent.

The literature on the subject was principally found in an article by Professor Frankland ('Experimental Researches,' London, 1877, p. 843). Here the percentage composition of human and cows' milk was given as follows:—

Table I.

	Woman.	Cow.
Casein	2·7	4·2
Butter	3·5	3·8
Milk sugar	5·0	3·8
Salts	·2	·7

A glance at this table will show that the assimilation of the two required that the quantity of casein present in cow's milk should be decreased, while the quantity of butter was maintained, and that of milk-sugar should be increased.

In the case of the addition of milk-sugar the increase was easy, as a supply of that constituent was easily obtained to augment that which was already in the natural compound. But the subtraction of

the casein was not so simple a matter. He proposed, however, to accomplish this, to remove one third of the casein from cow's milk, and to keep the butter strength as it was, thus giving a liquid having a composition per cent. of—

Table II.

	Per Cent.
Casein	2·8
Butter	3·8
Milk-sugar	5·0
Salts	·7

The mode of preparation was to remove the cream from one-third of a pint of new milk and by means of rennet to curdle the skimmed milk; the separated whey had then 110 grains of milk sugar dissolved in it, the solution being added to the remaining two-thirds of a pint of new milk and the cream which had been removed as above.

Although very good results could be obtained by this process it had the disadvantage of being wasteful and tedious. A simpler mode of working was therefore thought out and the following plan was adopted.

Water was used in the place of the whey and extra cream separately purchased was used to supply the required extra butter. Milk sugar was separately added, the working formula being—

Table III.

New milk	30 oz.
Cream	1¾ oz.
Milk sugar	1⅛ oz.
Water	18 oz.

Fortunately, a large and well managed dairy in the neighbourhood supplied a cream which repeated analysis showed to be very uniform in composition, and so made it an easy matter to build up a product which should approximate very closely to its theoretical contents—

Table IV.

Casein	2·7
Butter	3·8
Milk sugar	5·0
Salts	·4

A comparison of the last table with the first will show that results are obtained more closely in accord with the human milk than by the mode advocated by Professor Frankland, while the process is simpler and more economical.

The prominence given in recent years to the supremely important question of sterilization was next taken into account; the object being to avoid the possibility of communicating disease, and also to present the food free from germs of decomposition, which might be developed after its ingestion and cause dyspepsia.

The method advocated by Professor Soxhlet, and published in the *Pharmaceutical Journal*, 3rd series, vol. xvii., p. 573, was adopted with slight modifications. The expense of rubber corks stood in the way of their use, but ordinary corks presented many difficulties in the obtaining of a perfect hermetical sealing. Chief among these difficulties was the fact that cork compressed while hot and wet into the neck of a bottle did not retain its elasticity sufficiently to remain air-tight. It was found feasible to produce results which would remain good for a week or so; it was much more difficult to secure its keeping for longer periods. Samples have however been manipulated, which remained sweet and good for over two years.

Several children were put upon this food, as made in our laboratory, and the results were of a most satisfactory character; the testimony of parents and medical attendants being that children were able to retain and assimilate the food, who could not retain or assimilate any other milk food; while the development of the children was steady and gratifying. The profit obtainable was not, however, sufficient to compensate for the trouble involved, and a simple receipt for its manufacture was given to several parents, who have been able, with the implements and intelligence contained in their kitchens, to produce satisfactory results. This was, new milk, 3 pints; cream, 4 ounces; milk sugar, 3¼ ounces; water, 2 pints. Dissolve the milk sugar in the water and mix all together. Put into bottles filled to shoulder only, place them on the tray of a fish kettle, surround with water and place on the fire. Allow the water to boil for half-an-hour, so that the expansion of the milk may be fairly complete; then cork and allow the boiling to continue for another half-hour, when the operation is complete.

A sample of the kitchen prepared article has been submitted to analysis with the following results:—

Casein	2·6
Butter	3·4
Milk sugar	4·8
Ash	·4
Water	88·1

A comparison of the digestibility of the three milks, that is the artificial human, the natural supply, and cow's milk has also been attempted. A sample of each was submitted to the action of rennet. In the case of the cow's milk the curd consisted of one large clot, while in the other two it was much broken up. To each a few minims of acid glycerine of pepsine was added, and they were placed in a water-bath at 140° F. for half-an-hour. Solution was almost complete in the case of the human and the artificial, while the cow's milk was far behind in the apparent solution.

DETECTION OF STEM ADMIXTURES IN ROOT DRUGS.*

BY E. S. BASTIN.

In the case of those root drugs, derived from plants which are herbaceous and which do not possess underground stems, such as Belladonna, Althæa, Asclepias, Bryonia, etc., there is no special difficulty in distinguishing between the roots and the stems, for the differences are too conspicuous to be overlooked. For this reason, also, we seldom find drugs of this class containing any considerable admixture of stems. But in the case of those root-drugs which are derived from shrubby or tree-like plants, and of these from perennial herbs that have rhizomes, the case is frequently different, and it is important for the pharmacist to know the readiest means of distinguishing between them. Among these drugs may be mentioned Ipecacuanha, Pareira, Gelsemium, Glycyrrhiza, the two Apocynums (*A. cannabinum* and *A. androsæmifolium*) and Hydrangea.

Ipecacuanha presents but little difficulty, for the underground stems found in most samples of the drug are thinner than the roots, but slightly contorted or annulate, have relatively a very thin bark and a much larger and more distinctly radiate woody cylinder, which contains a distinct pith. Its bark is also less

* From the *Apothecary*.

horny in texture, and separates less readily from the woody cylinder. It is scarcely necessary to apply tests, or even to use anything but a hand magnifier, to distinguish these differences. If, however, the student in this or any other similar study, finds it difficult to see the medullary rays or determine the limits of the bark and wood, the phloroglucin test would better be used. This consists in applying to the section, first, a 3 to 5 per cent. solution of pure phloroglucin in alcohol, and then, after a few moments, a drop of hydrochloric acid. Any lignified tissues that are present will presently change to a bright red colour, while the cellulose tissues will remain unchanged. In this way the pith is much more easily distinguished, the medullary rays brought into greater prominence, the cambium rendered more conspicuous by contrast with the adjacent wood; and, if bast fibres are present in the inner bark, these are usually rendered quite conspicuous.

Another very serviceable test to apply in an investigation of this kind is the iodine test. The official compound tincture of iodine may be used for this purpose. It not only shows the presence of starch by changing it to a dark, blackish purple, but since starch is often more abundant in medullary rays and pith than elsewhere in the wood, and may have also a different distribution in the different layers of the bark, the test often helps greatly to bring the structure of the stem or root into greater distinctness. This result is further aided by the fact that iodine stains lignified tissues a deep brown, while scarcely affecting cellulose cell-walls.

Still another simple test, which is occasionally quite useful, is the ferric chloride test for tannin. On applying it to any drug that contains tannin, a bluish-black or greenish-black colour is produced, and since tannin, when present, is not usually equally distributed through all the tissues, the test also serves to differentiate the parts and bring out structure. The test would better be applied to the dry section, for if the latter be soaked in water before applying the test, much of the tannin will be dissolved and diffused through the tissue, rendering the test less useful in differentiating structure or identifying tannin-bearing cells.

Pieces of the stems of *Pareira* are commonly found mixed with the roots in samples of this drug. They may be distinguished by the following differences: First, the stems are lighter coloured exteriorly, and somewhat so interiorly, than the roots, the colour of the surface being grayish or yellowish brown, while that of the root is very dark brown or almost black. The stems are also less tortuous, and very sparingly, if at all, marked with the transverse ridges and constrictions or cracks so characteristic of the root, and the longitudinal furrows are much more regular. Second, there are considerable differences in the internal structure. One of the most certain of these is the presence in the stem of a small but distinct pith, which the phloroglucin test renders very conspicuous. Usually, also, the concentric circles of woody bundles are more regularly arranged, the parenchymatous tissues bear a smaller proportion to the woody ones, and the former are less rich in starch.

Of course, in making comparisons as to the relative proportion of woody tissues, it is of importance to select roots and stems as nearly as possible of the same size. An old root, of course, will be more woody than a young one, and the same is also true of stems. The stems are less bitter to the taste, and, no doubt, contain less of the peculiar medicinal principles of the plant.

The roots of *Gelsemium*, another woody climber, are very apt to contain, along with the underground stems and roots, which constitute the official drug, fragments of the above-ground stem. The roots vary in diameter from pieces half an inch or more thick to fine fibres. Externally they are yellowish-brown, but slightly striped or wrinkled, with a closely adhering bark that is thin, brittle and scarcely, if at all, fibrous, and a clearly distinguishable cambium line where the darker bark joins the much lighter coloured wood. The wood in cross-section shows conspicuous white medullary rays, which are narrow toward the centre, and broaden toward the cambium zone. In all roots of moderate size, the wood is strongly lignified, as shown by the phloroglucin test, is hard, tough, and breaks with a splintery fracture; the ducts are numerous and conspicuous under a magnifying glass, though but faintly visible to the naked eye; the medullary ray cells stain conspicuously with the phloroglucin, but not so bright a red as the wood cells and ducts.

The knotty underground stem differs from the root chiefly in the presence of a pith which is usually somewhat darker than the adjacent wood, in the presence of silky bast fibres in the bark, and in the presence of purplish-brown lines on the surface. The bark is also more fissured longitudinally.

The above-ground stems are thinner, on the whole, than either roots or rhizomes, they are of a deep purplish-brown exteriorly, longitudinally wrinkled, and more or less fissured externally. There is, of course, a pith or hollow, and the silky bast of fibres are present in abundance, especially in stems that have attained the diameter of one-fourth of an inch.

Glycyrrhiza—*Glycyrrhiza glabra*, the source of ordinary licorice, is a herbaceous perennial which sends roots, 3 or 4 feet long, down into the ground, and also produces sucker-like or stolon-like underground stems several feet in length. Both of these are used in medicine, and it is seldom of practical importance to distinguish them, since they possess the same properties, and differ but little in the amount of the glucosidal principles present; the difference, if any, usually being in favour of the roots. These have a dark brown, longitudinally wrinkled and somewhat warty, corky surface, a bark which is about one-sixth the thickness of the woody cylinder, and is separated from the latter by a cambium zone, which is not usually very distinct. The wood, which, under the magnifier, looks quite porous from the presence of numerous large, dotted ducts, is traversed by numerous unlignified, medullary rays, which are narrower than the woody bundles which they separate. The colour of the wood and of the middle and inner bark is a bright tawny yellow. The inner layer of the bark is much thicker than both the other layers put together, and is crossed radially by somewhat wavy masses of bast fibres; which, under the microscope, are seen to be made up of more or less irregular bundles of bast fibres, separated from each other by soft tissues. Only the bast fibres are coloured by the phloroglucin reagent. The fibro-vascular system of the woody cylinder also presents a similar interrupted appearance from the alternation of soft tissues with lignified ones.

The underground stems differ from the roots chiefly in the following particulars: As a whole, the wood is denser, tougher and more splintery in its fracture, a pith is present, and usually darker in colour than the adjacent wood. The medullary rays are finer, the bark is exteriorly lighter coloured, and the corky layer more fissured, presenting an alternation of brown and lighter coloured streaks. It is also less warty. Licorice has, both in its roots and stems, a considerable amount of starch, most of which is stored in the middle and inner layers of the bark and on the medullary rays of the wood. The iodine test, therefore, brings out the structure very strikingly.

Apocynum—*Apocynum cannabinum*, the source of this drug, produces long, horizontally, creeping roots, which are usually buried 6 inches or more beneath the surface of the ground. From these spring an

upright, underground stem, which at the top is one to several headed, and from these heads arise the herbaceous above-ground stems. We commonly find in samples of this drug, not only the roots, the only portion which should be used, but the underground stem proper, and also portions of the subterranean part of the above-ground stem. The latter is easily distinguished by its thin wood and bark, its long pith and its numerous bast fibres in the inner layer of the bark, both from the root and rhizome. The root, which varies in diameter between one-fifth of an inch and one half-inch, has a greyish-brown, much wrinkled exterior, which is also more or less transversely fissured down to the woody cylinder. The latter is usually not over twice as thick as the bark, and is separated from it by a distinct cambium zone. Interiorly the bark is light greyish or brownish; and, under a magnifying glass is seen to be brown-dotted, with numerous milk ducts. It is destitute of fibrous tissues or stone cells. The wood is light yellow, crossed by numerous medullary rays too fine to be distinguished by the naked eye, and, by the phloroglucin test, is shown to be strongly lignified, except in very young roots. The iodine test shows abundance of fine-grained starch in the bark, but little or none in the wood. The large dotted ducts in the wood show a more or less concentric arrangement.

The underground stems have a relatively much thinner bark, a thicker, denser, and more distinctly radiate wood, with a central pith or hollow, which increases in size toward the upper end.

The underground parts of *Apocynum androsæmifolium* have a precisely similar habit of growth, but the roots average on the whole somewhat smaller, and are somewhat darker coloured on the outside; but the most important structural difference, as pointed out many years ago by Professor E. B. Stuart, consists in the presence in the middle bark of the root of this plant of irregular groups of strongly lignified stone cells. The roots of the two species may, therefore, be at once distinguished by applying the phloroglucin test, and observing the effects with a simple magnifier. Between the roots and stems of this plant there are, substantially, the same differences as those already described in *Apocynum cannabinum*.

Hydrangea arborescens is a shrubby plant, producing rhizomes and roots varying in diameter between one-fourth inch and three-fourths inch. Both have a thin, nearly smooth, greyish-brown bark, which covers a dense, hard, whitish wood traversed by numerous fine medullary rays, which are from one to three cells broad. The whole woody cylinder is strongly lignified. In the inner layer of the bark of both there are numerous irregularly scattered short bast fibres or sclerenchyma cells, which usually occur singly, but sometimes in groups of two, three or more, and there are very numerous thin-walled cells containing raphides. I know of no other drug which contains these needle-like crystals in so great abundance. The most practical way of distinguishing between root and stem is by the absence of pith in the former and the presence of a large-celled, copious and white one in the latter.

CURIOUS VESSELS FOR THE TRANSPORTATION OF PETROLEUM.*

Probably no great trade was ever so completely revolutionized in so short a time as that of oil transportation on the sea. Even the change in oil transportation on land, from railroad and canal to pipe line, is no parallel, for that took many years; but it took only four or five years to wipe an enormous fleet of sailing vessels out of existence, so far as the carrying of petroleum was concerned, and substitute another fleet of large, fast, and powerful steamships.

* From the *Oil, Paint and Drug Reporter*.

To-day America supplies the world with oil carried in bulk. Every two or three days a large iron steamer filled to the gunwales with petroleum leaves this port of Philadelphia. An endless chain of them joins the two continents. The advantage of a tank steamer for carrying oil in bulk can be seen at a glance when one understands how the old trade in wooden ships was carried on. Of course there were no tanks in those days. They have been suggested many years before, but old navigators had laughed at the idea. So, until five or six years ago, the world's oil supply was transported across the seas in barrels. These barrels were painted blue. They were counterparts of the kerosene barrels of internal commerce which all have seen. Each held fifty gallons. Any sort of cargo in barrels cannot be stowed to advantage aboard ship. The barrels were laid on their sides in the hold. A ship capable of carrying 2000 tons of cargo in bulk could hold only 1250 tons of oil in barrels. Subtracting the weight of the barrels there would be left only 1050 tons of petroleum, and leakage lessened this amount twenty tons before the ship reached a European port. Thus it will be seen that a sailing vessel could carry only about half its carrying capacity if its cargo were oil. This simply doubled freights, and added to the cost of oil on the other side.

Another large element of expense was the loss of barrels. Petroleum barrels are expensive, being made in the stoutest manner out of the soundest of materials. If the barrels were not returned to America their loss must be added to the freight on the oil. If they were returned there was the freight back.

Most of the sailing vessels which handled this enormous trade—for at this time America exported between 3,000,000 and 4,000,000 barrels of petroleum a year—started principally from this port and Philadelphia. The majority of them left New York harbour. Thence they travelled the globe, carrying their cargoes to Europe, the Indies, South America, China, and Japan. None went to Russia and the Mediterranean, for Russia was then, as now, working to the utmost oil wells which, although inferior in the quality of the product, were very productive.

A Yankee first conceived the idea of a tank steamer. He did not propose, however, to pump the oil freely into the hold of the ship. The belief was then strong that this would result in sinking the ship on the first swell. It was supposed that the oil would acquire a swaying motion as the swells would tip the ship, and that this swaying would cause the ship to roll over and sink. So the Yankee filled the hold of his steamer with miniature tanks, shaped like large barrels, and proceeded to pump those tanks full of oil. Dutch shippers copied the idea at once, and very soon there were several of these steamers on the sea. But they were miserable failures. It was hard to get the tanks full, the oil splashed out, and the leakage was enormous. The leakage charged the air under decks with petroleum vapour, which was highly explosive. Besides, there was a vast deal of space wasted in the hold. An Englishman took the Yankee's two fundamental ideas of the iron steamship and the tank, and produced the modern tank steamer. He admitted that if you let a shipful of loose oil pitch back and forth unrestrained it would soon swamp the ship. But he also held that if you put a solid deck over the ship and then filled the ship up to the deck with petroleum you would have practically a solid. That is all true, said the objectors, but you cannot fasten down a cargo of petroleum as you do a solid, because it expands and contracts greatly under the varying conditions of the atmosphere. This puzzled the Englishman for a while, and then he found the solution to the problem. A bottle with a long neck, he said, could be filled with fluid nearly to the top. You could then swing the bottle or tip it, and you would still retain a solid body

LIBRARY ... PATHOLOGY

of fluid within. At the same time, if you did not fill the neck to the top, the fluid would not spill and could expand and contract. Why not, then, fill your ship up to the deck with petroleum and put a neck on it?

This solved the problem. Tank steamers were introduced. To be sure, sea captains declared them to be unsafe, because they said they would "draw" lightning. That has since proved untrue. Many designs were tested and many failures were made, but at length complete success was reached. Instead of the entire interior of the ship being made a singly tank, it was cut up into seven or eight or nine pairs of tanks, made simply by dividing the hold lengthwise and across by oil-tight bulkheads. This will be seen in the longitudinal section of a tank steamer. The cross section of the same steamer will show the "necks" of a pair of tanks, with the level to which the tanks are usually filled indicated by a horizontal dotted line. These tanks with "necks" are called expansion tanks. The outside skin of the steamer forms the sides of the tank.

Tank steamers have been common in this harbour for several years, though few people have recognized them. They are like any other iron seagoing steamer in appearance, notably like the ocean tramps which are always to be found in our waters, save in one particular. The tank steamer has its smoke stack set far aft, within a few feet of the taffrail. All other steamers carry their smokestacks about a midship. The reason for this peculiarity can be seen at once by glancing again at the longitudinal section. It will be plain that the engine and boilers are placed in the extreme rear that the inflammable cargo may be amidships and forward. The oil tanks are separated from the engine room and boilers by two bulkheads with a considerable space between them. This space is filled with water.

Tank steamers vary in capacity, but 25,000 barrels of oil may be regarded as a fair cargo. An average cargo for a sailing vessel of the old days was 5000 barrels. Tank steamers are generally provided with powerful triple expansion engines, and go from New York to Liverpool in about eleven or fourteen days. The same trip took the sailing vessels of the old days two months. The largest tank steamer is the German ship *Brilliant*, with a capacity of 29,000 barrels, or 4300 bulk tons of oil. The English steamers *Bayonne* and *Manhattan*, of 28,000 barrels capacity each, probably lead the fleet, all things considered. The Dutch steamer *Bremer Haven*, 27,000 barrels capacity, stands among the leaders in size and speed.

There are about seventy tank steamers in operation. About twenty of these are used in the Russian trade. The rest carry oil from New York and Philadelphia to every part of Europe. In England they land their cargoes at London, Liverpool, Bristol, Hull and Sunderland, those being the only ports where tanks are provided for the storing of the oil. In Germany they unload at Bremen and Hamburg. Amsterdam and Rotterdam are the Dutch ports. Antwerp is the Belgian port, and Havre, Cette, Marseilles and Bordeaux are the ports of France. These fifty tank steamers now carry 5,000,000 barrels of oil yearly.

Notwithstanding the superior quality of the American petroleum, Russia is exerting herself to compete in the European market. She sells little in Northern Europe, but around the Mediterranean competition is lively. Russia was the first nation to use modern tank steamers to any extent. It is exceedingly difficult to get wood for barrels there, and the tank steamers went far toward making it possible for her to compete at all with America.

Not one of these fifty great tank steamers engaged in carrying American oil abroad sails under the flag of the United States. Not one of them was built in this country, and few of them are owned here. They are owned by oil houses in England, Germany and Holland. Most of them were built in England. Still, none of them has been built on this side of the water, except a few small ships for the coast trade.

Loading a tank steamer is very simple. After having discharged its cargo in Europe several compartments are filled with water for ballast, and the steamer returns. She is ordered to reload either at Williamsburgh or at Constable Hook. While the ship was coming westward for the oil, the oil was travelling eastward from the wells of Ohio and Pennsylvania. It was being sucked through the six-inch pipe mains, each 300 miles long, through which it flows, a never-ending stream, into the refineries at this terminus. Having passed through the refineries, the refined oil is forced into storage tanks along the water side. It is alongside of these storage tanks that the tank steamers are laid up. The first thing is to empty the tanks of the water ballast. Then six-inch pipes are run from the storage tanks ashore into the tanks in the ship. Force pumps are applied, and through each pipe the oil is forced at the rate of 30,000 gallons an hour. From three to a dozen such pipes are put in operation, and the complete loading of the ship is so speedy that the captains often refuse to let the sailors go ashore, assuring them that they will not have time in port for a single spree.

As might be expected, the rules aboard an oil steamer are exceedingly strict. There is a strict prohibition of fire aboard, save deep down in the stern, hid behind the double bulkhead and the wall of water which supplies steam to the engines. Cooking is not done by fire, but by steam supplied from the boiler. Smoking is forbidden everywhere on board. This is one of the articles which the sailor is compelled to sign. He is searched on entering the ship, and every match, flint, or other implement by which fire can be produced is taken from him. This restriction is not through fear that a spark may fall in the oil. So tightly are the hatches kept closed that there is no danger of that. But petroleum gives forth a dangerous vapour, which may saturate the air of a room and make it highly inflammable without the occupants knowing it. The sailors live forward, almost over the oil. Nevertheless, sailors do smoke on many of these oil steamers. The smell of tobacco invades their quarters, though the guilty are rarely found. It would seem reasonable to suppose that it would be found difficult to get sailors to ship on an oil steamer, or that they would at least require more than the usual wages. This is not the case, however, Jack Tar fears petroleum as little as he does the sea.

It is interesting that there is no trade for tank steamers with the East and West Indies, South America, or any Asiatic country. There may yet be such a trade with South America, but the chances are there never will be with the Asiatic countries. They do not use much oil, and what demand there is is only for the highly refined brands in tins.

OIL OF LEMON CONTAMINATED WITH COPPER.*

It is a well recognized fact that oil of lemon which has remained for any length of time in the copper vessels in which it is imported, is liable to become contaminated with this metal, owing to imperfect tinning; but, although occasionally attention has been drawn to this impurity, I do not recollect any method proposed for its elimination, writes W. H. McGrath. I have much pleasure, therefore, in giving in detail a process which in my hands has proved successful. The oil operated upon (about a gallon and a half) was part of a parcel which had been accidentally overlooked, and must have been some months in the drum in which it was found. On examination it had all the appearance of oil of bergamot, and being tested gave a distinct copper

* From the *Oil, Paint and Drug Reporter*.

reaction. To get rid of the metal without injury to the oil was now the object. Keeping this end in view, I proceeded as follows: A dilute acid was made consisting of one part of sulphuric acid and two parts of water. Several experiments were tried with small quantities of oil in order to ascertain how much of this dilute acid would be necessary, not only to absorb the copper, but to obtain this result in the most expeditious manner, the quantity finally determined being 1 c.c. dilute acid to 28 of the oil, or about 15 minims per ounce.

In this proportion the bulk was now treated with dilute sulphuric acid, and shaken together until the green colour of the oil disappeared, which was in the course of a few minutes; about 1 litre of water was added again, well shaken, and allowed to stand until separation took place, which was in a quarter of an hour. The acid solution was syphoned off, and put on one side for estimation of copper. The oil was now repeatedly washed with water until perfectly free from acidity, the water syphoned off, and the oil digested with dried sodium sulphate for twelve hours, and filtered through double paper filter. The result was unquestionably good, and to my mind, the oil appears to be somewhat improved by the treatment.

NUTMEG CULTIVATION IN JAMAICA.

In the *Bulletin of the Botanical Department of Jamaica* for October last it is stated that a large stock of the very finest nutmegs for seed has been imported to Jamaica from Grenada, and has been sown in the Hope Gardens, and, when ready for distribution, will be sold at the very low rate of three halfpence each, in large or small quantities. It is hoped that these arrangements will tend to develop the planting of nutmegs on a large scale in suitable districts in Jamaica. It is stated that already one order has been filed for 10,000 plants, and another for 5,000. The germination of the seed in large quantities, and the care of the seedlings, is said to require the strictest attention, to prevent extensive loss. From the seed bed, the seedlings are transferred to bamboo pots, and, when they have quite recovered from the transplanting, and have formed good roots, they are ready for the nutmeg plantation. The planters must now exercise strict supervision over the labourers, to see that the bamboo pot is carefully slit down on one side, and the plant, with the earth undisturbed round the root, gently placed in the hole prepared for its reception. If this operation is done too harshly or clumsily, the tip of the tap root is broken, and the plant soon dies.

Nutmeg trees require a deep, rich, loamy soil, moist, but not swampy, with a humid atmosphere. They thrive best in steady river valleys from sea-level up to 300 or 400 feet, but they will grow in favourable situations up to an elevation of 2,000 feet. The trees should be placed at distances of 25 or 30 feet apart, and if the situation is not naturally shady and sheltered, trees should be planted for the purpose of breaking the wind as well as for shade. The trees are a long time coming to maturity, not producing a crop, as a rule, till they are nine years old; and only when they first flower, at six or seven years of age, is it possible to determine whether they are male or female. A very small proportion of male trees is left for fertilization by insects; the rest are cut down and fresh plants are substituted. The fertile trees continue to produce fruit for seventy or eighty years. On an average, each tree will yield 10 pounds of nutmegs and about 1 pound of mace every year; and, when highly manured, it is said that they will produce ten times that amount.

In connection with the same subject, a note on the curing of nutmegs in Grenada is given in the November number of the *Jamaica Bulletin*, the details of which may be of service to those who are starting the culture. The process is said to be that which is adopted for preparing the nutmegs for the London market. The nutmegs are picked up from under the trees every day except Sunday. On being brought into the boucan, the mace is peeled off and pressed flat between heavy blocks of wood, where it is left for two or three days, than put into a case and left, till it reaches the proper colour. The nutmegs are put into receptacles (with fine mesh bottoms, so that the air can pass through) inside the boucan, and left there for three weeks or a month, in fact, until the nut begins to shake inside the shell. They are then shown the sun for a couple of hours a day for two or three days. After this they are cracked. Great care is necessary here, for if the outside shell is struck too hard it makes a black spot in the nutmeg, which affects the value considerably. When cracked, the nuts are sorted according to size, put into ordinary flour barrels and shipped. Regarding the value of the produce of nutmeg trees, when in full bearing, it is stated that one grower in 1883 realized from two trees as much as £30.—*Journal of the Society of Arts.*

THE NUT OIL TRADE OF INDIA.

A very large trade is done in Southern India in ground nuts (*Arachis hypogæa*), which are exported from Madras and Cuddalore and still more largely from Pondichery. The plant was originally imported to India from the French settlement of Senegal, but even there it is not indigenous, its proper habitat being South America. The chief area of production in India is South Arcot and Pondichery. The plant grows readily on very poor soil, and profitable industry can be gathered from the fact that the total cost of production amounts to not more than Rs. 10 per French candy (a French candy is 2·40 kilograms, equal to 5·28 lbs. English), while the same quantity is selling now at Rs. 26·8 per French candy and has been as high as Rs. 27·8 within the last three months. Recently large warehouses have been erected at the south end of Pondichery to receive the ground nuts brought in for export; and although there are twelve of them, and each of them is supposed to contain 100,000 bags, they are by no means sufficient, and during the season every spare shed and even houses and stables are filled to overflowing with ground nuts. The season is now over, say the *Madras Times* of November 19, the last ground nut steamer has left, and it is asserted that 100,000 tons of "pistaches," which is the local name of the article, have been exported this year, besides a large quantity of oil. There is a large and increasing trade in the oil between Pondichery and Rangoon and Moulmein; this has only arisen of late, as the oil has only recently come into favour with the Burmese. The Burmese do not employ ghee in their cookery, as natives of India do; in fact, they do not even milk their cows, so of course do not make butter, and for their cookery up till a recent date used gingelly oil. But they have now discovered the superior quality of the ground nut oil, and direct steamers take weekly 300 to 400 barrels of this oil to Rangoon and Moulmein; a considerable quantity is also beginning to be exported to Penang and Singapore. The whole of this oil is made in native mills, the ordinary rude hollowed-out trunk of a tree with a large heavy branch of another tree in the hole, which has a cross-piece to which a bullock or two bullocks are attached and driven round and round. If adequate European machinery could be erected, a very large saving would be effected by sending the oil alone, of which the seeds contain 43 per cent., to Europe. An attempt was made in Pondichery, and oil mills worked by steam pressure were started there, but after changing hands several times, they were finally abandoned, the machinery sold and taken to Bangalore, where it is now employed in making castor oil. The causes of failure of this enterprise were the great expense of expressing the oil as compared with the native methods.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, FEBRUARY 13, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE ILLEGAL SALE OF POISONS.

THE judgment delivered last Monday in the case heard before Judge PATERSON, at Barnstaple, is precisely what might have been expected under the circumstances, and there is reason for believing that a check will now be put upon reckless distribution of the powerful arsenical preparation that has lately come into use under the name of weed-killer. As upholding to the full the provisions of the Pharmacy Act in regard to the restriction of the sale of poisons Judge PATERSON'S decision is quite consistent with that arrived at by the magistrates in the Lewes case reported at page 607. That was a prosecution by the police under the 17th section of the Act, and the offence then charged against the seed merchants who sold the weed-killer was merely hat of having sold the article without the sale being registered, as the 17th section of the Act provides that the sale of a preparation of arsenic shall be registered. In the interests of the public it is important that the precaution of registering sales of poison, as well as that of labelling should be observed in all cases, and it is equally important that any neglect of those precautions should be taken cognizance of by the police or other local authorities. The provisions of the 17th section of the Pharmacy Act afford ample facilities for this being done by anyone who chooses to take the trouble, and it would contribute very much to the better observance of the Act in all respects if those provisions were more frequently put in force in that way. If that were done, a basis would often be obtained for the institution of further legal proceedings by the Pharmaceutical Society in regard to the restriction of the sale of poisons to the persons who are legally qualified and authorized by the Act to deal in them. In fact, the efficacy of the Pharmacy Act as a means of protecting the public against the dangers attending the use of poisons, depends very largely upon the vigilance exercised locally. This is very plainly shown by the circumstances connected with the use of weed killers. The application of a strong solution of arsenic for the destruction of weeds appears to be comparatively a novelty; and as Judge PATERSON remarked, its use for that purpose is in itself perfectly innocent. But when a preparation of this kind is distributed throughout the kingdom, for sale by seedsmen and for use by gardeners, without the necessary precautions for making its dangerous characters known, a very serious risk is incurred by the public, as has been proved by the number of fatalities which have occurred.

Even if the dangers of arsenical weed killers were known to the persons who have hitherto been engaged in the retail sale of this article, it could scarcely be expected that the mode in which their business is conducted would allow of proper precautions being taken to prevent them. That is a duty which specially belongs to those engaged in a business of a totally different order, and hence it is that the Legislature has restricted the sale of poisons to a particular class. It is to the maintenance of the law in this respect that the action of the Pharmaceutical Society has been directed in the prosecution at Barnstaple. As stated in our report of the case at page 584, proceedings were taken under the 15th section of the Act, which it is the special business of the Society to enforce for the protection of the public. It is no trade monopoly that the Act is intended to protect, but the public safety, and for that object it is laid down as expedient that persons dealing in poisons shall possess a competent practical knowledge, and that no other persons but those who have been certified to possess such knowledge shall deal in poisons, or at least in those articles which are held to be poisons within the meaning of the Act. Just as this restriction of the trade in poisons is a measure intended solely for the protection of the public, so should the efforts of individual registered chemists to maintain that restriction be regarded, not as the endeavour to secure a monopoly for their own advantage, but as one instigated by a desire to extend to the public that protection which the provisions of the Act contemplate as necessary and that competent chemists are able to furnish. They are, as a class, the legally constituted guardians of the public safety in regard to poisons, and it is only by assuming that attitude that they may reasonably expect to command confidence and consideration. The responsibility thrown upon them of observing certain conditions in the sale of poisons should not be regarded as obnoxious interference with the details of their trade transactions, but as the evidence of their solicitude and utility for affording protection against risk.

In so far as the enforcement of the Pharmacy Act by the Pharmaceutical Society has the effect of securing for registered chemists consideration from the point of view above pointed out, service is

rendered to the entire body of a nature which ought in itself to impress upon the mind of every member of that body the fact that his individual interest is being promoted by the work done in that direction. Nor should it be overlooked that for the furtherance of the work it is the duty of every registered chemist to render his assistance. At present, however, that is far from being adequately done. The entire burden of enforcing the provisions of the Pharmacy Act is borne by about one-third of the whole number of those who are interested, and the whole are benefited by the work done at the cost of the minority. This consideration ought to carry some weight with registered chemists who are still unconnected with the Society, no less than the admitted fact that one of the greatest necessities of the trade is that of being a united body. The recent report of the Registrar shows that there is some movement towards a more general association with the Society, to which the late alterations of the Society's bye-laws may have contributed. Their full effect, however, cannot be looked for immediately, and it may require time, as well as further personal intercourse between provincial chemists and the members of the Society's Executive, before any very large additions can be made to its ranks. It may, however, be suggested to those who still remain unattached, and therefore, to a very large extent, inoperative for good, that the considerations above put forward should be weighed by them, together with the acknowledged necessity for union, and the generally admitted fact that the representation of the trade can only be realized through the Pharmaceutical Society. In that way there is reason to believe that many will be led to perceive that policy as well as the obligations of duty to their craft and their colleagues both point in the same direction. In the interval between the present and the time when it may be possible to introduce another Pharmacy Act Amendment Bill into Parliament, the prospect of a large accession to the Society may therefore be hopefully contemplated.

THE COLUMBIAN WORLD'S CONGRESS OF PHARMACISTS.

Our transatlantic cousins are making preparations for a series of gatherings in connection with the Exhibition at Chicago which, so they say, are such as were never before attempted. With the approval of the Government of the United States a World's Congress Auxiliary has been formed, which is charged with the duty of promoting the holding of congresses of specialists in the fields of science, art, literature, education, and other branches of human thought and civilization. Thus there are to be congresses of chemists, botanists, physicians, sanitarians, lawyers, political economists financiers, electricians, architects, librarians, etc. It is proposed to arrange the dates for the respective meetings so that those nearly related shall take place in immediate succession, as far as practicable. The work of the Auxiliary has been allotted to appropriate general and special committees, the members of which reside in or near Chicago, and arrangements are being made to provide places of meeting. In connection with pharmacy it is anticipated that thousands of pharmacists will visit the Exposition, and that important pharmaceutical bodies will hold their meetings in Chicago in 1893. The World's Congress Auxiliary has therefore appointed a Pharmaceutical Committee, through which it will extend to the pharmacists of the world the same facilities and services which are tendered to all other congresses to be held during the Exposition season. The members of this Committee are Professor Oscar Oldberg, E. H. Sargent, A. E. Ebert, D. R. Dyche, and L. C. Hogan.

It is proposed among other things to convene the Seventh International Pharmaceutical Congress at Chicago during the season of the Columbian Exposition. The American Pharmaceutical Association is taking an active part in promoting this project. A circular has been issued inviting all persons connected with pharmacy, and asking for advice and co-operation of societies, schools, examining boards, and other organized bodies of pharmacists at home and abroad. Individuals and societies, etc., intending to take part in the Columbian World's Congress of Pharmacists or in any of the proposed pharmaceutical meetings in Chicago are requested to inform the Chairman of the Committee, Professor Oscar Oldberg, of their intention, and to state whether they are disposed to contribute papers suitable to be read before the Congress. All communications, proposals, papers, or letters of inquiry are to be addressed to him, care of the World's Congress Auxiliary of the World's Columbian Exposition.

THE QUALITY OF LOW-PRICED DRUGS.

The *Times* of last week reports a case heard at the Southwark Police Court which is one of many illustrations of the short-sighted policy of purchasing medicinal preparations from grocers or oil shops. The attraction is the low price at which the articles are offered, and it is not taken into account that the quality of the articles may be as low as the price. In the case now referred to the proprietor of an oil shop was summoned under the Food and Drugs Act for selling seidlitz powders that were not of the quality and substance laid down in the British Pharmacopœia. Three powders were supplied and the price charged for them was threepence. When analysed it was found that the powders contained only seventeen

and-a-half grains of tartaric acid and sixty-nine-and-a-half grains of Rochelle salt and bicarbonate of soda. These are barely half the proper quantities which the Pharmacopœia directs. The defendant endeavoured to excuse himself on the ground of the price at which the powders were sold, and stated that they had been supplied to him by a firm of wholesale chemists, and that they were sold in the same condition that he had received them. This is certainly a poor defence, for there are no doubt persons calling themselves wholesale chemists who will supply anything that is required of them and do not incur any responsibility in doing so. It is, therefore, satisfactory to find that the magistrate was of opinion that the retailer is to be held accountable for the articles he sells; and that since the seidlitz powders were not in accordance with the Pharmacopœia standard, he imposed a penalty and costs, amounting to twenty-two shillings and sixpence.

A letter has been received from Messrs. Flesher Raybould and Co., of Dudley, in reference to the report of the Excise prosecution at page 647, and contradicting the statement that their preparation was described on the labels as being "More useful than either brandy, rum, or whiskey." They also state that they had been under the impression that a medicinal spirit could be compounded and sold without interruption. But they overlook the fact that a medicinal spirit which can be used as a beverage comes under the regulations of the Excise, provided it contains more than two per cent. of proof spirit. The evidence given showed that the Indian Brandee contained more than forty per cent. of proof spirit, and it was upon that basis the prosecution was instituted.

* * *

We are informed that the annual dinner of the Chemists' Assistants' Association will take place at the Holborn Restaurant on Thursday the 3rd of March, and that on that occasion the chair will be taken by Mr. S. R. Atkins, of Salisbury. A numerous list of stewards has already been issued, and tickets can be obtained from the Honorary Secretary, Mr. J. C. Stead, 143, New Bond Street, W.

* * *

The Committee of the Edinburgh Chemists' Assistants' and Apprentices' Association has decided that on the occasion of the meeting to be held on February 18 members shall be allowed to invite friends, and that the meeting is to be open to ladies. Tickets of admission may be had from any member of the Committee, or on application at the house of the Pharmaceutical Society, 36, York Place, Edinburgh.

* * *

A telegram has just been received announcing the sudden death of Professor Dittmar of the Glasgow and West of Scotland Technical College and Anderson's College. The cause of death is stated to have been paralysis of the brain.

* * *

We have received intelligence of the death of John Cooke, an annuitant on the Benevolent Fund, which took place on the 6th instant. Mr. Cooke was in his seventy-second year, and had been an annuitant since 1884.

Transactions of the Pharmaceutical Society.

EVENING MEETING IN LONDON.

Wednesday, February 10, 1892.

MR. MICHAEL CARTEIGHE, PRESIDENT, IN THE CHAIR.

On Wednesday, the 10th inst., Professor Armstrong delivered the third of his course of lectures on Fermentation, in the theatre of the Institution, the chair being taken by Mr. Michael Carteighe, the President, at half-past eight o'clock.

Professor ARMSTRONG said that in the previous lecture he had directed attention to what was known about *enzymes*, and to the magnificent classical work of O'Sullivan and Thompson on Invertase. He would now consider the question in what way did the enzymes induce hydrolysis. The work done by invertase, which after all was but a type of enzymes generally, consisted in inducing the hydrolysis of cane sugar in accordance with the equation $C_{12}H_{22}O_{11} + OH_2 = C_6H_{12}O_6 + C_6H_{12}O_6$. It was clearly proved by O'Sullivan and Thompson's work that no element of vitality was retained by the enzymes, and that the effect they produced was strictly comparable with that produced by such an agent, for instance, as common sulphuric acid; a conclusion which greatly simplified the problem they had to consider. There was little doubt that the function of the enzymes was that of an intermediary, and might be compared to the part played by an agent who brings together two persons to transact business, one having an article to dispose of which the other was ready to purchase. In a similar way the enzymes bring together substances which of themselves are incapable of interacting, although ready to do so. The compounds acted on were in all cases ether-like bodies, and it would enable them to come to a conclusion with regard to the way in which enzymes acted, if it could be decided in what manner hydrogen chloride induces the hydrolysis of ordinary ether. Pure water has no action on ether, but acid water resolves it into two molecules of ordinary alcohol. In attempting to solve the problem, in what way did hydrogen chloride function in such a case, we are brought face to face with the question of the nature of chemical changes generally; and probably so soon as we have clear ideas as to what constitutes electrolysis we shall be able to understand what happens when cane sugar is resolved into dextrose and levulose, but not before. Hydrogen chloride, *per se*, was incapable of producing an electric current, and the same was true of water *per se*, but directly the two were joined it was easy to resolve the hydrogen chloride into hydrogen and chlorine. Chemists, like ladies, were often dominated by fashion; and at the present time the fashionable hypothesis appeared to be that when hydrogen chloride dissolved in water it fell to pieces, into ions. The view was that the solution, to the extent of 80 or 90 per cent., consisted not of hydrogen chloride in water, but of hydrogen and chlorine in a separated state. Personally he was a total disbeliever in the hypothesis, and regarded it as merely a fashion for the moment. Moreover, the hypothesis could not be extended to the enzymes, because they belonged to a class of compounds which were not resolvable into ions. The alternative view which he would suggest was the direct antithesis of this disintegration hypothesis, namely, an integration hypothesis, according to which the ether undergoes resolution into alcohol, by an interaction between the ether and water being brought about through the agency of hydrogen chloride, which serves but to bring them together. There were many cases in which a view of that

kind would explain interaction. Chemists used to be satisfied with writing equations which represented merely substances taken and substances produced, without paying any attention to the minute impurities which might be present, and which were supposed to exercise no influence whatever, but recently many cases had been found in which these so-called impurities play an important part. It was now well known, for instance, that phosphorus was not combustible in oxygen, and neither was carbon. These substances as generally used were not pure, and the impurities played a very important part. They had all been accustomed to say that when hydrogen and oxygen were mixed together and heat applied that they would combine and form water, but that was not a fact. If they had pure hydrogen and pure oxygen there would be no action between them under ordinary circumstances. It had been clearly proved that the interaction of hydrogen and oxygen was conditioned by a third substance. These third substances or "agents," as he would again call them, played a very important part. The hydrolysis of substances of the cane-sugar type by means of enzymes seemed to be brought about by the temporary association, through the agency of the enzymes, of the water, and of the carbohydrates. An hypothesis of that kind involved a further widening of their ideas also in other directions. They had got into the way of representing oxygen by the symbol O, and hydrogen by the symbol H, and saying that oxygen combines with two atoms of hydrogen, and when so combined is saturated; but the ordinary properties of water would seem to show that such is not the case. They could not see their way to explain the change from the gaseous form to the liquid, and the liquid to the solid, unless they were prepared to admit that the water molecules have a certain amount of residual affinity. There was a good deal of evidence to support the view that the hydrogen in water is practically saturated, and that the residual affinity resides in the oxygen. It is by this residual affinity probably that the association of enzyme, water and carbohydrate is promoted. In order that any chemical change may take place it is necessary that the conditions be fulfilled which are fulfilled in any galvanic cell. A galvanic cell cannot be made from zinc and sulphuric acid; there must be a third element, such as, for instance, platinum. Also there must be a circuit in which electrical conduction can take place: and one of the substances must be an electrolyte. Sooner or later probably all chemical changes would have to be regarded as cases of localized electrolysis. In the case of hydrolysis under the influence of enzymes there was no rearrangement of parts, but merely two pieces, so to speak, taken off and joined on to others, but in ordinary fermentation by brewer's yeast, not only a separation of the carbon atoms from each other was effected, but a great rearrangement of the atoms, which, indeed, was characteristic of what was called fermentation. The compounds which are capable of undergoing fermentation, such as sugar, lactic acid, etc., are all hydroxyl compounds, and possess a certain resemblance to water. With reference to the theories which had been advanced to explain the way in which fermentation is brought about, it was evident that they had been propounded on insufficient knowledge, no account having been taken of the structure of the compounds concerned. The first he would refer to was that put forward by Liebig in his "Letters" about the year 1840, and adhered to by him up to so late a date as 1870. This was essentially a mechanical theory, his view being that the active constituents of yeast were in a state of motion, the which motion was communicated to the sugar molecules, shaking them, as it were, into alcohol and carbon dioxide. That theory might be all very well in days when the chemical structure of the compounds was not known, but it would not be accepted now. Whoever wished to know anything about this subject must begin by studying Pasteur. The essence of his theory is stated by himself in the words: "Fermentation by yeast is presented to us as a direct consequence of the processes of nutrition, assimilation and life, when these are carried on without the agency of free oxygen." According to this theory, to put it rather crudely, the yeast ferment bites out some of the oxygen from the sugar molecules, and, in consequence, the molecule falls to pieces and its atoms take fresh forms. Berzelius supposed that fermentation was brought about by means of what he called catalytic action. Nägeli, as a botanist, recognized the vital character of the change, and he emphasized the fact that it takes place under the immediate influence of the plasma of the cell. All the evidence at the present time goes to show that fermentation proper takes place within the cell and within the cell alone. The whole of the sugar fermented has to pass through the cell walls, and is changed within the cell. Now, the changes which take place in fermentation can be absolutely matched in the laboratory. The conversion of sugar into lactic acid may be effected by milk of lime, so that there is nothing so very mysterious in the action of the organism after all; in principle there is no difference between the action of the organism and the action of milk of lime. An explanation of the action was put forward by Von Baeyer in 1870. [Dr. Armstrong then explained at considerable length, by means of diagrams, the various changes which take place, starting with the formula of ordinary glucose represented in its hydrated form.] All that he had said about enzymes would apply in explanation of the way in which the organism acts. It is not improbable that the very thing which, in a free state, produces the hydrolysis of cane sugar, when held in the protoplasm brings about fermentation. He could not conceive that there was anything which would condition an actual separation of water from the glucose molecule in the manner supposed by Von Baeyer, but if they were to extend the electrolytic hypothesis to fermentation they could see clearly how that change might take place. Supposing a circuit to be established within the molecules and between contiguous groups—supposing, in consequence of the possession by the water of residual affinity, and of the enzyme within the protoplasm carrying water with it, an association to be established between the enzyme, the water, and two contiguous CH·OH groups, they could imagine an electrolysis taking place of such a kind that the hydrogen atoms of the water become thrown up against one group displaying OH by H, while oxygen attaches itself to the neighbouring group, converting this into $C(OH)_2$. Such an extension of Von Baeyer's theory would justify us in regarding fermentation as the outcome of a series of hydrolytic changes.

The PRESIDENT then proposed a vote of thanks to Professor Armstrong for his interesting lecture, which was carried unanimously.

DONATIONS TO THE LIBRARY AND MUSEUM.

At the meeting of the Library, Museum, School and House Committee, held on Wednesday, the 10th inst., the undermentioned donations were reported, and it was ordered that the thanks of the Society should be communicated to the respective donors:—

To the Library in London—

West (W.), The Freshwater Algæ of Maine, 1891.
From the AUTHOR.

Chemists' Assistants' Association, Proceedings, 1890–91. 2 copies. From the ASSOCIATION.
Royal Society of London, Catalogue of Scientific Papers, vol. 9. From the SOCIETY.
American Pharmaceutical Association, Proceedings, vol. 30, 1891. From the ASSOCIATION.
Philosophical Society of Glasgow, Proceedings, vol. 22, 1890–91. From the SOCIETY.

To the Library in Edinburgh—

American Pharmaceutical Association, Proceedings, vol. 30, 1891. From the ASSOCIATION.

To the Museum in London—

Specimen of Tari pods.
From Messrs. GONNE, CROFT and Co.
An original bundle of Vanilla pods from Fiji.
From Messrs. EVANS, LESCHER and WEBB.
Sections of the stems of medicinal plants from Queensland. From Mr. H. A. SCHLESINGER.
Authentic specimens of the resins of *Dammara alba*, *Dysoxylon acutangulum*, *Hopea Maranti*, *Hopea Sangal*, *Hymenæa verrucosa*, *Poupartia dulcis*, and *Vatica sublacunosa*.
From Professor VAN EEDEN, Haarlem.

To the Herbarium—

Twelve specimens of British plants.
From Mr. H. GROVES, Clapham.
Forty specimens of British plants.
From Mr. J. W. WHITE, Clifton.

Proceedings of Societies in London.

ROYAL INSTITUTION.

METALS AT HIGH TEMPERATURES.

A discourse on the above subject was delivered by Professor Roberts-Austen on Friday night, the 5th instant. The measurement of high temperatures in lecture experiments is exceedingly difficult, but the lecturer on this occasion succeeded in demonstrating a temperature of 2000° C. to the whole audience.

The metals to be melted were heated in a clay crucible, in which a thermo junction was imbedded, only a thin layer of clay intervening between this and the metal. Attached to the two ends of the junction were two wires, whose distal ends were connected with a mirror galvanometer situated in the middle of the theatre. The spot of light was reflected on to a scale just above the lecturer and extending from one end of the wall to the other. In this way a very considerable range of temperature could be demonstrated, and further the space traversed by the spot of light was so considerable as to allow of the detection of the slightest motion of the mirror.

The inability of the chemist to measure high temperatures was regretted by Robert Boyle 200 years ago, and in 1872 Sir William Siemens used almost the same words of regret as Boyle when bringing out his electrical resistance pyrometer. The earlier workers used the air thermometer, and this in the hands of Derille and Troost gave very good results; the instrument, however, is an inconvenient one. The pyrometer of Sir W. Siemens has since been improved by H. le Chatellier and made a singularly delicate instrument.

An entirely different form of pyrometer is the thermo junction, and this is convenient for small masses of metal; the particular junction used by Professor Roberts Austen consists of platinum and platinum with 10 per cent. of rhodium. Another junction capable of measuring 2000° C. is iridium and platinum with 10 per cent. of iridium. By means of the apparatus described above the lecturer demonstrated the melting point of gold, palladium, aluminium, gold alloyed with 10 per cent. of aluminium, and gold alloyed with 20 per cent. of aluminium. It is a remarkable fact that although the melting point of aluminium is much lower than that of gold, yet an alloy of gold containing 10 per cent. of aluminium melts at a very much lower temperature than one containing 20 per cent. In the latter case there can be little doubt that a chemical compound is formed, the resulting alloy being of a magnificent purple hue.

The spectra of metals at high temperatures have been worked at by Lockyer and Roberts-Austen, who find that there are very few characteristic changes as the temperature rises. When, however, the spectrum of iron as it exists in the sun is compared with that which can be obtained on earth at the highest available temperature, one is bound to admit that iron does not there exist as we know it, but in a very much simpler condition. Further at temperatures below the melting point, it is possible to profoundly modify the arrangement of the iron molecules. If a piece of iron be heated it loses its magnetic power, and regains it on cooling. This was demonstrated by measuring the heat of the iron by the thermo junction, and at the same time the return of magnetic power by a mirror, which was deflected as soon as that power returned. With the deflection of the mirror a spot of light rapidly traversed a screen. A point of much industrial importance is the following:—On either side of a mean temperature of 650° C., steel is practically two different metals. A steel rod is heated above 650° C., then clamped firmly at one end, while to the other is attached a weight, and a long indicator. Now one would imagine that were the rod going to bend, it would do so when hottest. This is not the case. At a critical temperature the steel suddenly bends; a temperature which corresponds no doubt to an unstable arrangement of the molecules.

An example of the power of metals to combine with one another at high temperatures to form chemical compounds seems to be afforded by the existence of the purple alloy of gold and aluminium. So strong is the tendency to form this compound that it may be readily prepared by pouring into a crucible, containing a little aluminium at the bottom, an alloy of gold and lead; as the metal cools a button of the purple alloy rises to the surface.

In conclusion the lecturer referred to some facts which are being collected, concerning the solution of small quantities of metals in a metallic solvent, as of importance in deciding the rival theories of solution.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At the meeting held on the 28th ult., Mr. W. H. Symons read a paper on fat extracts and continuous percolators. A very large number of the different forms of apparatus used for these purposes was shown, and Mr. Symons described another new form, which he has devised to obviate the use of corks, and ensure long continued maceration and percolation of the material to be extracted without the necessity of such continuous watching as some of the older forms of extracting apparatus require. This apparatus in its simplest form consists of two test tubes, one fitting loosely within the other and perforated at the bottom. The material to be extracted is packed into this inner tube and the solvent is placed in the outer tube. By means of a wire attached to the upper end of the inner tube it can be suspended at any desired height within the outer tube. The whole arrangement is then suspended within a long vertical glass tube or column

closed at the bottom, and having the mouth closed by a tube holding water for condensation of vapour. By heating the lower part of this tube the solvent is vaporised from the solution of extract in the outermost of the two tubes first mentioned, and condensing in the upper part of the column drops into the inner tube, which contains the material to be extracted. In this way continuous percolation can be carried on until all soluble material is extracted and left in the tube surrounding the percolator. At the end of the paper Mr. Symons spoke in favour of the use of a flask arranged like a work bottle for shaking out liquids with solvents, such as chloroform or ether, as being more convenient than the stoppered separators commonly used for that purpose.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting was held on Thursday, February 4, Mr. E. F. Harrison, Vice-President, in the chair.

A paper entitled "Practical Hints on Photography," was read by Mr. J. M. Boucher, who treated successively of the dark room, the camera, the lens, the sensitive dry plates or films, the selection of suitable views, the exposure, development and fixing, intensifying, printing on paper, mounting, etc.

The paper was illustrated by specimens and experiments, the meeting being photographed by a magnesium flash light, and the process of development and fixing gone through.

A report on Inorganic Chemistry, by Mr. E. White, was postponed to the next meeting.

Mr. Donington gave notice that at the next meeting he would move a resolution, "That for the future the reading of reports at meetings of this Association be discontinued."

Provincial Transactions.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

At the meeting of this Association, held on the 10th inst., the following paper was read:—

Botany as an Aid to Pharmacists.

BY JOHN HUMPHREY.

It is a prevailing belief amongst students and graduates in pharmacy that botany is to them a useless science. The former regard it as an additional stumbling block placed in their path without any reasonable excuse, whilst the latter are apt to regret the time, wasted as they term it, spent in studying its details. That such a transparent fiction and absurd fallacy should be so widespread appears to indicate that elementary pharmaceutical education is sadly deficient, in so far that it fails to develop the reasoning faculties. For an individual who fails to see the value of what is essential to his welfare can hardly be described as a reasonable or reasoning being. The ancient medicine men knew full well the importance of an intimate acquaintance with the mysteries of the plant world so far as these were revealed to them. But for their patient and persistent investigations modern botany would not to-day have advanced so far. The study of plant life in its varied aspects originated in the necessities of the healing art, and now, curiously enough, the perfect practice of medicine requires, as a chief part of its sub-structure, a real knowledge of scientific botany. Division of labour having influenced the profession of medicine no less than other departments of human activity, the practical application of this knowledge has devolved upon the pharmacist, to whom it should in his everyday routine be as much a living reality as his knowledge of chemical facts.

Students rarely see far enough ahead to comprehend that nothing is useless or unnecessary in the curriculum devised by sager minds than their own. Surely the past and present leaders in pharmacy were and are better fitted to judge of the fitness or unfitness of any subject of study than are those for whose benefit a beaten path has been made where formerly everyone needed to find his own way. Doubtless many juniors are, in their own opinion, able to arrange matters more ably than those who now seek to guide them, but, on the whole, the time-worn method of letting experience guide works very well. If students will work steadily at the subject they will find in time that the study of botany practically is of advantage to them, in that the mastery of numerous details increases the powers of observation, whilst the application of numerous facts in the methods of classification insensibly leads to the acquirement of orderliness in all things. As business men they will speedily realise the value of the ability to see a little further or a little more than most people, and to keep a place for everything and everything in its place. These necessary corollaries afford fairly substantial evidence of the value of the study as an abstract one. It may also be urged that the health gained during country rambles and the skill attained in discovering the lurking places of rare species are equally desirable possessions. But it is when we approach the subject of vegetable materia medica that the especial importance of this branch of science is disclosed For an acquaintance with dried drugs should depend upon something more than a general idea of their appearance impressed by repeated inspections. And knowledge of them should include more than the ability to recall at will the name, natural order, part used, etc. This plan of parrot learning is painfully familiar to many, whilst anything like a decent familiarity with the botanical characteristics of drugs and their substitutes is very rare. Seeing what interest is imparted to an otherwise dismal study by approaching it thus rationally the wonder is that so comparatively few see the matter in a right light. If we are to regard botany as a useless science so far as pharmaceutical students are concerned then are we bound to include in the category of mental lumber such facts as that a certain drug is a root obtained from such a plant in such a natural order, should be collected at some particular time and show certain definite points of structure. This is a point to be borne in mind by students who grumble at the necessity of the study.

The skilled pharmacist has even less right to be heard in defence of this monstrous fable, and Nemesis will surely overtake him if he persists in bolstering up his absurd arguments and practices what he preaches. He must be able to judge for himself of the quality of whatever he sells. So far he has been willing to give his personal guarantee with preparations of drugs and with chemical substances of definite composition. Henceforth, however, he will need, if he would maintain his position as a specialist, to give this guarantee with everything that passes through his hands. At first sight this seems an irksome burden and a non-essential one. But if a pharmacist is to depend upon wholesale drug houses for the purity and quality of his crude and powdered drugs he has no claim to other public recognition that may be fairly claimed by grocers and others. Anyone may buy from first-class wholesale dealers, and all who do so and proceed to retail the goods without further precautions are

upon precisely the same footing. From a purely economic point of view it will be a distinct advantage to the pharmacist to be able to apply botanical knowledge in his daily business. First he must master thoroughly the macroscopic and microscopic structures of the various vegetable products in their crude condition. Then he must learn to recognize the differing minute structures in the powdered drugs, and be able to detect sophistications as well as judge of the condition and fitness for use of the substances examined. Nothing but a thorough practical training in botany will enable him to accomplish such work with ease and satisfaction, and there is no shirking the fact that such work will every day become more imperatively necessary if the pharmacist is to be recognized as being entitled to a special position amongst tradesmen and professional men. Chemistry is undoubtedly the most important subject we have to deal with, but botany may not, with impunity, be left in the background.

Those who keep pace with the times in matters scientific will find it greatly to their advantage to pursue one fast-extending branch of the science which has almost assumed the position of a science in itself. It is now well known that the ubiquitous microbe in his numerous varieties is technically classified as a vegetable organism. Hence the botanical student has a natural claim to deal with these minute bodies. Commercially the pharmacist will find it repay him to extend his knowledge of them, and intellectually he will find a vast field open for investigation. Little has been done, and in a brief time as yet, but the results are very numerous, and it may surely be anticipated that an enormous harvest yet remains to be reaped. Apart from this, however, our knowledge of many drugs is very imperfect, and investigators are needed all along the line in materia medica. Our text-books state many facts that will not bear criticism, and it will be to the great advantage of all of us to have these statements confirmed or corrected.

I think I have said enough to prove that this much neglected and abused subject is both of immediate value and hides latent possibilities in its bearing upon our special work as pharmacists. If any student is induced to consider plants more closely, or any past student to take a closer interest in his stock, I shall be amply repaid for urging the claims of a subject that possesses great attractions for me.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The seventh meeting of the session was held in the Pharmaceutical Society's House, 36, York Place, Edinburgh, on Wednesday, February 3, at 9.15, p.m., Mr. John Lothian, President, in the chair.

The minutes of last meeting having been read and approved the following "Pharmacy Notes" were read:—

Liquor Bismuthi et Ammoniæ Citratis.

BY A. G. HENDRY.

Some time ago my attention was directed to this subject by a paper by Mr. Gorrie (*Pharm. Journ.*, [3] vol. xxi., p. 770), in which he referred to the discoloration of the preparation when made by the official process. The causes then given were probably all more or less correct—viz., dirty citrate of bismuth, heat of chemical combination, and in some cases a dirty mortar. The object of this note, however, is more to propose a remedy than to discuss the cause.

Most of you have probably observed that this preparation often gets cloudy or precipitates. This can be avoided by adding a few crystals of citric acid to the bismuth citrate, and using sufficient ammonia to leave the liquor distinctly alkaline.

I have found that rubbing up the citrate with considerably more water than the Pharmacopœia directs (sufficient to form a thin cream) lessens the coloration to a certain extent. To get rid of it entirely, it is necessary to filter through a small quantity of purified animal charcoal. This removes all traces of colour, leaving the solution water-white, quite permanent and much more elegant in appearance than the ordinary preparation.

Concentrated Infusion of Senega.

BY A. G. HENDRY.

Concentrated infusions are conveniences which are in everyday use, and about which a great deal has been already said. To-night I only propose to take up two of them. The first is Senega. I may say at starting that without special apparatus and the opportunity of working on larger quantities than the retail pharmacist is likely to require, a stronger infusion than one which, when diluted with 7 parts of water, is equal to the official preparation, is not likely to be satisfactory, and it is to the so-called 1 to 7 infusion I refer in this and the subsequent note.

The faults found in commercial samples are—a tendency to deposit freely; they are often dark coloured and strongly alkaline (in which case there is probably little or no deposit); they do not, when diluted, fairly represent the fresh article nor contain a sufficient quantity of the active principle of the drug.

In my opinion the following process gives the best product. Let the drug be well ground or bruised and macerated for an hour or two with sufficient water to thoroughly damp it at a temperature not exceeding 104° F. Then pack firmly in a series of suitable percolators and allow percolation to proceed, adding cold water to the first percolator when necessary and passing the percolate from it through the others till the drug is exhausted. With care and working on a sufficiently large quantity no evaporation should be required, but if necessary it must be conducted at as low a temperature as possible. Finally, add about 35 fluid ounces (less in winter) of rectified spirit to each gallon and filter.

The theory of continuous percolation is old enough, and the points I wish to bring forward are:—(1) Under the influence of heat exceeding 104° F., a portion of the acid principle senegin, or polygalic acid, unites with the albumen and colouring matter, and becomes insoluble in water, thus weakening the infusion; (2) Below that temperature little pectin is dissolved, while the senegin is, rendering the addition of alkali unnecessary, and facilitating filtration; while preserving the keeping properties of the infusion.

The practice of heating concentrated infusions to the boiling point, before addition of spirit and subsequent filtration, admissible in some cases such as calumba, should not be followed here. The result of heating is to throw down a copious precipitate, which detracts from the strength of the infusion and renders filtration difficult. Ammonia is often used to dissolve this precipitate; but, as the Pharmacopœia stands, I do not think the addition of it or any alkali, is justifiable. Only lately I had reason to observe the difference in a mixture which had been prepared first with an alkaline infusion and then with a fresh one. The mixture contained spiritus ætheris nitrosi, and while in the one case it remained clear, in the other there was a dense precipitate.

Considering the extent to which concentrated infusions are used, I believe an official formula would be an advantage, and would conduce to uniformity. There is no doubt that, with ordinary care, a product

can be obtained, with few exceptions, equal in strength to the present B.P. preparation, and far exceeding it in elegance, while the convenience will not be denied. To such a formula the addition of liquor ammoniæ B.P., in the proportion of 2 per cent. of the drug used would, I think, be advisable.

Concentrated Acid Infusion of Roses.

BY A. G. HENDRY.

In attempting to concentrate this preparation, if the pharmacopœial directions are followed—viz., treatment with boiling water and dilute sulphuric acid, a pasty mass results, which cannot be readily exhausted by percolation, and which, for obvious reasons cannot be squeezed in an ordinary press. Moreover, on adding the rectified spirits necessary for preservation to an infusion made with boiling water, the whole becomes coagulated, owing to the action of the spirit on the albumen and pectinous matter contained in the rose petals. This renders filtration a matter of difficulty and involves considerable loss of product.

The object of this note is to suggest a process giving little trouble, and producing an article which, when diluted 1 to 7, forms an infusion fairly representing the fresh preparation made according to the Pharmacopœia.

The process is as follows :—Take of red rose petals, dried and broken up, 2 pounds ; place in a stoneware jar, and add 5 or 6 pints of water, at a temperature of from 150° to 160° F., previously mixed with 16 fluid ounces of diluted sulphuric acid. Cover well and allow to stand till nearly or quite cold. Pack in a suitable glass percolator and percolate with cold water till exhausted. In working with large quantities the petals may be distributed over several percolators and the liquid passed through all. Evaporate if necessary to a suitable volume, taking care to reserve a considerable quantity of the stronger liquor, to which the other may be added when evaporation is complete. About 30 fluid ounces of rectified spirit to each gallon is necessary for preservation. It is always well to ascertain the amount of sulphuric acid present and make it up by the addition of more if necessary. By numerous estimations of the fresh infusion I have found the amount to be 0·1875 per cent., which multiplied by 8 gives 1·4 per cent. in the concentrated infusion. The colouring matter of the infusion acts as an efficient indicator.

Such an infusion will contain all the active ingredients of red rose petals, the constituents of which are tannic and gallic acids, colouring matter, volatile oil, small quantities of a fixed oil, and a considerable amount of albuminous matter, with traces of inorganic salts. If the temperature stated be not exceeded no albumen will be dissolved. It is not intended that it should be, for were any quantity contained in the infusion it would not be fluid. In any case the albumen can have no connection with the astringency of the drug, and it is for this property and its colour that it is generally prescribed.

The reading of the papers was followed by a discussion, taken part in by Messrs. Cowie, Duncan, Hendry, Henry, Hill, Lothian and Macpherson, and on the motion of the Chairman the author was awarded a hearty vote of thanks.

The members then examined a very fine collection of typical microscopic sections of plants exhibited by Mr. William Duncan, to whom a hearty vote of thanks was awarded, and also to the members and friends who had lent their microscopes. The meeting then losed.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

At the usual weekly meeting of this Association, held in their premises at 74, Commercial Street, Dundee, a lecture was delivered entitled, "A Night among Seaweed," by James Jack, F.L.S., Arbroath, Examiner in Botany to the Pharmaceutical Society.

Mr. Charles Kerr, Ph.C., honorary President, occupied the chair, and there was a large attendance, including Messrs. James M. Hardie and C. Cummings.

The study of marine algæ or seaweeds was, Mr. Jack said, until very recently a branch of science almost totally neglected, but was now being taken up by the highest in the botanical ranks. Seaweeds were not to be regarded as weeds of the sea; he thought that that name did them a great injustice ; no plants ought to be called weeds where each has an equal right to grow. A weed was an intruder, a plant out of place. The seaweeds were invested with a peculiar interest independent of their own mysteries of structure and function.

Mr. Jack then went on to describe the order as divided into three groups, which were, as a rule, regarded as distinct natural orders, the orders taking their names chiefly from the colour of the spores. They were called respectively the *Chlorospermeæ*, or green-spored algæ; *Melanospermeæ*, or olive-spored algæ ; and *Rhodospermeæ*, or red-spored. The various characteristics of these, and of their methods of reproduction, having been described in a most interesting manner, Mr. Jack proceeded to give some valuable hints as to the methods of collection and preservation of specimens. The green algæ were to be found at high tide, the olive algæ between tide marks, and the red algæ at and about low water. The plants having been carefully collected from the pools or sides of rocks, using the hand alone to pluck them, they were first carefully cleansed and placed individually in a basin of water—sea water preferably. The specimen being now quite clean, a sheet of stiff paper of suitable size is placed beneath it, finally drawing it carefully and gently out. The mounted specimen is now left to drip for a few minutes, and then covered with a piece of muslin and laid between sheets of blotting-paper, which is frequently changed.

Mr. Jack's very extensive collection of beautifully mounted specimens was much admired.

The economic uses of the algæ were briefly referred to, and the lecturer concluded by expressing the hope that others would be induced to take up the study of Algology. They would find that the harvest was plentiful but the labourers few.

The Chairman, in the course of a few appreciative remarks, called for an expression of thanks to Mr. Jack, for his excellent and interesting lecture. He had pleasure in announcing that Mr. Jack proposed to present a prize, consisting of 'Bentley's Botany,' to the member of the Association, who made and submitted to him for classification and naming the best collection of algæ found in the basin of the Tay.

On the motion of the secretary, Mr. W. Mair, seconded by Mr. Alexander Coutts, Mr. Jack was unanimously elected an honorary member of the Association, and a very successful meeting terminated.

GLASGOW CHEMISTS AND DRUGGISTS' ASSISTANTS' ASSOCIATION.

At a meeting of the above association, held in the Waterloo Rooms, on the evening of Wednesday, February 3, a lecture on Micro-Botany was delivered by Mr. C. O. Sonntag, of the Microscopical Society, his subject being "Desmidieæ."

At the conclusion of the lecture a large number of desmides were exhibited under microscopes, kindly lent by Mr. Ballantine, optician, and others.

Parliamentary and Law Proceedings.

Judgment in the Prosecution under the Pharmacy Act at Barnstaple.

Illegal Sale of Poison.

At the Barnstaple County Court, on Monday last, His Honour, Judge Paterson delivered judgment in the case of the Pharmaceutical Society of Great Britain *versus* Mr. E. J. Butt, seedsman and florist of Barnstaple, and which was heard at the last Court. Before giving judgment the plaintiffs were required, according to the decision of the judge at the last Court, to prove that special authority was given to prosecute in this particular case, and that the action was not taken merely under general instructions. Mr. Flux, Solicitor to the Society, said he was present to deal with that point, but before doing so, he might mention that the very self-same point did the very next day but one after the last Court, at which counsel were present on both sides, come before the learned judge at the Sheffield County Court, and that His Honour then held that the document under the seal of the Society which he (Mr. Flux) produced at the last Court giving general authority was in itself adequate.

Mr. A. F. Seldon (who appeared for defendant): That is a Judge of the County Court.

His Honour: You see the respect that is paid to the County Court.

Mr. Flux: Naturally I reported to the Council of the Society that which you suggested; that special authority must be proved, and the Council placed at my disposal the very best evidence that could be produced. They emancipated their Registrar from other duties in order that he might go into the box.

Mr. Seldon: I am very much obliged to them.

Mr. Richard Bremridge then entered the witness box and was sworn. He said he was the Registrar of the Pharmaceutical Society and the plaintiff in the action. He had authority to bring that action, that special action against Mr. Butt.

His Honour: This particular action, besides general authority?

Mr. Bremridge: Yes; the authority of Council as it appears in the minute book of the Council.

Mr. Flux submitted that that was sufficient evidence, the witness's oath, and that it was not necessary to burden the proceedings.

Mr. Seldon submitted that the minute must be produced.

His Honour: Why did not you bring the books?

Mr. Flux: I have the books; but it is unnecessary to trouble the Court with them. The oath of the witness is adequate.

His Honour: If you have the books, why not produce them?

Mr. Flux: I will comply with your Honour's wish, but my desire was to save the time of the Court.

Mr. Flux then produced the minute book of the Committee, the General Purposes Committee, which met on October 6 of last year. He read from it the report of the Committee in relation to this case, which ran: "E. J. Butt, seedsman, High Street, Barnstaple. This unregistered person was warned in June last not to sell weed killer containing a scheduled poison. He is now reported to be continuing the offence. The Committee recommends proceedings under direction of the President."

The witness (Mr. Bremridge) then produced the minute book of the Council meeting on October 7, the day after the meeting of the Committee. The minutes and report of the Committee were read at that meeting in committee, and the minute continued, "On resuming it was moved by the President and seconded by Mr. Martindale, and resolved that the report and recommendation of the General Purposes Committee be received and adopted," and the minute of the General Purposes Committee therefore became a resolution of the Council.

Mr. Flux: That is my case, sir.

His Honour: Are you satisfied, Mr. Seldon?

Mr. Seldon: Yes, your Honour.

His Honour then delivered judgment as follows:—This was an action by the Society for the penalty of £5, imposed by section 15 of the Pharmacy Act, 1868 (31 and 32 Vict., c. 121), for selling poison contrary to that enactment. Mr. Flux appeared for the plaintiffs, Mr. Seldon for the defendant. The defendant was a seedsman and florist, and kept an open shop in High Street, Barnstaple, for the sale by retail of seeds and flowers. It was proved before me at the last court that the defendant was not a registered pharmaceutical chemist or chemist and druggist within the meaning of the Pharmacy Act, 1868, and that on Tuesday, October 27 last, he sold in his shop a gallon drum of weed killer. The drum, which was made of iron, was labelled "poison," also it was labelled "weed killer," with directions for its use, "with care," and it was admitted on the part of the defendant that the drum contained arsenic in large proportions. The first section of the Pharmacy Act, 1868, makes it unlawful for any person to (*inter alia*) sell "poisons," unless such person shall be a pharmaceutical chemist or a chemist and druggist within the meaning of that Act. The second section declares that the articles named in schedule A to the Act shall be deemed to be poisons within the meaning of such Act, and amongst the articles named in that schedule is "arsenic and its preparations." By section 15 it is enacted that "any person who shall" (*inter alia*) "sell or keep an open shop for the retailing, dispensing or compounding poisons, not being a duly registered pharmaceutical chemist or chemist and druggist, shall for every such offence be liable to pay a penalty or sum of five pounds." Mr. Seldon, for the defendant, contended that the Act applied only to poisons pure and simple, and not to a compound which might contain any of the poisons mentioned in the Act. There is no express decision as to whether the Act does or does not apply to any such compounds. In the Pharmaceutical Society *v.* Wheeldon (24 Queen's Bench, Division 683), an unregistered chemist's assistant who sold a packet of Battle's vermin killer was held liable to the penalty imposed by section 15 of the Pharmacy Act, 1868, and Battle's vermin killer was a compound containing the poison strychnine, but by a resolution of the Pharmaceutical Society made in accordance with section 2 of the Act, there is this addition to schedule A: "Preparations of strychnine and every compound containing any poison within the meaning of the Pharmacy Act, 1868, when prepared or sold for the destruction of vermin, are to be deemed poisons within the Act." Mr. Seldon, in support of his contention that the Act applied only to simple poisons, and not when mixed with other ingredients, referred to a dictum of Lord Justice Lush in Berry *v.* Henderson ('Law Reports,' Queen's Bench, 296). The case itself was not on section 15, but section 17 of the Act, which makes it an offence to sell any poison unless in a wrapper labelled as there required, or to sell any of the poisons in the first part of schedule A to any person unknown to the seller, unless introduced to him by a person he knows. That section 17 contains, however, a proviso that not any of the provisions of that section shall apply to any medicine supplied by a legally qualified apothecary to his patient, nor apply to any article when forming part of the ingredients of any medicine dispensed by a person registered under this Act, if the medicine be labelled and the ingredients entered in the manner there directed. The question in Berry

v. Henderson was whether a duly registered pharmaceutical chemist had brought himself within that proviso, and so had become not liable for selling poison contrary to the enacting part of that section. In the course of his judgment Lord Justice Lush said, "I observe that the schedule seems to treat all the poisons as sold in their simple state or in some form of preparation alone, and it does not appear to contemplate any of them being mixed up with any other ingredient, it applies to them pure and simple." This is the passage in the judgment which was cited by Mr. Seldon in support of his contention. It is, however, a mere dictum, and unnecessary for the decision on the question in that case. Still, a dictum pronounced by so eminent a judge is entitled to great consideration, and it would probably have much influenced my judgment, but that it is considerably qualified by what that learned judge himself immediately afterwards says, namely, "but taking the general sweeping words of the enactment alone, they would have prohibited any medical man, perhaps, from dispensing a prescription that contained a poison." The learned judge then goes on to say that the proviso in section 17, which I have above set out, was inserted to obviate the effect of what he describes as the sweeping words of the enactment. That proviso, I think, shows that the legislature did not intend to exclude from the operations of the Act any of the poisons mentioned in schedule A, when they formed only the ingredients of a compound and were not sold in a pure and simple state, as otherwise no such proviso would have been required. Besides, to allow any one of the poisons mentioned in that Schedule to be sold by unqualified persons and without complying with the regulations of the statute, because it formed only part, though, perhaps, the chief and largest part of a compound, would, I think, destroy the protection which was intended for the benefit of the public against the indiscriminate sale of poison. The poison might be fatally dangerous though sold in a compound, and the Act would lose much of its effect if the provisions mentioned in it were to be limited to such poisons as are pure and simple. It is true that the poison sold in the present case was in a compound to be used for an innocent purpose, namely, the destruction of weeds, but it is not the purpose for which it is used, but the sale without the requirements of the statute, which is illegal. Since the drum which the defendant sold contained arsenic in large proportions, and since arsenic is one of the poisons described in schedule A, and so within the meaning of the Pharmacy Act, 1868, therefore the defendant, not being duly registered as required by the schedule, committed an offence which made him liable to the penalty of £5 under section 15. Consequently I must give judgment for the plaintiffs for £5 and costs, the costs to be on the higher scale, column B, but plaintiffs not to have costs of adjournment. As this matter is one of general importance I give the defendant leave to appeal.

Curious Case of Lead Poisoning.

The general cargo of the steamer Dunedin, which arrived at Leith from Dunkirk on Saturday, included three barrels of sugar, the history of which is of such a nature as necessitated them being taken in charge by the Leith police, on the instructions of the Procurator-Fiscal for the county. Information as to the circumstances leading up to this action have been elicited from the police. It appears that as far back as July, 1890, the new barque Orion, belonging to a Dundee owner, left Leith on its maiden trip to New York. The provisioning of the vessel was entrusted to a Dundee merchant, who, from a consignment of sugar brought into Leith from Amsterdam, had a quantity of it transshipped at Leith to the Orion, on board of which it was emptied from the bags into barrels. The Orion arrived at New York without any particular incident occurring, but on the passage to Melbourne, one after another of the crew became ill until there were scarcely enough hands to manage the ship. The symptoms in the case of each of the men were similar, and on reaching Melbourne the men were sent to the hospital, where shortly afterwards the sailmaker, George Nairn, belonging to Leith, died. A *post-mortem* examination made on Nairn's body showed that death had been caused by lead poisoning, the coroner's jury returning a verdict to that effect. Following this discovery, the stores of the vessel were subjected to analysis, with the result that the sugar in the men's room was found to contain carbonate of lead in such large quantity as to easily account for the illness of the crew. The remaining quantity of sugar on the vessel was accordingly seized, sealed by the authorities at Melbourne, and conveyed, along with the official documents bearing on the matter, to Dunkirk by the Orion, where she recently arrived. The papers were sent from Dunkirk to the Board of Trade of this country, and subsequently the Treasury took charge of the inquiry, the Orion meantime proceeding to New York, while the barrels, as already stated, were taken to Leith and put into the custody of the police, who are making investigations. The coroner's jury at Melbourne failed to discover how the lead had got into the sugar, and the belief is that it must have been either in the barrels, which were made by a Leith cooper, or have been introduced among the sugar on board the vessel. Against the theory that the poisonous substance had been obtained from the bags in which the sugar was brought from Amsterdam is the fact that part of the same assignment was sent in the bags on to Dundee and distributed without any injurious results. The three barrels and the sugar at Leith are to be examined and analysed by Dr. Littlejohn.

Obituary.

Notice has been received of the death of the following :—

On the 8th of December, John Farmer, Pharmaceutical Chemist, Putney, S.W. Aged 86 years.

On the 22nd of December, Henry Phillips Foster, Chemist and Druggist, Market Place, Newark-on-Trent. Aged 58 years.

On the 26th of December, Charles Shepherd Lord, Chemist and Druggist, Coronation Street, Sunderland. Aged 55 years.

On the 8th of January, John Place, Chemist and Druggist, Green Street, Cambridge. Aged 45 years.

On the 21st of January, William Skoulding, Chemist and Druggist, Wymondham. Aged 86 years.

On the 23rd of January, Henry Prydderch Williams, Chemist and Druggist, Leyton Road, E. Aged 57 years.

On the 23rd of January, Owen Ellis Shone, Chemist and Druggist, Moreton Street West, S.W. Aged 39 years.

On the 24th of January, John Harris, Chemist and Druggist, Beech Street, E.C. Aged 79 years.

On the 25th of January, Henry Durden, Chemist and Druggist, Dorchester. Aged 63 years.

On the 27th of January, Felix Stevens, Chemist and Druggist, Judd Street, W.C. Aged 54 years.

On the 27th of January, William Cowen, Chemist and Druggist, Tinsley Road, Carbrook, near Sheffield. Aged 67 years.

On the 27th of January, Edward Evans, Chemist and Druggist, Llangollen, Denbighshire. Aged 56 years.

On the 29th of January, William Moore Turner, Chemist and Druggist, St. Ives, Hunts. Aged 57 years.

On the 29th of January, William Bond Strange, Chemist and Druggist, Kingswood Hill, Gloucestershire. Aged 70 years.

On the 31st of January, John Williamson, Chemist and Druggist, Newlands, Darlington. Aged 70 years.

On the 31st of January, Richard Freeman, Pharmaceutical Chemist, Kennington Park Road, S.E. Aged 81 years.

On the 3rd of February, William Edwards, Chemist and Druggist, Llangefni, Anglesey. Aged 78 years.

On the 3rd of February, Richard Loxley Dingley, Pharmaceutical Chemist, Bridge Street, Evesham. Aged 69 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Chemists and Physicians' Prescriptions.

Sir,—Referring to the letter of Dr. J. Althaus in your last issue I would point out that in the matter of prescriptions containing unusual doses of active drugs, pharmacists are often placed in an awkward position.

Undoubtedly one of the most important duties of the dispenser is to detect an overdose, and when it appears to him that one is ordered to communicate with the prescriber before dispensing. This frequently means considerable time being taken up and a delay in sending out the prescription, and which has to be accounted for in some way to the patient. A satisfactory excuse and one which must not raise alarm is, to some patients, most difficult to give.

I would suggest that the method already adopted by some practitioners be more extensively used, and it would then leave no doubt in the mind of the pharmacist as to the meaning of the prescriber. It is for the prescriber when ordering an unusual dose to add his initials immediately after writing the quantity of the drug.

It is frequently impossible to distinguish without some sign on the prescription between an overdose and a large dose given intentionally.

A short time ago a prescription was handed in at a dispensing establishment for pil. hydrarg. biniodid., gr. ½. Send 48. One to be taken three times daily. The question naturally arises in the mind of the dispenser—Is red iodide really intended? The initials of the prescriber (placed against the gr. ½) would have shown at once that he was cognisant of having ordered an unusual dose and intended it.

I certainly think that there are very few pharmacists indeed who would have spoken to a patient in the manner referred to by Dr. Althaus. The facts given of the case are meagre. The majority of dispensers would, I am certain, rather go to any amount of trouble in the matter of communicating with a prescriber in the case of a doubtful prescription than raise any feeling of alarm in the mind of his patient.

A. Blackburn.

Eccles.

Sir,—Readers of the Journal will, I am quite sure, accept, with every feeling of kindliness, the "friendly note of warning" from so great an authority as Dr. Althaus, which appeared in your last week's issue.

It is very much better to know where the rough edges are, so that we may keep them smooth, and be able to run frictionless, side by side with the medical profession.

At the same time we should much like to hear the case as it could be told by the chemist of H—— in War—— shire.

Dr. Althaus himself, calls particular attention to the power of "auto-suggestion;" precisely, that is the very point, wherein most frequently lies our difficulty. In fact, acccpting the dictum that "one ounce of practice is worth a pound of theory," let me illustrate.

Yesterday (Sunday) morning I was, so to speak, cross-examined for more than half-an-hour by a nervous patient, and who, by the way, made most of the questions leading ones (would that Dr. Althaus could have heard them). With the memory of the letter fresh in my memory I tried to be very careful in my statements and refrain from expressing any opinion, and I should not be surprised that even what I did say may be misrepresented.

In answer to my suggestion that the patient had better fully trust his medical adviser and carry out his instructions to the letter, I was very curtly informed "That's all very well. You chemists are sure to stick up for the doctors." *Verb. sap.*, of course they should, and I hope they will.

Torquay. Chas. Shapley.

Sir,—Some few years back, the following prescription, written by a German physician doing a large practice in London, was handed me to dispense:—

"℞ Hydr. Perchlor. . . . . ℥ij.

Sign.—One teaspoonful to be injected every three or four hours." The patient (a fidgety one) wished to wait for the prescription and use immediately. I wonder what chemist would dispense this without comment.

London. John W. T. Morrison.

The Opium Used in Medicine in India.

Sir,—At a recent meeting of the British Pharmaceutical Conference at Cardiff a suggestive paper was communicated by Mr. E. M. Holmes, F.L.S., on "The Opium Used in Medicine." Mr. Holmes stated, "It is a startling fact that India, which produces an immense quantity of opium, does not supply this country with the drug that is used in medicine," and he pointed out that there was no reason why "India, instead of Turkey, should not supply the whole world with medicinal opium. The chief differences between Indian and Turkish opium exist in the appearance and in the relative percentage of morphia and narcotine contained in the crude drug." During the discussion on Mr. Holmes' paper, a sample of what is presumed to have been Malwa opium was exhibited. It was suggested, from the appearance of the drug, that it would make a "very nauseous tincture." Mr. Passmore considered that the object of Mr. Holmes' paper was not apparently to argue in favour of using Indian opium as now produced, but with a view to the probable decline of the use of Indian opium by the Chinese, to suggest improvement of the product, so as to render the Indian drug suitable for English consumption in place of Turkey opium.

In connection with Mr. Holmes' paper I would remark that all the opium issued in Bengal by the Government Medical Store Department for medicinal purposes is produced in India. The principal medical store keeper to Government, Calcutta, has kindly furnished me with the following note:—"All the opium used in this depot is procured from Patna; and this opium is used in the preparation of tincture opii B.P., and in all other preparations into which opium enters. It is used in the quantities laid down in the Pharmacopœia, just the same as if the opium was grown in Asia Minor. This has been the immemorial practice in the depot as far as I know." Again, Dr. Dymock, who was for 19 years medical store keeper to the Bombay Government, informs me that all the opium used at the Bombay Medical Store Depot is Malwa opium, supplied direct from the Government godouris. No Turkey opium is issued. The Calcutta and Bombay depots are, however, not the only ones in India; there is a store at Allahabad in the North West Provinces, one in the Punjab, and another in Madras; all these depots issue Indian grown opium. Dr. Dymock also informs me, "I have always myself used the Malwa opium in the same doses as are laid down for Turkey, and I think this is the general practice. I have never heard of any comparative experiments having been made to test the narcotic effects of the two drugs. All the preparations containing opium are made at the Government store depot with Malwa opium in the proportions laid down in the B.P., no allowance being made for its inferior yield of morphia." The medical store keeper at Calcutta also informs me, "There is no record of any kind, so far as my knowledge goes, of objection to the use of Indian opium."

The medical store depots issue drugs for the use of the British troops in India, over 70,000 men, as well as for the native army and hospitals, and in certain cases for dispensaries. It will form some idea of the consumption of

opium and tincture of opium in India, when I state that the Medical Store Department, Calcutta, issued in 1890-91 178 lbs. of solid opium and 1394 lbs. tin. opii, this being exclusive of the issues from the depots of the Punjaub, Allahabad, N.W.P., Bombay, and Madras. The Medical College Hospital, Calcutta, in 1890 had 58,849 patients, in and out, under treatment, and the consumption of solid opium was 8 ozs., and tinc. opii 17 lbs., in addition to other preparations containing opium. In this hospital both Europeans and natives are treated. In the General Hospital, Calcutta, there are about 220 beds and no natives are admitted, only Europeans and Eurasians.

The opium used for patients in the hospitals for British troops, and by officers of the Indian Medical Department, is prescribed by medical men who have been educated in England, where Turkey opium is solely used. Approximately there are 621 medical men attached to the native army in India, in addition to 338 serving with British troops; thus over 900 medical men prescribe Indian grown opium, and I have already adduced evidence to show, without complaint. It is inconceivable that if any appreciable difference really existed in the relative physiological action of the two varieties of the drug that it could have escaped detection. Medical officers attached to British regiments, as they spend only a portion of their service in India, must necessarily, at comparatively short intervals, be prescribing for the same class of patients Indian and Turkey opium in similar doses yet without apparently noting any difference in the action of the two drugs. As a matter of fact, few medical men are probably aware when they prescribe opium in this country that they are ordering a drug which contains a relatively much smaller morphia content than Turkey opium. On the whole, therefore, I think that there is no valid reason why Indian opium, as it is at present produced, should not be used in lieu of Turkey opium in Europe.

In selecting opium for medicinal purposes care is taken to procure samples of a rich chestnut colour, good aroma, and as pure and free as possible from *pasewha*. It is issued from the opium godouris in either 1 lb. cakes containing about 10 per cent. of moisture, or in powder, the moist opium being powdered by being placed on plates heated on a steam table and constantly rubbed with steel spatula till a dry powder is obtained.

As it is possible that the Museum of the Pharmaceutical Society may not contain a specimen of Patna powdered medicinal opium I have the permission of the Secretary to the Board of Revenue, Bengal, to offer for the acceptance of the Pharmaceutical Society a sample.

Calcutta. C. J. H. Warden.

The Chemical Relations of Fluorine.

Sir,—The researches of Moissan's respecting the substance which has hitherto borne the name of "fluorine," will, if I mistake not, influence the future of chemistry to no slight degree. The immense power as a supporter of combustion, and its combining with almost every known body, would almost be sufficient of itself to demonstrate that "fluorine" may be a modified form of oxygen.

Such a theory will probably be met by the sarcasm of some and the derision of the others; but let us look into some of the experiments which M. Moissan has actually performed, and I think we shall find in every case that "fluorine" compares in every respect with oxygen, but is more intense in its actions. Looking at the action of this gas upon the metals, we observe the same affinities as we find with oxygen. Gold and platinum are only slightly acted upon by fluorine. Mercury is seized upon with great vigour. Zinc, aluminium and magnesium burn with great brilliancy in combining with it. Copper is only slightly acted upon. Silver combines with it by gently heating. Lead forms a pasty mass. Carbon burns freely in it, and hydrogen enters into combination with the greatest vehemence.

This is not all; for we find like oxygen fluorine possesses no action upon the diamond. Again, fluorine and oxygen have no action upon one another in the free state; yet if fluorine be passed over water, we have a substance produced resembling ozone; the globule of water at the same time giving a pale lambent, blueish flame or film. It has also been discovered, no known chemical means appeared to be able to isolate "fluorine" from its compounds; but electricity was the means of its isolation. So also, we know "ozone" is produced by electricity; and if "ozone," of which we know very little, be considered a modified or condensed form of oxygen, why not also fluorine, seeing its character throughout demonstrates many analogies with oxygen. If oxygen is capable of existing as O_2O, why also is it not capable of existence in the state to which we have hitherto given the name of fluorine?

We are told fluorine is a yellowish gas, somewhat resembling in odour the intermediate characters of ozone and chlorine, and that experiments have so far failed to liquefy fluorine, although subjected to great pressure and intense cold. The subject is full of interest, and in a few years we may indeed find fluorine is merely a modified form of oxygen.

Frederick Davis.

Note on the Solubility of Iodine in Chloroform.

Sir,—In the *Pharmaceutical Journal* of January 22 Mr. Duncan has criticised the published statements as to the solubility of iodine in chloroform. For the purpose of comparison it was a little unfortunate that Mr. Duncan did not determine the solubility at the usual temperature (15·5° C.), because the difference in solubility is very considerable.

Mr. Duncan gives 1 in 56·6 at 10° C.

Mr. Squire, in the 'Companion,' gives 1 in 25, the temperature not being stated, it is presumably 15·5° C.

I would also call attention to the top line of each page of the 'Companion,' "Solids by Weight, Liquids by Measure." The sp. gr. of chloroform being nearly 1·5 the solubility by weight becomes, acccording to Squire, 1 in 37·4.

I have repeated Mr. Duncan's experiment, keeping the chloroform in contact with excess of iodine, at about 10° C. during one night, then slowly raising the temperature to 15·5° C., and after about two hours estimating the iodine in solution. I found it to correspond to 1 in 31·3 by volume and 1 in 46·9 by weight. If kept at 17° C. and cooled down to 15·5 for a short time immediately before the titration I found it to correspond to 1 in 30 by volume or 1 in 45 by weight. Probably Mr. Duncan is correct, but at the normal temperature Squire's 'Companion' is no so far wrong as Mr. Duncan's note would suggest.

R. A. Cripps.

NOTICES OF MEETINGS.

Newcastle-on-Tyne Chemists' Assistants and Apprentices' Association.—The next meeting will be held on Wednesday evening, February 17, at 8.15, in Lockhart's Café, St. Nicholas Square.—Paper: "Notes on Some of the B.P. Liquors," by G. F. Merson.

School of Pharmacy Students' Association.—The next meeting of the School of Pharmacy Students' Association will be held on Thursday, February 18, when a paper on "True and Commercial Pareira Brava," by Messrs. F. A. Ringer and E. Brooke, will be read, and a "Report on Inorganic Chemistry" will be given by Mr. E. White.

Edinburgh Chemists' Assistants' and Apprentices' Association.—The next meeting of the Edinburgh Chemists' Assistants' and Apprentices' Association will take place in the Y. M. C. A. Hall, 14, South Street, Andrew Street, on Thursday, February 18, at 9 p.m., when Mr. J. Laidlaw Ewing, Chairman of the Executive of the North British Branch of the Pharmaceutical Society, will give a lecture on "A Holiday Trip to Russia, Finland and Sweden," illustrated by lime-light views.

Midland Counties Chemists' Association.—A meeting of the above Association will be held at the Mason College on Tuesday, February 16, 1892, at 8.15 p.m., when the following papers will be read:—"Coal and Coal Gas," by Mr. H. D. Adcock; "The Accuracy of Chemical Thermometers," by Mr. J. F. Liverseege, F.I.C.

Chemical Society, Thursday, February 18, at 8 p.m.—Ballot for the election of Fellows. "A search for a cellulose dissolving (cyto-hydrolytic) enzyme in the digestive tract of certain grain feeding animals." By Horace T. Brown, F.R.S.; "Limettin," by Professor Tilden, F.R.S.

MODERN PHARMACEUTICAL NOMENCLATURE.

[Neo-Latin.]

BY JOSEPH INCE.

New remedies and extra Pharmacopœial formulæ have enlarged the boundaries of our medical vocabulary. The contrast between England and France in this respect is great: we latinize all such introductions; the French naturalize science, and in the two standard reference works, the Formulaire Dujardin-Beaumetz et Yvon, 1888, and the Formulaire Magistral A et G. Bouchardat, 1889—both crowded with novelties of the most modern date, not one Latin title is adopted. Words of Greek origin are also latinized and pressed into the service of British pharmacy.

In consequence we in England get a Neo-Latin which is perplexing to the uninitiated but which has the merit of not being constructed in an arbitrary manner. Its study is important to the British pharmacist, since prescriptions are seldom written in the vernacular except so far as directions are concerned.

Abroad, it is of minor consequence, medical formulæ being almost invariably expressed in the mother tongue. The list here presented is meant for convenient reference, while explanatory comment is given on the origin of some of the nomenclature employed.

The reader may turn to such terms as Abstractum, Ætheroleum, Lamella and Tabella: others taken from Hospital formulæ, as Buginarium, Carbasus, Collunarium and Collutorium: the series of shortened titles either of comparatively recent date, as Chloral; or created in the official Addendum, as Phenazonum: and lastly to illustrations of familiar terms which pharmaceutically would be nothing if not classical.

Not every pharmacist could state at hap-hazard and without previous reflection what was the accepted latin for Lip-salve (ceratum rosatum). Asthma-paper (charta fumifera). Poor-man's plaster, (charta picœa). Gun-cotton (gossypium fulminans, or lana collodii). though he might know that nebula is a spray and ought to know that when Cæsar took his Seidlitz in the morning, he called it

Pulvis Sodæ Tartaratæ Effervescens.

No difficulty attaches to the nomenclature of new galenical preparations; they lend themselves readily to latin forms. Nor is any embarrassment caused by the introduction of modern chemical terms until they enter pharmacy and are wanted for medical use.

It is to be regretted that many such titles have and continue to be introduced which are regarded as indeclinable. This class of nomenclature being mainly derived from advanced chemical research, must of necessity increase, and we shall be burdened with a catalogue of terms with no grammatical inflexion. Illustrations may be found in Syrupus chloral, and Emplastrum menthol.

Members of the medical profession, who for technical reasons write all such words in the genitive, have already adopted a nomenclature of their own which must find its way into a future pharmacopœia.

A work issued by authority should lead and not be led, and as far as possible should avoid change. Latin words ending in *al*, are neuter; of the third declension; they make the genitive in ālis. Ex. Animal. ālis.

Latin words ending in *ol*, are neuter; of the third declension; they make the genitive in ŏlis. Ex. Alcohol-ŏlis. Camphora ope alcohŏlis redacta. It is suggested that it would be strictly classical to adopt this inflexion throughout, and thus render the nomenclature of the Pharmacopœia, and that of the prescriber, uniform.

A further suggestion may be offered respecting words ending in yl. Of these at present there are few illustrations, but there is a presumable certainty that their number must increase.

We have already amyl, as Amyl Nitris, besides 'Amyl, Hydrate of'; and 'Amyl, oxide of.'

Butyl Hydras and ethyl, as 'Ethyl Acetate of.' These are precursors of a series which it is reasonable to assume will be officially introduced.

Is it not better that from the commencement they should have a definite inflexion assigned, rather than that they should drift into the Pharmacopœia as indeclinable nouns hereafter to be altered?

The final syllable of these terms is long because they were originally written, amyle, butyle and ethyle.

Their inflexion must depend upon agreed consent, for classical authority is wanting.

I propose to make them neuter nouns in um, and to write amīlum, butīlum, ethīlum, and so throughout.

The vowel y is found only in words borrowed from the Greek, and it therefore should be rejected in a new Latin nomenclature.

Moreover this would remove the one instance in which confusion might arise between amўlum, starch; and amīlum, amyl. The y in the first noun is short, being the latinized form of ἄμυλον, meal not pounded by a millstone.

It will be observed that in the series called shortened titles, the contracted form has been coined first and subsequently translated into technical latin.

Abstractum. i. n. subs. 2nd decl. *an abstract.*

Abstracta (plur.). Solid powdered preparations containing the soluble constituents of the drugs from which they are made, and bearing a definite uniform relation to the drug.

They are made by evaporating an alcoholic tincture of a drug spontaneously at a low temperature (not exceeding 122° F. [50° C.]) mixing it with a sufficient quantity of sugar of milk to make the final product when dry, weigh one-half the weight of the drug, and then powdering

Drug in No. 60 powder 200.
Alcohol (sp. gr. 0·820.)
Saccharum Lactis.
to make when done 100.

The abstractum therefore is double the strength of the extractum Ex. Abstractum Conii.

Abstractum Nucis Vomicæ.

Acetanilĭdum i. n. subs. 2nd decl. *Acetanilide*, commonly known as antifebrin.

Latinized polysyllables, terminating in *idum*, employed in modern chemistry and pharmacy make their penultimate short: hence their accent is on the antepenultimate.

Ex. Brómĭdum: Chlórĭdum et passim.

Acētum Britannicum. *Aromatic Vinegar.*

Acĭda. ōrum. n. subs. 2nd decl. plural.

General title for Acids.

Acidum phenicum. *Carbolic acid.*

Adeps Lanæ. *Wool-Fat.*

Adeps Lanæ Hydrōsus. *Hydrous Wool-Fat.*

Registered trade-mark in the United Kingdom, *Lanoline.*

Aether Ozonicus. Ether containing in solution peroxide of hydrogen of 30 volume strength, with me alcohol.

Aetheroleum ei. n. subs. 2nd decl. *A volatile oil.*

Ex. Aetheroleum Macĭdis. Ol. Myristicæ.

Albuminātus a. um. adj. *Albuminated.*

Ex. Liquor Ferri Albuminati.

Alcohol ŏlis. n. subs. 3rd decl. *Alcohol.*

Alcohol Amylicum. *Amylic Alcohol* prepared from sugar derived from amўlum, *starch.*

Alcohol Cetylicum. *Cetylic alcohol.*

Obtained by saponifying Cetaceum, *spermaceti.*

Alcohol Cerylicum. *Cerylic alcohol.*

Obtained from Cera, *Chinese wax.*

Aldehўdum. i. n. subs. 2nd decl. *Aldehyde.*

Ex. Aldehydum dilutum.

The word is derived from the first syllables of the term *al*cohol *dehyd*rogenatum, which means alcohol from which hydrogen has been abstracted.

$C_2H_6O - H_2 = C_2H_4O$.

Alcohol. Aldehyde.

Anilīnum. i. n. subs. 2nd decl. *Aniline.*

As obtained from *anil*, Portugese for indigo.

Anticatarrhālis. e. adj. *To prevent catarrh.*

Ex. Pulvis Anticatarrhalis. *Catarrh snuff.*

Antiperiodicus. a. um. *Antiperiodic.*

Ex. Pilulæ Antiperiodicæ. (Warburg).

Apozēma. ătis. n. subs. 3rd decl.

A strong infusion or decoction made extemporaneously.

Ex. Apozema laxativum.

Aqua Coloniensis. *Eau de Cologne.*

,, Phagedœnica. *Lotio flava.*

,, Pulverisata. *A spray.*

Term used in the same sense as Nebŭla, adapted from the French.

Aqua Sedatīva. *Raspail's Ammonia, Camphor and Salt.*

Aqua Vĕgĕto minerālis. *Goulard's Extract.*

Axungia. æ. f. subs. 1st decl. *Lard.*

Old word revived. Axunge, the grease of wheels. [ab axe rotarum quæ unguuntur.]

Balnea. eōrum. (plural) n. subs. 2nd decl. General title for Baths.

Balneum Äeris Calidi. Temperature 120° to 150° F.

Balneum Algense. *Bath with Carragheen Moss.*

Balneum Aquæ Calidæ. Temperature 98° to 110° F.

Slight variations of temperature are given in Hospital formulæ.

Balneum Diuturnum. *Water used at 92° F.*

Balneum Furfurōsum. *Bran bath.*

From Furfur. ŭris. m. subs. 3rd decl. *bran.*

Balneum Glutĭnis. *Bath made with patent size.*

From Gluten. ĭnis. n. subs. 3rd decl. *glue.*

Barbaloīnum. i. n. subs. 2nd decl. *Barbaloin.*

Good illustration of a shortened title, being the contracted form of *Barbadoes Aloin.*

Bilis Bovīna Depurāta. *Purified Ox-gall.*

Continental for Fel Bovinum Purificatum.

Bolus orientālis. *Armenian Bole.*

Boras sodicus. *Borax* (continental).

Bromoformum. i. n. subs. 2nd decl. *Bromoform.*

From Bromine formyl. vide Chloroformum.

Bromurētum ferrōsum. *Ferrous bromide.*

Buginārium. ü. n. subs. 2nd decl. *a nasal bougie.*

Ex. Buginarium Cocaīnæ Hydrochlorātis.

Capsŭla. œ. f. subs. 1st decl. *a capsule*

elastic gelatine being most frequently employed.

Ex. Capsulæ Copaibæ.

Carbăsus. i. f. subs. 2nd decl. *gauze.*

Ex. Carbasus Acidi Carbolici.

C. Carbolata. C. Iodoformata.

Carbo ossium. *Animal Charcoal.*

Cataplasmăta um. (plural) n. subs. 3rd decl.

General title for Poultices.

Caustĭca orum. (plural) General title for Caustics.

Causticum i. n. subs. 2nd decl. *a caustic.*

Ex. Causticum Acidi Chromici.

Causticum Pastæ Londinensis. *Hospital form.* caustic soda and unslaked lime made into a paste.

Cerātum rosatum. *Lip salve.*

Charta fumifĕra. *Asthma paper.*

,, nitrata. *Nitre paper.*

also : C. epispastica. Blistering paper (formerly 'tissue') and C. sinapis. *Mustard paper* (sometimes 'leaves'). B.P. official titles.

Charta picæa. *Poor man's plaster.*

Chloral ālis. n. subs. 3rd decl. *Chloral.*

Ex. Chloralis Hydratis, grana decem.

Shortened form of *Chlor*ine *al*dehyde, the descriptive title of the probable action of chlorine on aldehyde $CH_3 \cdot COH + 3Cl_2 = CCl_3 \cdot COH + 3HCl$.

Aldehyde. Chlorine. Chloral. Hydrochloric acid.

Chloroformum i. n. subs. 2nd decl. *Chloroform.*

The name Chloroform has been conferred upon this substance on the supposition that it contained the radical of formic acid (formyl CH) and it is sometimes styled the terchloride of formyl [$CHCl_3$] Bloxam.

Collodia orum. (plural). General title.

Collodium ü. n. subs. 2nd decl. *Collodion.*

Ex. Collodium Flexĭle. *Flexible Collodion.*

C. Stypticum. *Styptic Collodion.*

C. Vesicans. *Blistering Collodion.*

Collunaria orum. (plural). General title.

Collunarium ü. n. subs. 2nd decl. *A nasal douche,* from collŭo. ĕre. 3rd conjug. *to wash out, rinse,* nāris. is. f. subs. 3rd decl. the nostril. The plural, nares, is generally used in medical applications.

Collutoria. orum. (plural). General title.

Collutorium. ü. n. subs. 2nd decl., *a mouth wash,* from colluo. and os. ōris. n., *the mouth.*

Collўria. orum. (plural). General title.

Collyrium. ü. n. subs. 2nd decl., *an eye lotion,* latinized Greek from Κολλύριον, *i.e.*, Κωλύειν τὸ ῥεῖν, *to stop the discharge.* Lotio ophthalmica and Lotio pro oculis are both in use.

Conus. i. m. subs. 2nd decl. Literally *a cone.*

Ex. (pharm.) Coni odorati. *Pastilles.*

Cordiale. is. n. subs. 3rd decl. *A cordial.*

Ex. Cordiale Rubi Fructûs. *Blackberry cordial.*

Numerous illustrations of this word occur, chiefly American.

Cordialia. orum. (plural). General title.

Crinālis. e. adj., *belonging to the hair* [crinis].

Ex. Linimentum crināle. Squire. (a cantharidin liniment applied to the scalp).

Deaurātus. a. um. adj. *gilded* ['de,' intensitive.] deauro. are. v. a. 1st. conjug. *to gild.*

Ex. deaurentur pilulæ., *let the pills be gilded.*

Decocta. ōrum. n. subs. 2nd decl. (plural). General title for decoctions.

Decoctum, *that which is boiled down*, from decŏquo. xi. ctum.

Deflagrātus. a. um., adj. *deflagrated*, in pharmacy, *fused.*

Ex. Potassii Nitras deflagratus, *fused nitre.*

[Nitre Balls.]

Detannātus. a. um., adj. *freed from Tannin.*

Ex. Tinctura Cinchonæ Detannata (more correctly, detannatæ.)

Dextrīnum, i. n. subs. 2nd decl. *Dextrin.*

Elaeosaccharum. i. n. subs. 2nd decl. *volatile oil and sugar.* Hybrid derivation. Greek and Latin mixed, from ἔλαιον, *olive oil*; saccharum, *sugar.*

Vide Oleosaccharum.

Elixir. n. subs. indecl. *An elixir.*

Ex. Elixir Adjŭvans (vehicle for acrid or saline remedies).

Elixir Salūtis. Tinctura Sennæ Composita (old).

Extractum Euonўmi Siccum. *Dry Extract of Euonymus*, commonly known as Euonymin.

Factitius. a. um. adj. *artificial.*

Ex. Sal. Carolinum Factitium.

Artificial Carlsbad Salt.

Fomentum. i. n. subs. 2nd decl. *A fomentation.* Used in the same sense as Fotus, by which latter word it has been superseded.

Fotus. ûs. m. subs. 4th decl. *A. fomentation.*

Ex. Fotus emolliens.

Fumi. orum. m. subs. 2nd decl. (plural).

General title. Fuming Inhalations.

Ex. Fumus Potassii Nitratis. *Nitre paper.*

Fumigatio. ōnis. f. subs. 3rd decl. *a fumigation.*

Gelatīna. æ. f. subs. 1st. decl. *Jelly, or something thick.*

G. de Cornu Cervi. *Hartshorn Jelly.*

G. de Fuco Crispo. *Carragheen Jelly.*

G. de Helminthocorto. *Corsican-moss Jelly.*

G. de Lichene Islandico. *Iceland-moss Jelly.*

Gelatīnum. i. n. subs. 2nd decl. *Gelatine.*

A neuter noun has been selected in the B.P. Addendum, 1890, to express the word Gelatine, because the feminine Gelatina is already used in a technical pharmaceutical sense to denote a thick vehicle. È gelatinâ, in a medical formula, almost invariably has this meaning.

Thus :—è gelatinâ quâvis is equivalent to è quovis vehiculo crasso.

Glusĭdum. i. n. subs. 2nd decl. *Gluside.*

Shortened form of Glucusimide, *a sweet imide*, commonly known as saccharin.

Glycerīna. orum. (plural). General title.

Glycerinum. i. n. subs. 2nd decl. *a glycerine.*

Ex. Glycerinum Acidi Tannici.

Glycerinum. [not B.P.] *a glycerole.*

Ex. Glycerinum Guaiaci. *Glycerole of Guaiacum.*

Glycerītum. i. n. subs. 2nd decl. *a glycerite.*

Ex. Glyceritum Picis liquidæ. *glycerite of tar.*

Glyceritum. Tragacanthæ. U.S.P., 1870.

Glyceritum, continental for Glycerinum (occasional).

Glyconīnum. i. n. subs. 2nd decl. *Glyconin.*

(Yolk of egg and glycerine).

Gossypia Varia. (plural). *Medicated Cotton-wools.* of which Gossypium Acidi Carbolici is a type. Many illustrations of this word occur.

Gossypium. ii. n. subs. 2nd decl. *Cotton-wool.*

Ex. Gossypium absorbens. *Absorbent cotton-wool.*

The title is appropriate and descriptive. While ordinary Gossypium floats on an aqueous medium, G. absorbens sinks in the liquid and is literally absorbent.

G. fulmĭnans. *Gun-cotton.*

G. stypticum. *Styptic cotton.*

[Solution of chloride of iron, glycerine and water.]

Hydrolātum. i. n. subs. 2nd decl. *a distilled water.*

Ex. Hydrolatum Rosæ. Aqua Rosæ.

Hypodermĭcus. a. um. adj. *subcutaneous.*

from ὑπὸ *under.* δέρμα *the skin.*

Ex. Injectio Morphinæ Hypodermica.

Instillatio-ōnis f. subs. 3rd decl. *Inhalation Drops.*

Ex. Instillatio Eucalypti.

Instillationes are drops used for inhalation on the sponge of the Inhaling Respirator.

Instillatio Creasoti.

℞ Creasoti.

Ethylic alcohol. āa ʒj.

M. Signa. Ten drops on the sponge of the Respirator Inhaler.

John C. Thorowgood.

Insufflatio. ōnis. f. subs. 3rd decl. *an insufflation.* [something blown in,—aural, nasal, or otherwise.]

Ex. Insufflatio Eucalypti Gummi.

Iodoformum. i. n. subs. 2nd decl. *Iodoform.*

Derivation—Iodine-formyl. CHI_3.

Iōdol. ŏlis. n. subs. 3rd decl.

shortened form of *iodo*-pyrr*ol.*

Lamella. œ. f. subs. 1st decl. *a disc.*

literally, a small round piece of metal. fr. *lame.*

Ex. Lamellæ Atropinæ. L. Cocainæ.

L. Physostigminæ.

Lana Collodii. *Gun-cotton.*

vide Gossypium fulminans.

Lanolīnum. i. n. subs. 2nd decl. *Lanolin.*

Limaturæ Ferri. *Iron filings.*

Liquor Electropœĭcus. *Battery Fluid.*

L. Glonoīni *Solution of Glonoine.*

(Nitro-Glycerine.)

L. Picis Ligni Fossĭlis. *Coal-tar Solution.*

L. Trinitrīni. *Solution of Trinitrin.*

or *Solution of Nitro-glycerine.*

Lotio ammonico-camphorata. *Eau Sédative.*

Lutum cum Lentisco. *Mastich Stopping.*

Massa [continental for Pasta.

Ex. Massa de Jujubes. *Pâte de Jujubes.*

Massa cum Gummi. *Pâte de Guimauve.*

Mellīta. orum. (plural). General title. Word taken from Mellītus. a. um. (classic). Something made with mel, *honey.*

Mel Boracis is classified amongst Mellita.

Menstruum. ui. n. subs. 2nd decl. *Menstruum.*

(*a*) The solvent used.

(*b*) In pharmacy the vehicle in which a medical preparation is exhibited, *i.e.*, the liquid portion, generally aqueous, of a Mixture.

Derivation : mensis, a month, being employed by the older chemists for digesting the solvend or substance to be dissolved. This practice was retained in the Boyle-Godfrey Laboratory up to very recent date.

Menthol-ŏlis. n. subs. 3rd decl. *Menthol.*

Shortened form of *Menthæ*-alcoh*ol.*

Mollinum. i. n. subs. 2nd. decl. *Mollin* (a soap).

Ex. Mollinum Hydrargyri.

Mucāgo pro Mucilāgo. *Mucilage.*

Ex. Mucago cum Gummi. *Mucilage of Gum Arabic*

Mucago cum Gummi Tragacanthæ.
Nataloīnum. ī. n. subs. 2nd decl.
Shortened form of *Natal-Aloin.*
Nebula. æ. f. subs. 1st. decl. *A spray.*
Ex. Nebula Ferri Perchloridi.

Ol. [termination].

"It will be noticed that all the alcohols have the termination *ol.*" Attfield.

Oleas. ātis. m. subs. 3rd decl. *an oleate* (chem).
Ex. Linimentum Hydrargyri Oleatis.
Oleātum. i. n. subs. 2nd decl. *an oleate* (pharm).
Ex. Oleatum Zinci.
Oleosacchărum. and Oleosaccharurētum. i. n. subs.
2nd decl. *Volatile oil and sugar.*
French, German and American [strength variable.]
Oleum Cadīni and Oleum Cadīnum. [B.P. Addendum.]
Juniper Tar Oil. Huile de Cade.

Mérat et de Lens state: Cade, Cadé, Cad, are the old names for Juniper. Cade is the more liquid part of the oil which is obtained from the pine by combustion, and oil of cade, that which is obtained from the Juniper.

Pancreaticus a. um. adj. (*pancreas anat.*) *pancreatic.*
Ex. Liquor Pancreaticus.
Pancreatīnum i. n. subs. 2nd. decl. *pancreatin.*
Paraffīnum i. n. subs. 2nd decl. *paraffin.*
from Parum-affinis, *without affinity.*
A substance which resists all ordinary reagents.
Paraldehȳdum i. n. subs. 2nd decl. Shortened form of Para (παρὰ *beside.*) *alcohol dehydrogenatum.*
vide Aldehydum.
Pastillus i. m. subs. 2nd decl. *a pastil.*
with a basis of Gelatine and Glycerine, afterwards medicated. Ex. Pastillus Cocainæ Hyrochloratis.
Pectorālis e. adj. *Pectoral.* (Pectus).
Ex. Species Pectorales.
Peptonātus a. um. adj. *peptonized.*
Ex. Liquor Ferri Peptonati.
Pessus ī. m. subs. 2nd decl. *a pessary.*
Ex. Pessus Coninæ.
Petrolātum i. n. subs. 2nd decl. *vaseline.*
Petroleum ei. n. subs. 2nd decl. (lit. *rock-oil*).
hybrid derivation: πέτρος-oleum.
Phenacetīnum i. n. subs. 2nd decl. *phenacetin.*
Phenazonum i. n. subs. decl. *Phenazone.*

The word according to Professor Attfield, is a shortened form of the long but descriptive name *phenyl*-dimethyl-pyr*azolone*, which is indeed given in the Addendum as a synonym.

Phenazone is commonly known as 'Antipyrine' which is a registered trade-mark in the United Kingdom.

Picrotoxīnum i. n. subs. 2nd decl. *Picrotoxin.*
Pilula Ferri (official title.) *Blaud's Pill.*
Plasma. ătis. n. subs. 3rd decl. *Glycerin of Starch.*
Pomātus. a. um adj. *made* from *apple* (pomum).
Ex. Tinctura Ferri Pomata. Tincture of Malate of Iron.
Porphyrisātus. a um. *reduced to fine powder in a porphyry mortar.*
Ex. Limatura Ferri Porphyrisata. *Porphyrized iron.*
Potassa cum Calce. *Vienna Paste.*
Caustic potash and quick lime.
Potus acidŭlus effervescens. *Effervescing lemonade.*
Potus citrātus. *Still lemonade.*
Ptisăna. æ. f. subs. 1st decl. *an infusion.*
From πτισσάνη, barley, fr. *tisane.*
Old English: *phtisan.*
Pulvis Aerophŏrus. *Saline effervescing powder.*
Pulvis conspersus, *a dusting powder.*
P. ad sternutamentum, *snuff.*
P. Sodæ Tartaratæ Effervescens. *Seidlitz powder.*
P. Terræ Cimoliæ, *Fuller's Earth in fine powder*, or Cimolite, so called from its ancient source, the island of Cimolus, in the Cretan Sea (Squire).
Quadruplex. ĭcis. adj. *fourfold.* Ex. Pilulæ Quadruplices.
[Iron, Quinine, Aloes, Nux Vomica].
Rotŭla. æ. f. subs, 1st decl. Small round lozenge of melted sugar, serving as the base for various essential oils.
Ex. Rotulæ Anisi.
Rotulæ Menthæ Piperitæ.
Salol. ŏlis. n. subs. 3rd decl. *Salol.* Shortened form of Salicylate of Phenol, or *Sali*cylic *Phenol.*
Sapo Kalīnus Venālis. *Green soap.* Formerly known as Sapo viridis.
Serĭcum anglicum. *Court plaster.*
S. oleātum. *Oiled silk.*
Seripărus, a. um., *curdled*, from sĕrum, *the watery part of milk, or whey,*
Ex. Liquor seriparus. *Liquid Rennet.*
Socaloīnum. i. n. subs. 2nd decl. Shortened form of *Socotrine Aloin.*
Splēneticus. a. um. adj. *relating to the spleen.*
Ex. Mistura splenetica. [Iron, quinine, and nitric acid.]
Spongia cerāta vel compressa. *Sponge tent.*
Suffumigatio. ōnis. f. subs. 3rd decl., *a fumigation.*
Ex. Suffumigatio Guytoniana. *Chlorine fumigation.*
Sulphŏnal. ālis. n. subs. 3rd decl.

The word was intended by its inventor, Professor Kast, to show the relation of the compound to sulphur and the acetals, Mercaptal being a sulphuretted acetal. Shortened form of *sulphon*-acet*al.*

Descriptive name: diethylsulphon-dimethyl-methane.

$$\begin{matrix} CH_3 \\ CH_3 \end{matrix} > C < \begin{matrix} SO_2C_2H_5 \\ SO_2C_2H_5 \end{matrix}$$

Tabella. æ. f. subs. 1st decl. *a tablet.*
Ex. Tabellæ Nitroglycerini.
Tinctura Antiperiodica. *Warburg's Tincture.*
Traumaticus. a. um. adj. *wound healing.*
Τραυμα. ἄτος. n. subs. *a wound.*
Triplex. ĭcis. adj. *triple.*
Ex. Pilulæ Triplices.
[Aloes. Mercury. Podophyllum.]
Trituratio. ōnis. f subs. 3rd decl *a triturate*, a powder in which there is a definite relation between the active ingredient and the diluent.
Substance, 10.
Saccharum Lactis, 90.
Ex. Trituratio Elaterini. [American.]

In English hospital practice, Aconite, Atropine, and some few other substances are thus treated.

Trituratio Rhīnitis. *Triturate for inflammation of the nose.*
ῥὶν, ῥινὸς, the nose.
[Camphor. Ext. Belladonna. Quinine.]
Valeras. pro Valerianas. (Continental.)
Ex. Valeras quinicus. *Valerianate of Quinine.*
Vapor. ōris. m. subs. 3rd decl. *an inhalation.*

Ex. Vapor Pini Sylvestris.
Vaselīna. orum. (plural.) General title.
Vaselinum. i. n. subs. 2nd decl. *Vaseline.*
Ex. Vaselinum Atropinæ.
Xylum iodātum. *Iodized cotton.*

CARNAÜBA WAX.*

BY THOMAS MORONG.

The well known Carnaüba wax is obtained from the leaves and berries of the black palm, *Copernicia cerifera*, and I have no doubt might as easily be obtained from other two species found mingled among the trees of the former, as the cereous deposit is formed on the leaves of all of them. The young leaves, while still wrapped in the bud or soon after opening, are steeped in boiling water, and the wax, rising to the surface as scum, is skimmed off like bayberry wax, or it is shaken from the dried leaves by rubbing or beating them together. It is then melted over a fire and run into cakes. The outer rind of the berry is also slightly wax-coated, and when it becomes dry it is readily crushed into fragments, and, if boiled, will yield a small percentage of wax. This deposit lies in continuous layers or incrustations on both sides of the leaf, a white, delicate substance looking like spermaceti, which can be easily scraped off with a knife. It does not seem to exude from superficial glands, as is sometimes supposed, but to be a secretion of small, papillose, dark glands under the cuticle. Under a one fifth objective it exhibits masses of translucent wax, mingled with minute white circular crystals. Doubtless under a higher power it would all be resolved into such crystals. It is stated by a writer in the 'Encyclopædia Britannica' that in composition this wax is found to "consist of ethers of myriocyl alcohol and ceryl alcohol with cerotic acid." The same writer also states that its "melting point ranges from 85° to 90° C." There can be no doubt that its melting point is very high, and that herein lies its chief value, though I can with difficulty believe that it is so near the boiling point of water as this statement implies. In consequence of this great hardness, Carnaüba wax is of much economical value. It is employed to harden beeswax and stearine in the manufacture of candles. It is also employed by furniture-polishers and brass-finishers in putting a fine polish upon their wares, and can be used for waxing floors. Recently it has been found serviceable in insulating electric wires.

* Abstract from an article on "Copernicia Cerifera Mart.," in the *Bulletin of Pharmacy.*

A JAPANESE SULPHUR MINE.

A writer in the Japan *Mail*, of Yokohama, describes a visit to a sulphur mine in the Northern part of the main island. The works are situated on a platform made in a gorge partly by hand and partly by a landslip, and from the back a road goes up to the solfataras. On each side are high hills well wooded, save where landslips have occurred. They possess a bath deliciously warm, containing sulphur in suspension and iron and alum in solution. The sulphur is melted by super-heated steam. About a mile up the gorge are the springs which supply the baths at the works, and also a bathing establishment in another valley some miles away, and another spring is used by the miners to cook their rice. All are boiling when they issue, but unless enclosed in covered pipes they cool rapidly and deposit fine "flowers of sulphur," which is collected and sold for local consumption. Leaving the springs, the sulphur region proper is entered, which is almost at the top of the gorge, or head of the valley. Before coming into the hands of the present proprietor, the solfatara was worked on Government account, and one of the old workings is very curious. It is a small gallery with a hot ceiling, and exudes very beautiful needle-shaped crystals of pure sulphur, boiling hot, and transparent when first gathered, but they soon become opaque and change into small octahedral crystals that will not bear much pressure, but crumble to the touch—showing that the sulphur has been deposited at fusing heat. Arriving at the head of the stream the ascent of the crater begins. There is a toboggan slide of 720 feet from the crest of the crater down the steep cone to the upper workings. The ascent is neither safe nor easy. A miner went in front with a pick to cut steps, and the clouds were entered about half-way up. At the bottom of the crater are very rich mounds of sulphur ore in inexhaustible quantities. The workings give off fumes and gas, and great care is needed by the workmen. The place seemed much like that described in one of Sinbad's voyages—no life, no vegetation, no water, only mud and sulphur. It is on record that 315 years ago the crater exploded like Bandaisan and did great damage. The path down the gap then made in the crater is a difficult one, overhanging rocks threatening at every step, the path entirely obliterated, and the chasms left by the torrent being both steep and dangerous. Above the neighbouring town of Numajiri there is a sulphur factory on the old Japanese principle of smelting in an open boiler and refining in a close cylinder furnace. It was not at work, but must be a most wasteful method, and hurtful from the fumes given off. The deposits are enormous and must amount to millions of tons. The proprietors profess to turn out an article equal to the "roll" sulphur of commerce. In the sulphur regions there is no sign of life, vegetable or animal, but the cone and descent are well wooded, and rare plants and flowers flourish in profusion. These, however, become stunted as one descends into the crater, and on the mud plain there is not a vestige of verdure. There are, of course, no fish in the rivers.—*Oil, Paint and Drug Reporter.*

ARTIFICIAL COLOURING OF GHERKINS.*

A correspondent of the *Magdeburg Gazette* has written from Brunswick that a complaint has been lodged against a pickle manufacturer, established in that town, because of an offence against the law concerning foods. The point in question was the green coloration of peas by means of copper. The accused has been acquitted. Another pickle manufacturer has been accused of having given artificially a fine green colour to gherkins; he has likewise been acquitted. A straightforward journal published at Brunswick, in mentioning the affair, said that the maker had been accused of colouring the gherkins by means of copper or of sulphate of copper to give a fine appearance to the goods, and that he had employed poisonous colours. It has been proved that the defendant had imported the salted gherkins from Amsterdam, and that he had boiled them in a copper stew-pan.

The accused was acquitted because gherkins often contain copper naturally. 1st. The amount of copper added to the gherkins could not be determined; 2nd. It has not been proved that the goods were prejudicial to health; 3rd. Evidence has not been forthcoming that the defendant understood that the process to which he subjected the gherkins might be prejudicial to health. The court considered the charge as ill-founded. The matter in question was but the improvement in appearance of the goods.

The copper produces a coloration by an unknown chemical action, according to German experts.

* Translated from the *Supplément au Moniteur de la Pharmacie.*

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, FEBRUARY 20, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

PHARMACY LAW AS A SUBJECT OF PHARMACEUTICAL EDUCATION.

THE members of the Manchester Pharmaceutical Association may be congratulated on their having chosen this subject for one of the papers to be read at their meetings, and thanks are also due to them for thus assisting to direct attention to the newly introduced requirement of the Board of Examiners. There is certainly very much reason for thinking that a greater familiarity with the provisions of the Pharmacy Act would be highly useful to all who are engaged in the business. On that account, therefore, we expected that the paper announced to be read by Mr. JAMES HART would have given an impetus to the consideration of pharmacy law in all its bearings. Unfortunately he has been prevented by illness from producing his paper at the time appointed, but to fill his place on the spur of the moment a very important phase of the subject has been taken up by Mr. WILLIAM LANE, and made the basis of a discussion which is reported at page 679. We fully concur with him in the opinion that the time is not far distant when registered chemists will be called upon to exercise greater strictness in carrying out the provisions of the Pharmacy Act in regard to the sale of poisons. In stating the history of the circumstances which have led to the present attitude of the medical profession in reference to the sale of secret remedies containing poison, Mr. LANE showed that since the prosecution of a chemist by the Government two years ago, there has been a growing tendency to act upon the interpretation of the Pharmacy Act then taken by the Counsel representing the Treasury, and to insist that all preparations containing scheduled poisons should be subject to the same conditions in their sale as the poisons themselves. This principle has quite recently been upheld in the weed killer case at Barnstaple, and on behalf of the medical profession it is strongly urged as being one that is essential for the safety of the public.

But, as Mr. LANE justly pointed out, there are difficulties to be encountered by those who are desirous of observing the principle which the Treasury has declared it will enforce and medical authorities declare to be essential for public safety. Among the host of secret remedies which the chemist is called upon to supply, it still remains to be shown how he is to ascertain that any of them contain poison of such a nature that they require to be labelled poison and otherwise subjected to the precautionary measures which the Pharmacy Act demands. From the fact that such preparations are sold in sealed packages under a Government stamp it is more than questionable whether the seller has any right to ask or to consider what they contain. It is true that in regard to some of the preparations in question, common repute attributes to them poisonous characters, but that would be scarcely a sufficient ground to act upon, and it would be unreasonable for the chemist to be expected to analyse every secret remedy he sells. It is from some other quarter that action must be taken in the first instance, if the enforcement of the Pharmacy Act provisions in the sense adopted by the Treasury is to be carried into effect, and it is precisely such action that is suggested by the British Medical Association. The fact of the presence of a scheduled poison in some secret remedy must be proved, and upon that basis the provisions of the seventeenth section of the Act enable any person to institute a prosecution for neglect of any of the precautions therein described. Whenever that proceeding is justified by a conviction evidence is furnished of a further offence under the Act having been committed, and there would be a ground for calling upon the Pharmaceutical Society to prosecute for the offence of selling poison without being legally qualified to do so, and, as Mr. WILKINSON remarked, that course could then be taken with propriety.

The alteration of public opinion that has taken place in regard to the sale of poisons in the form of secret remedies seems likely to become another instance of the modification of Acts of Parliament which result from the influence of altered conditions. It has been recently remarked by a legal authority that the language of Acts of Parliament is vague, and it may be suggested that this characteristic is almost a necessary one. For since Acts of Parliament are intended to apply to the future, it is but fitting that while their provisions embody general principles, the application of them may be susceptible of adaptation to any combination of conditions by which those principles would be disregarded. In the case of the Pharmacy Act the leading principle was to protect the public, and if it can be shown that a practice, which at the time of the passing of the Act was not a source of public danger, has since then developed to such an extent as to be

now a real source of danger, it is but reasonable and consistent with the spirit of the Act that the scope of its provisions should be extended by judicial interpretation so as to provide a remedy. As Mr. BENGER remarked at the Manchester meeting, secret remedies, or so-called patent medicines, have only recently been regarded as coming within the scope of the Pharmacy Act. But in this respect there has been a great alteration of public opinion. Medical authorities have long been urging that serious mischief is being done by the sale of narcotics and other poisons in a concealed form, as ingredients of secret remedies. Legal authorities have given their support to the view that the term "patent medicine" applies only to such medicines as are actually the subject of letters patent, and that the secret preparations to which that term is sometimes applied are in no degree exempted from the provisions of the Pharmacy Act, in the event of their containing poisons within the meaning of the Act. This aspect of pharmacy law is therefore one of especial interest at the present moment, both for the public and for registered chemists.

EDUCATION AND EXAMINATION.

WE have from time to time, in these pages, drawn attention to the dangers accompanying the prevailing tendency to substitute examination for education rather than supplement the latter by the former. The risks attendant upon the regulation of systems of education in strict accordance with examination requirements is, perhaps, greater now than at any previous time, and we gladly note in the *Times* of February 16 a letter addressed by the Bishop of London to the Lord Mayor on the subject of the proposed Gresham University, in which occurs the following remarkable passage :—

"The University of London does excellent work "in examining all comers and appraising their "attainments. But the highest kind of teaching, "which aims at formation of mind, cannot find "free play for itself under a system which sub-"ordinates the teacher to the examiner. Such a "system has a perpetual tendency to give a "mechanical character both to the teaching and "to its results. Originality and freshness in the "teaching is killed by the perpetual necessity of "paying regard, not to the subject that is to be "taught, but to the examination that is to be "passed.

"The two colleges (King's and University) and "the Gresham foundation are the right nucleus of "the new institution. The Gresham professor-"ships exist for the very purpose of giving the "kind of instruction wanted, and, had they been "early incorporated into a body that could grant "degrees, would undoubtedly now be holding a "much more conspicuous place than they do. The "colleges are engaged in the actual work, and they "have never yet been able to show their true "merit because they have steadily refused to lower "their instruction by making the passing of an "examination the one purpose of its being given."

These are words, the importance of which cannot be over-estimated, and pharmacists in particular should take them to heart, and do their utmost to support the principle here inculcated. Cram is sadly in the ascendant in much that passes for pharmaceutical education nowadays, and there is little reason to doubt that the greater part of the failures in the Minor examination are due to the fact that the candidates have prepared themselves or been prepared *for* the examination, instead of being rationally educated. If any profession is to be elevated to a higher status than formerly, it is incumbent upon students preparing to fit themselves for that profession, not to scan the examination syllabus or papers of questions and base all their studies thereon, but to get a thorough knowledge of every subject likely to bear upon their future everyday work, and then, and not until then, to present themselves to the examiners. An examination should be regarded, not as a trap to catch the unwary, unprepared for "catch" questions, but as a test of fitness to serve the public, whilst students might be less the prey to extreme nervousness if they could think of an examiner as a sympathetic fellow craftsman with an awkward duty to perform, and more prone to be merciful than otherwise.

The number of candidates presenting themselves for the Major examination, the first part of which was held during the past week, was twenty-seven. As this was the first occasion on which the new regulations were followed it would appear that several influences have operated to induce candidates to come forward for the grade of pharmaceutical chemist. The reduction of the fee is no doubt one influence, but it may also be inferred that the introduction of a written examination has been favourably considered, and that on the whole the alterations made in this examination have been well adapted to existing conditions.

* * *

The next evening meeting of the Pharmaceutical Society at Edinburgh will be held on the 24th inst. in the Society's House, 36, York Place, at 8.30 p.m. The chair will be taken by Mr. J. Laidlaw Ewing, and papers will be read on "Castor Oil," by D. B. Dott and Dr. Stockman; on "Calamine," "Opium Assay" and "Narceine," by D. B. Dott.

* * *

In regard to the opium traffic in China a declaration of opinion purporting to be signed by upwards of five thousand medical men is being circulated, and it is therein stated that as the habit of opium smoking or eating is morally and physically debasing and the unrestrained sale of opium is associated with many grave dangers to the well being of the people of India the drug ought to be classed and sold as a poison purchasable only from chemists as in England, and that the growth of the poppy and the manufacture and sale of opium should be prohibited in India except so far as it may be required for medical purposes.

Transactions of the Pharmaceutical Society.

MAJOR EXAMINATION.

February 16, 1892.

The following are the questions that were set for this examination:—

Chemistry and Physics.

1. How may carbon dioxide be liquefied, and what are the properties of the liquid? Under what conditions of temperature and pressure can it exist? Show how it has been utilized for the production of extreme cold.

2. Describe in detail the process of Gay-Lussac for determining vapour densities. Give an example with the necessary calculations.

3. What is meant by chromatic aberration, and how may it be corrected? Discuss the subject fully and give figures.

4. Describe the construction and use of (1) the electroscope, (2) the galvanometer, (3) the voltameter.

5. Give the names, formulæ and sources of the first five alcohols in the paraffin series; show in which of them isomerism may occur, and point out its character.

6. How is acetic aldehyde prepared? Give an account of the preparation and properties of the substituted aldehydes of the Pharmacopœia.

7. Give a full account of the chemical characters of olive oil, dealing especially with the products of its saponification.

8. What is a sulphonic acid? Give an example, and describe its preparation, properties and constitution.

9. What difference is observed in the behaviour of the hydrogen in the nucleus and in the side chains of a benzine derivative? Give an illustration in support of your answer.

10. Describe, with equations, the various sources and methods of preparation of salicylic acid. What are its principal impurities? Indicate their origin, and describe some process by which they may be removed.

Botany and Materia Medica.

Time allowed for both papers, Three Hours.

Botany.

1. Define a Zygospore, Zoospore, and an Ascus, and name the natural orders in which they occur.

2. Give a short account of Inulin, Aleurone Grains, and Cystoliths.

3. Distinguish between the Natural Orders Iridaceæ, Liliaceæ, and Amaryllidaceæ, and name any genera that may occur to you.

4. Describe the Ovule, and state what changes take place during its transformation into seed, illustrating the same by drawings.

Materia Medica.

1. Identify the starches submitted to you on slides marked 1, 2, 3.

2. What are the active principles of Belladonna Root? State what you know about Homatropine and its preparation.

3. Give the B.P. process for the estimation of opium, and explain the successive stages of the process.

4. What medicinal or economic products are yielded by the natural order Aurantiaceæ.

Paris Society of Pharmacy.

A meeting was held February 3, under the Presidency of M. Portes.

After the usual preliminary business the following notes, etc., were read:—

"The Origin and Determination of a Certain Number of Astragali and their Products," by M. Planchon.

"On the Composition of Concentrated Extracts of Coffee," by M. Bürker.

These extracts were shown to be less valuable than fresh infusions prepared extemporaneously, owing probably to the dissipation of aromatic products. They contain also only one-tenth of the quantity of caffeine found in the roasted grains themselves.

"The Analysis of Black Teas, etc.," by MM. Dommergne and Nicholas.

"On the Cause of Certain Abnormal Reductions of Fehling's Solution by Urine Containing Various Proportions of Glucose," by M. Grimbert.

"The Natural and Artificial Colouring Matters of Sponges," by M. Viron.

"Upon a Red Pigment Extracted from a Specimen of Orange Flower Water," by M. Viron.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The first general meeting of the forty-third session was held at the Royal Institution on Thursday, February 11, the President, Mr. J. S. Ward, F.C.S., in the chair.

In the absence of the writer a paper by Mr. A. E. Lomax on "Some Common British Plants and their Uses," was read by Mr. T. H. Wardleworth.

Wormwood.—This plant, found lingering around the forge and the barn, may be almost dismissed with Culpepper's remark, "I shall not describe it, as every boy who can eat an egg knows it." Though well known in the past as a herb of most potent virtue it is rarely sought in the country now except by the herbalist or the wandering botanist. In the days of Gerard, and at the close of the sixteenth century, it had quite an exalted position in the estimation of the apothecary, and he gravely prescribes it in cases of bites of the shrew mouse, and also where the mushrooms and toadstools have been eaten with unpleasant results. The prevalent impression regarding the great sea-serpent seems to be that it is the creation of the modern journalist to fill up the silly season, but we shall have to go further back for its origin, as we find Gerard, without qualification, says that wormwood is recommended when persons have been bitten by the sea dragon. Culpepper devotes fully four pages to a disquisition on its virtues, and waxes on its excellence in wheals, black and blue spots, coming either by bruises or heating. Quinsey, stings of hornet, wasp or scorpion are cured by it. Mix, says the author of the complete 'Herbal,' some wormwood with your ink and neither rats nor mice will touch the paper written with it. The careful housewife, when spinsters used the spinning wheel and the clothes press was an institution in every well ordered house, went in quest of wormwood. They strewed it in their drawers and closets; for, as Culpepper remarks, such a plan would make the moths scorn to meddle with the clothes, as much as a lion scorns to meddle with a mouse or an eagle with a fly. Haller recommends it for keeping off fits of the gout, and it is said that King Charles V. derived great benefit from its use. As its name indicates, it has been used as a vermifuge; in fact, its relative, *Artemisia maritima*, is the source of our

santonine to day. The *Artemisia maritima* grows in such profusion on the Siberian Steppes that the necessary apparatus has been erected on the spot, and santonine is made from the flower heads close to the place of growth. The wormwood in England, however, has fallen from its high estate, and is only to be found in the hands of the humble herbalists, being no longer reckoned worthy of a place among the specifics of the day. The plant in France more than holds its own, but not as a remedy. The authorities are gravely concerned about the absinthe drinking, a practice causing serious and far-reaching trouble among the city dwellers of France. The wormwood used in the preparation of the absinthe is collected principally in Switzerland, though some is gathered in France for the purpose.

The next on our list is the common palm, *Messalia officinalis*, belonging to the Labiate family, and like most of that large family, possessing aromatic properties. My own grandmother used to grow this in her garden, and would wax eloquent on the virtues of Balm tea. It is much used on the Continent for slight nervous affections now-a-days ; but in the times of our forefathers its uses were very many. Culpepper informs us that it is a remedy against the stings of the scorpions and the bitings of mad dogs (I am afraid it is no use giving M. Pasteur the wrinkle). It is good to wash aching teeth, and profitable to those that have the dysentery (the bloody-flux). The leaves, also, taken with a little nitre in drink, are good against the surfeit of mushrooms. Used with salt, it takes away wens and hard swellings on the flesh or throat, and is good for the liver and spleen. But not only is the body profited by the wondrous remedy, but the mind comes in for a share of the benefits it bestows ; for it causes the mind and heart to become merry, and drives away all troublesome thoughts and cares out of the mind. Wherefore, friends and brethren, when the cares and burdens of business, or rather want of business, are heavy upon you, and the influenza has ceased its ravages, and your trade is reduced to pennyworths of "Purient Pills," take Balm tea to revive your drooping spirits; it is cheap, and in spite of all its many virtues it is not a patent. But I have not done quite with the virtues of balm. Yet one more. Any of you that may be bee-keepers, note, according to our quaint our friend Gerard, if the leaves thereof be rufled upon the hive, the bees will keep together and others will come unto them.

The Bistort, or snake weed *Polygonum Bistorta*, belonging to the family of the Docks (though not particularly connected with Liverpool on that account), is a rather conspicuous plant; its fine, handsome spikes of fresh-coloured flowerets showing up above the tall, waving grass in many of our damp meadows. I have noticed it especially in Derbyshire. This second specimen of it is from Pike's Peak, Colorado, at an altitude of about 10,000 feet; and is interesting as showing the great alteration in the plant, produced by the difference in level, and probably also in soil. The root seems to be a powerful astringent. Gerard tells us that "the juice put into the nose prevaileth much against the disease called polypus, and the bitings of serpents." It was also used in dysentery, and as a wash for the mouth to fasten loose teeth. Gray says a decoction is as good as an astringent injection, as a gargle in relaxed sore throat, and as a lotion for ulcers where there is much discharge. The use of this plant, however, is not confined to medicine ; for in the north of England (where, by-the-bye, it goes by the name of the Easter giant) the young shoots were formerly eaten in herb puddings.

The lesser centaury, *Erythræa Centaurium*, a pretty little plant with pink flowers, belonging to the Gentian family, is our principal native substitute for the official Gentian. To give you an idea of the large quantities of this little plant, which are gathered for herbalists, I may mention that on one occasion I met a man with a huge bundle of this plant only on his back, which certainly did not measure less than three feet long by one and a half feet thick, and must have contained thousands of plants. This wholesale destruction of plants used by herbalists round our large towns has caused many of these plants to become extremely scarce anywhere near our larger centres of population, and, nowadays, the plant-lover must wander far-a-field to find many of these native gems in their natural haunts. I may instance the hemlock, valerian, wormwood, marsh buckbean, or trefoil, and, though not to so large an extent, the lesser centaury and yarrow. The nettle still rears its head defiantly everywhere in spite of the onslaughts made upon it by the manufacturers of nettle beer. But I must return to our little friend, and first inform you that, teste Culpepper, the herb is so safe that you cannot fail in the using, only giving it inwardly for inward diseases. Like its cousin, the gentian, it is very wholesome but not very toothsome. The juice of the herb mixed with honey was said to clear the eyes of dimness, and the green herb bruised to be an excellent application to wounds and sores. Gray praises it highly, saying that it possesses all the essential properties of gentian, and though not used professionally is a very valuable nature medicine as a bitter, febrifuge, and vermifuge. Externally also as a lotion for pediculi and itch.

The Marsh Mallow.—Our next plant is a very pretty light pink flowered velvet-leaved plant, very often confounded with the common mallow, which has dark purple flowers. It grows in waste places, whereas the true marsh mallow is a local plant, growing, as its name indicates, in marshes and generally near the sea. My grandmother used carefully to grow some plants of the common mallow in her garden, and nothing would convince her that it was not the true marsh mallow. With this plant she used to act Lady Bountiful, on behalf of the old sore legs of the neighbourhood, and, I must confess, with great success. The French are very fond of this plant. They call it guimauve, and make the lozenges from it known as pâte de guimauve. The decoction is demulcent and contains much mucilage. A syrup was official in the London Pharmacopœia. The diseases for which it was chiefly used were dysentery, stone, and irritable cough. Externally it was used as a lotion for sores and bruises.

Marsh Trefoil.—Another plant belonging to the Gentian family, though very different in appearance from the centaury, is the Marsh trefoil, bogbean or marshbuckbean, *Menyanthes trifoliata.* This plant grows in ponds and marshes, and has beautifully fringed flesh-coloured flowers and trifoliate leaves. According to Gray it is a bitter astringent used as a vermifuge and in rheumatism and dropsy. All the plant, but especially the root, is intensely bitter, and like gentian it is a valuable tonic. In the North of Germany this plant is used as a substitute for hops in brewing, 2 ozs. being equivalent to 1 lb. of hops. Like several other plants used by herbalists it has become almost extinct in this neighbourhood; in fact, I only know of two places where it still lingers on. Possibly drainage has something to do with its disappearance.

Solomon's Seal (*Polygonethium officinale*).—The virtues of this plant are well known to-day, but not so well as in the days when disputes were settled more readily without appeals to the law. Gerard tells us "that the root of Solomon's seal stamped while it is fresh and green and applied, taketh away in one night or two at the most any bruise, black or blue spots got by falls or woman's wilfulness in stumbling upon their hasty husbands' fists, or such like." Culpepper attributes much the same virtue to it, but dwells upon its power in healing broken bones, for which purpose it was steeped in ale or wine and then drunk.

The Italian dames, to secure a good complexion, made a wash with the root which was said to be efficacious in sun-burning, freckles, and kindred deformities of the skin. The graceful flowers are still to be found in our gardens, but the glory has faded from its fame, and we now only meet with the root in rare instances, and then for the purpose of removing the familiar black eye.

Acorus Calamus or Sweet Flag.—The interest centering round this is chiefly historical. The recent visit of an epidemic, the name of which I need not mention, has caused our public buildings to reek with the odour, agreeable or otherwise, of eucalyptus oil. Our forefathers had not this excellent antiseptic in their day, and therefore had to content themselves with what they found around them. During the great plague they strewed the courts of justice with sweet-smelling calamus to keep away the infection. So strong is custom that this practice lingers with us to-day, and we read quite lately of the ceremony being performed in one of the law courts.

Yarrow.—The plant of the dry pastures and meadows, the sandy lane and the town dust-heaps. No herbalist's store would be complete without this plant. Its other name, of nose bleed, indicates the use to which it was put in the old time. Now this plant is rather a *Lusus natura* in its way, for Gerard tells us in the first place that it staunches blood in any part of the body, and then that put into the nose it causeth it to bleed. Now, truly, this is a valuable property, for we can let blood and stop it with the same plant. This is a practical illustration of the homœopathic principle before the days of homeopathy. Take yarrow and the nose bleeds, take more and behold the blood stops.

Horehound.—This, like yarrow, is a stock article with herbalists, ofttimes in gardens, more tolerated than encouraged; near old walls, by foot-paths and untilled spots it is to be found. Its virtue in old times read like the latest patent medicine of to-day. Opening the liver and spleen, cleansing the breast and lungs, prevailing against an old cough, pain in the side, spitting of blood and ulceration of the lungs. Efficacious in giving relief during laborious child-bearing, of great merit in consumption, as hath been often proved by all learned physicians of our London College. To all this were added virtues of an optical character; horehound clearing the sight, cleansing the yellowness of the eye, and stayeth the running and watering of them. Truly a magnificent record, such a one that would turn a patent medicine vendor of to-day green with envy. But, alas! its virtues to-day are sadly limited in scope; of the long list above given, the cough alone seems susceptible to its charms.

Stinging Nettle.—Culpepper has a quaint way of describing or omitting to describe some plants. He generally passes them over with the remark that they are too well known to need description; and therefore he will not go to expense of time in writing about them. In speaking of the nettle, however, he excels himself, when he says, "Nettles are so well known, that they need no description; they may be found by feeling on the darkest night." Like other plants in favour in that day, the nettle was credited with virtues that would make it a chemist's shop in itself. Gerard, in particular, gives a prescription for its employment; being boiled with barley cream, it bringeth up tough humours that stick in the chest, as it is thought. In Gerard's time, evidently, every man did not "look the whole world in the face," as he indicates the nettle as "good for those who cannot breathe, unless they hold their necks upright," and also for the troublesome cough that children have, called chin-cough. The Roman nettle is said to have derived its name from the fact that the Romans are said to have brought it over with them to tickle their backs, as they found the climate so cold. They may have found it necessary to bring the nettle in the first instance to keep themselves warm, but we rather think they found Britain a little hotter before they left it.

Tormentil.—On our heaths and commons one of the brightest of plants to be met there is the Tormentil or Cinquefoil, *Potentilla tormentilla*, belonging to the rose family. Its roots are powerfully astringent and febrifuge, and forms our most valuable native remedy for diarrhœa and dysentery. Royle's 'Materia Medica' gives a formula for the decoction, which is prepared by boiling 2 ounces of the root in 1½ pints of water down to a pint, and straining. Culpepper has a long disquisition on its virtues, used both internally and externally; which, if I were to quote in full, would be as effectual in sending you all off to sleep as the most accomplished hypnotist.

Coltsfoot.—A very common plant of waste places, clay banks, and brickfields, which in a few weeks will brighten up these bare spots of the earth's surface with its yellow flowers—this is coltsfoot, *Tussilago Farfara*, dear to our youthful days in the form of coltsfoot rock. This plant has several aliases, coughwort, foalsfoot, horse-hoof, and bulls-foot. Culpepper hath a great opinion of its virtues, and he tells us that it is good for a hot, dry cough, wheezing, and shortness of breath, that the dry leaves are best for those who have their rheums, and distillations upon the lungs causing a cough, for which also the leaves used as tobacco and the root is very good. The distilled water is a singularly good remedy against the hot agar, it also helps St. Anthony's fire (erysipelas) and burnings. Grey says that the leaves form the basis of most of the British herb tobacco, and that the downy substance on the underside of the leaf, dipped in solution of saltpetre and dried, is used as tinder. This recalls the old days of flint and steel.

Celandine.—This plant generally follows the footsteps of man, and is found in the neighbourhood of dwellings; it will be found snugly ensconced in some edge under the shade of a wall. Its botanical name is *Chelidonium Majus* and belongs to the poppy family. The derivation given by old Culpepper for the name is a fine piece of reasoning and worthy the attention of our ophthalmic surgeons, for, says he, it is called chelidonium from the Greek word chilidon, which signifies a swallow, because they say that if you put out the eyes of young swallows when they are in the nest the old ones will recover their eyes again with this herb; and, continues he, of this I am confident, for I have tried it, that if we mar the very apple of their eyes with a needle she will recover them again, but whether with this herb or not I know not. Be this as it may, the orange-coloured juice is still used to drop into the eye as a popular remedy for ophthalmia and also to apply for the removal of warts. Internally it is an acrid poison, but, according to Gray, it has been regarded as stimulating, aperient, diuretic, and sudorific.

Angelica.—Perhaps I ought not to include this, as it is not a wild plant of Great Britain, and is only to be found in some of our old country herb-gardens. It is the *Angelica* or *Archangelica officinalis*, the root of which candied formed a highly-esteemed cordial and aromatic tonic among our forefathers. Gerard has some quaint observations about this plant, for, says he, the roots of angelica is a singular remedy against poison and gainst the plage, if you do but take a piece of the root in your mouth or chew the same between your teeth, it doth certainly drive away the pestilential air, yea although that corrupt air hath possessed the heart yet it driveth it out again by urine and sweat. It attenuateth and maketh thin gross and tough *flegme*, the root being used green and full of juice. It is also a most singular medicine against surfeiting and loathsomeness to meat, it helpeth concoc-

tion in the stomach and is right beneficial to the heart. It cureth the bitings of mad dogs, and last, but not least, it is available against witchcraft. The taste of the root is not unpleasant, being fragrant, slightly bitter, and pungent. Gray says that the Laplanders use it as both food and medicine, that they eat the stalks roasted in the hot ashes for coughs and hoarseness, and the tender flowers boiled in milk to the consistence of an extract to promote perspiration and to strengthen the stomach and bowels in diarrhœa.

Elecampane.—This is rather a local and not a common plant, being generally found in waste, sandy places and among sandhills near the sea. The Latin name is *Inula Helenium*. Old Gerard has sundry and various pieces of quaint information anent this plant. He tells us it is of great virtue given in a looch, which is a medicine to be licked upon (? are lozenges looches) and likewise preserved, as also otherwise given to purge and void out thick, tough and clammy humours which stick to the chest and lungs. The root preserved is good and wholesome for the stomach; being taken after supper it doth not only help digestion but also keepeth the stomach soluble. The juice of the same boiled driveth forth all kinds of worms from the belly. Also Galen saith that herewith the parts are to be made red which be vexed with long and cold grips, as are divers passions of the huckle bones, called the sciatica, and little and continual burnins and looseness of certain joints by reason of much moisture. A decoction of inula drunken provoketh urine, and is good for them that are grieved with inward burstings, or have any member out of joint. The root of inula boiled very soft and mixed in a mortar with butter and powder of ginger, maketh an excellent ointment against itch, scabs, manginess and such like. Primitive pharmacy this, not much like our eloquent preparations of to-day. Grey says the root is aromatic, slightly bitter, tonic, diaphoretic and stomachic; useful in asthma, hooping-cough and uterine diseases. The root contains a starchy substance, inulin, volatile oil, acrid resin and bitter extractive.

Burdock.—This plant, the *Arctium Lappa*, will be remembered by most of us who have been boys (I do not refer to those who have not been anything but men all their lives), by the burrs we used to throw at each other for the fun of seeing them stick on the other fellow's coat; a property the flower-heads possess on account of their being covered outside by a number of minute hooks, which catch in the nap of the cloth. I do not, however, bring it before you on account of its youthful associations, but on account of its medicinal properties; for, saith Gerard, and evidently he was no teetotaler, the root stamped and strained with a good draught of ale is a most approved medicine for a windy or cold stomach; likewise taken with old wine it doth wonderfully help against the biting of serpents. The young stalks, according to Gray, when peeled form a substitute for asparagus. It was reckoned by Sir Robert Walpole as an excellent substitute for sarsaparilla. The root is reckoned tonic, aperient, sudorific and diaphoretic, and has been used in the form of a decoction in rheumatism and skin diseases. The fruit, which is bitter and slightly acrid, has been used as a diuretic.

The meeting accorded a hearty vote of thanks to Mr. Lomax for his paper, and to Mr. Wardleworth, who read it.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

The fourth ordinary meeting of this Association was held on Wednesday evening, February 10, in the rooms of the Chemical Club, Victoria Hotel.

The chair was taken by Mr. George S. Woolley, President, and there was a good attendance of members.

The event of the evening was a discussion on "The Labelling of Proprietary Medicines containing Poison," the subject being introduced by Mr. Wm. Lane.

Mr. Chairman and Gentlemen,—When called upon by our Secretary to contribute a paper this evening, I declined, for the simple reason that I had nothing of importance to occupy your attention. However, on learning that our friend Mr. James Hart, who would have read a paper on "Pharmacy Law," was unable to do so owing to indisposition, I, under the circumstances, promised to introduce for discussion a subject which to my mind is a very important one, especially if we regard it in the light of the future—"The Labelling of Proprietary Medicines containing Poison." I feel fully convinced, gentlemen, that the time is not far distant when we shall be called upon to exercise greater strictness in carrying out the provisions of the Pharmacy Act in regard to the labelling and sale of poisons, more especially as concerns the labelling of proprietary compounds containing poison. Now, proprietary medicines are of two kinds, unstamped and stamped. The latter are generally called "patent medicines." This, of course, is an error, as only those medicines which are under letters patent are really entitled to be so designated. Proprietary medicines of the former class are simply labelled after the name of the ailment they are intended for, as, for instance, "Rheumatic Mixture," "Toothache Tincture," "Gout Pills," and added to the title are simple directions for use, with the seller's name and address, but no sole proprietary right of manufacture is claimed. With stamped proprietary medicines the possessive case is used, as, Smith's Rheumatic Mixture, or sole proprietorship is expressed in the words, "prepared only by," or an equivalent phrase. The medicine is, moreover, invariably held out to be a remedy for curing or alleviating or destroying certain pains, aches or maladies. Medicines of the latter category thus come under a sort of tax, and this tax is made visible in the form of a revenue stamp. But if a medicine in the first-named class be a poison, or contains as an ingredient a poison, certain precautionary details have to be observed in labelling it for public safety. It can hardly be contended that by adding such further hypographical matter to the label, wrapper, or advertisement, as would render it liable to the revenue tax, we lessen its narcotic potency, hence it must appear that scheduled poisons, containing medicines of the revenue stamp class, require to be under the same regulations for their sale in the interests of the public, as do medicines in the unstamped proprietary class. You will remember that some two years ago an inquiry was held at Wandsworth by Mr. Braxton-Hicks, into the cause of death of a child. The case is known as the Matthias case, and it transpired in that inquiry that the deceased and his sister had taken the contents of a bottle labelled "Compound Syrup of Camphor or Cough Tincture"; and the mother stated that if she had known—mark you—if she had known that the bottle contained poison, she would have kept it locked up in a cupboard. The chemist contended that he had sold the syrup as a patent medicine, and that it was not customary to label such medicine poison when sold under a government stamp. The coroner, however, expressed himself in a very decided manner, that he believed this medicine and all such medicines containing poison were really subject to the same restrictions as regarded their sale as unstamped proprietary medicines were, and addressing the chemist said that it was very probable that he should order proceedings to be taken against him under the 17th section of the Pharmacy Act, which, as you know, runs thus—"It shall be unlawful to sell any poison, either by wholesale or retail, unless the

box, bottle, vessel, wrapper, or cover in which such poison is contained be distinctly labelled with the name of the article, and with the word poison, and with the name and address of the seller of the poison." Proceedings were, at the instigation of the coroner, shortly after commenced by the Public Prosecutor at the Mansion House Police Court, charging the chemist with having sold three bottles of cough mixture containing in each bottle 2 grains of acetate of morphia, the bottle not being labelled in compliance with the 17th section of the Pharmacy Act, 1868. For the defence the custom of the trade was relied upon, but the Treasury pointed out that no custom of the trade can affect the statute. The case ended in the chemist being fined 10*s.* and 2*s.* cost of the summons. Now, in the argument of this case the only point that seemed to present any doubt in the mind of the Lord Mayor was as to whether the Act could be construed to include mixtures containing a poison. The Act says any poison. Mr. Gill, for the Treasury, argued that if a person sells a bottle of mixture of any kind, any ingredient of which is a poison, he in fact sells poison, because he sells every ingredient in that mixture. The Lord Mayor observed that he would like to see this section of the Act more explicit. Still you see, gentlemen, there was a conviction, and so far as I have been able to judge from the literature on this case the decision gave entire satisfaction to the press on the grounds of public safety. I am sorry to have detained you in thus going over the points of this to us somewhat interesting case, but by having done so the better to prepare you for the second part of my remarks. In November of 1891 Mr. Ernest Hart, Chairman of the Parliamentary Bills Committee of the British Medical Association, again (for this matter had occupied their attention previously) brought before the Committee the subject of the sale of poisons and patent medicines, and referred to the fact that it was distinctly announced at the time of the Mansion House prosecution as the intention of the Government to press to the utmost, and if any instance of a proprietary medicine containing poison and not so labelled was brought to the notice of the authorities proceedings would be taken against the person selling. No further steps had, however, been taken by the Government in this matter. The Chairman then announced that he had had certain proprietary medicines examined for the information of the Committee, and handed in the report of Dr. B. H. Paul, showing that ten of the preparations examined contained morphia in proportions varying from ·08 to 3·11 grains per fluid ounce. Two of the preparations contained strychnia in the proportions of ·05 gr. and ·10 gr. per fl. oz., and one preparation contained aconitine 1·6 gr. per fl. oz. Three only of these preparations were labelled poison. A resolution (*vide British Medical Journal*, November, 1891) was proposed by the Chairman, and unanimously adopted by the Committee, to the effect that the solicitor to the Treasury, and also the Pharmaceutical Society, be requested to take such steps as may seem most advisable to put in force the powers entrusted to them by Act of Parliament, with a view of preventing the sale of proprietary medicines containing poison by persons not authorized to sell such. We then see that this question is by no means laid at rest; it has been taken up by the Committee referred to and we shall most certainly hear of it again. Well, now a difficulty naturally arises. How are we to know whether the proprietary medicines we are handling do contain a scheduled poison. They come to us labelled "Smith's Soothing Syrup," "Brown's Night-drops," "Jones' Cough Syrup," and so on. Are we to hastily conclude that these preparations are poison—containing compounds and label them poison, or are we to analyse them so as to render ourselves proof against the possibility of a prosecution? In the first case there is, supposing the preparation to be free from poison, the danger of creating unnecessary alarm, and this to the prejudice of the manufacturer to whom we should be liable at law. In the second case it is not reasonable to expect every chemist to analyse the stamped proprietary medicines he is called upon to supply. Perhaps the ultimate solution of the problem will be that the Government will compel the proprietors of stamped and unstamped medicines to declare on the label the name and quantity of any poison the medicine may contain. Our course will then be quite clear, and not until then shall we understand our position. For the present we must not shirk our responsibility as custodians of poisonous compounds. It is the duty of every qualified chemist to exercise that care and discretion which by virtue of his training in so responsible a calling as that of pharmacy he is so well fitted. He will then show that public safety is better secured under his control than by the indiscriminate vending of dangerous and poisonous compounds by the uninstructed and untrained trader.

A discussion was opened by Mr. Wilkinson, who expressed his opinion that the labelling of certain proprietary medicines with the word "poison," was rather a difficult question to settle. Every chemist puts up some proprietary article containing poison, even if not containing anything approaching a dangerous quantity. Members should remember that the police had the power to set the law in motion against anyone who sold a proprietary article containing poison, and which was not fully labelled in accordance with the Poisons' Act.

Mr. Benger feared that the use of the word "poison" indiscriminately on all medicines containing poison, however minute the quantity, would tend to weaken the meaning of the word as we now understood it. It would probably be necessary to find another word to be attached to bottles or packets containing strong poison, and which were of a highly dangerous character. Should it be necessary to use the word as extremely as had been suggested, they might as well label whiskey, brandy and other alcoholic drinks poison, as they were responsible for far more deaths than the poisonous medicines referred to. It was perhaps desirable, from the chemist's point of view, that the law should be enforced, as that would put the sale of all poisonous patent medicines in the hands of qualified persons. From the point of view of the public he was not so sure that this would be an advantage.

Mr. Blackburn thought that pharmaceutical preparations containing poison, including chlorodyne and morphia lozenges and others of that class, should invariably be labelled "poison" before leaving the pharmacy.

Mr. Benger said that of course that if it was decided by law that such things should be labelled "poison" they would have to comply with that law.

Mr. Pratt remarked that it was very evident an alteration of the law was necessary.

Mr. Blackburn said one could scarcely take up a daily paper without finding recorded one or more deaths caused by taking poisonous medicines. That was due, to a very great extent, to the present defective state of the law. Coroners were throughout the country calling the attention of the Government to this state of things. The matter should certainly not be allowed to drop, as the present seemed to be the most favourable time for action. He saw no reason why the sale of patent medicines should not be restricted to men qualified to handle them. At present when a man came to a chemist and asked for a scheduled poison he would not be supplied unless that chemist knew him, but that man could from an unqualified person obtain the poison without difficulty.

LIBRARY

The Chairman: It must be a compounded medicine he gets from the unqualified person.

Mr. Blackburn: The grocer can label laudanum as "Pain Killer" and then sell it as he likes.

Mr. Kirkby remarked that this subject had not been discussed a moment too soon. The matter had already been taken up by the medical profession, who had formed a strong opinion upon the subject. It was desirable that chemists should insist on all poisonous compounds being labelled as such, however minute their quantity.

Mr. Wilkinson said that some blamed the Pharmaceutical Society for not instituting prosecution against grocers for selling poisonous preparations. The Pharmaceutical Society could hardly start to do so. If the law were set in motion by some authoritative body, then it would go quickly enough. The Society, if it prosecuted grocers and other traders, would do more harm than good. It would be said by the public that it was their own advantage they were seeking and not the good of the public.

The Chairman remembered that at the time of the passing of the Act a question was raised about photographic dealers selling cyanide of potass and other poison. When Mr. Brown and he went up to the Council for the first time they made a point of that. Several older members of the Council deprecated any interference with the sale of poison for trade purposes. He felt at that time and still felt that the Act should have been administered strictly. He would have brought the thing to an issue at once; the matter, however, was not done. Patent medicines ought to have been put on a right footing twenty-two or thirty-three years ago, and yet here they were talking about the question yet.

Mr. Benger reminded the Chairman that it was only quite recently that patent medicines were regarded as coming within the scope of the Act at all.

Mr. Blackburn said that the Inland Revenue returns showed that there were far more of these patent medicines sold than there were twenty-five years ago.

Mr. Smith (Radcliffe) considered that patent medicine licences should be in the hands of qualified persons only. To make up to the Inland Revenue the loss caused by issuing a smaller number of licences, the cost of these might be increased.

The Chairman said that it was evident from the discussion that the Pharmacy Act might be greatly improved, but in his opinion, this Act, which had been in force twenty-three years, should be replaced by an entirely new Act. Members might rely upon it that the Pharmaceutical Council which had already submitted three if not more Bills were quite alive to what was wanted, and would utilize any chance there might be of obtaining beneficial legislation.

Mr. Lane considered that grocers were in as unfavourable a position as druggists in this matter. It was not proposed to act in a spirit of antagonism towards any class of traders. The grocer was almost as ignorant respecting the composition of the patents he sold as the druggists were. If they were labelled poison the grocers would not sell them; the sale of these things would then come into the hands of the chemists, who were the only persons qualified to handle them.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

For the first time in the history of this organisation the members on Wednesday night had a social evening at their rooms. It was the beginning of a series, and, judging by the attendance, the new departure is a welcome one and calculated to keep the members in closer touch. Instead of hearing an address on something pertaining to their profession the assembly were treated to a witty and interesting lecture on "Stage Land," by the Hon. Secretary, Mr. R. Watts. He gave a lot of information which would be entirely new to most of the audience, and altogether his lecture was very entertaining. There were some capital illustration shown by Mr. Newsholme through his own lantern. The chair was occupied by the President, Mr. Morrison.

Proceedings of Societies in London.

SOCIETY OF ARTS.

Burning Oils for Lighthouses and Lightships.

BY E. PRICE EDWARDS.

This paper is not intended to re-open the controversy in respect of the relative merits of oil, gas, and electricity as lighthouse illuminants. My purpose is to give a simple account of the use of various kinds of oil for the illumination of lighthouses and lightships in this and neighbouring countries; to show what has been done in the past and what is being done at the present time.

It should also be understood that I do not propose to enter into minute technical details regarding the chemical composition of the oils, but shall present to you facts of a more or less general but essentially practical character, which have come under my observation while carrying out my duties as an official of the Trinity-house Corporation.

The importance of the subject as affecting the safety of life and property at sea, and facilitating navigation in the dangerous waters near to our shores, will probably be regarded as sufficient justification for its presentment before this Society.

Up to the middle of the last century, and in some cases up to the early part of the present century, British and other sea lights were simply bonfires fed with wood or coals, or bales of pitch and oakum, burned in open fixed grates, or swinging iron baskets, known as "chauffers." Such lights as guides or warnings to mariners were frequently of the least service when most needed; at the best they were uncertain and insufficient, their smoky, ill-burning flames or red-hot fuel being visible at very short distances at sea. It is said, however, to have been an advantage possessed by these bonfires that their light was, at times, reflected in the sky, whereby mariners were enabled to fix approximately the position of the light-tower itself. The employment of these fiery materials seems to have lessened when candles of tallow came into use. One trustworthy record of this we find in Smeaton's work on the Eddystone Lighthouse, wherein he says that the light was maintained with twenty-four candles, "whereof five made two pounds." He further tells us that it was very necessary to keep the lantern cool, complaint having been made of "it being so hot, especially in the summer, as to give much trouble by the running of the candles." It will be understood that an important function in connection with the use of tallow candles was the snuffing of them, and the old clock in the Eddystone tower was set to strike once every half-hour "to warn the keepers when to snuff the candles."

It is not easy to find any exact records of what was the actual practice in respect of the majority of the lighthouses in those comparatively dark ages, but stated in general terms it may be accepted that wood, pitch bales, coals, and candles, were the main illuminants for lighthouses up to the middle of the last century, and that they were all miserably inefficient for the purpose.

As an illuminating agent for domestic purposes, oils of various kinds have been, as you must all be well

aware, employed from time immemorial, and it is more than probable that, for small harbour and fishermen's lights, oil of some kind was used, but the appliances for burning oil were then so imperfect that a light so produced was regarded as quite inferior to a coal fire.

Not until the invention of the Argand oil burner, about 1784, was anything like a real advance made in the use of oil for sea lights. Most of the difficulties which had previously prevented oil from being used for that purpose were overcome by the splendid invention of M. Argand, and thenceforward oil quickly displaced all other illuminating agents for lighthouses. It is now more than 100 years ago since that distinguished Frenchman perfected his burner, and to this day the large majority of oil-burning lamps are constructed on the principle then discovered and realised by him.

Perhaps I may be here permitted to refer briefly to the manner in which oil is consumed and light produced while a lamp is in operation. Of course, the process is quite familiar to many of my hearers; but, as it will be a convenience to me to state it here, and it may possibly be useful information to some of you, I will ask the indulgence of those who know all about it. In the first place, it should be realised that, when oil of any kind is consumed, by burning in a lamp or elsewhere, and flame is the result, the liquid itself is not inflamed. We talk freely enough of the burning of oil, but what really burns is the vapour or gas of the oil. In lighting a lamp, in the first instance, the flame of a taper or match is applied to a portion of the oil-sodden wick, and the heat of this flame converts the oil in that part of the wick into vapour or gas, and the same flame ignites the oil vapour. The burning vapour will then continue the manufacture of more vapour, as additional oil is supplied to the wick, and thus the oil will be consumed by evaporation, until there is no more oil in the lamp to be drawn up the wick for conversion into oil vapour. One other point to be borne in mind is that, in the act of burning, the vapour combines chemically with the oxygen of the atmosphere; and, as oxygen is the principal supporter of combustion, it follows that, the more effectually air containing oxygen can be supplied to the flame, the more perfect and vigorous will be the burning of the vapour.

It was the recognition of this principle which enabled Argand to accomplish his great work, and to produce an oil burner associated with a glass chimney, by means of which the flame of a cylindrical wick was fed with air internally and externally, whereby vastly improved combustion of the oil vapour was effected, the smoky and snuffy solid wicks then used for oil lights were banished, and the maintenance of a clear steady flame rendered possible. Briefly stated, the great invention consisted of the introduction of a hollow cylindrical instead of a solid wick, working on a hollow metal cylinder open at the bottom and at the top, whereby air was admitted into the centre of the burning ring at the top to the wick. A glass cylinder outside the wick drew up a circular current of air, and caused it to impinge upon the outside surface of the flame, and also prevented irregular draughts and puffs of air from striking the flame. With this burner was associated a cistern, so placed that the oil should flow by gravitation down the supply pipe to the burner, and, immersing the wick, would be maintained in the burner tube at a constant level very near to the top of the burner, the portion of wick above this level being fed with oil by capillary action, the oil creeping up the wick to the burning point. Of the further extension of the Argand principle I shall speak presently. I refer now to M. Argand's great invention, because it marks the period of the real advent of oil as an illuminant for lighthouses.

At the period indicated fish oils of several kinds were employed for various purposes, including illumination, but the lighthouse authorities seem, by common consent, to have adopted spermaceti oil, obtained from the South Sea whale, as the most suitable for their purposes, and at the close of the last century this was, in the northern latitudes, in pretty general use. From about 1790, sperm oil was burned with good results in the Argand lamps used for lighthouses in England, Scotland, and Ireland, the United States, France, and other European countries up to 1832. In that year France changed her oil, but Great Britain and Ireland held on to the sperm for another twelve years, the authorities being well satisfied with its suitability and efficiency, and being apparently unwilling to make a change which might prove of doubtful advantage. At this time the market price of sperm oil ranged from 5s. to 8s. per gallon, and there was no lack of the commodity. But as time went on, prices showed a continued upward tendency; ominous rumours were current that the supply being dependent upon the success of the whaling industry would become restricted as the demand increased. Furthermore, colza or rape-seed oil was entering into competition with it at about half the price, and in 1845, after careful experiments, the Trinity-house Corporation acted upon the recommendation of a Select Committee of the House of Parliament, and determined to adopt this oil for their lighthouses and lightships in lieu of sperm, on account chiefly of the much lower price of the former.

This is the oil which had been used in French lighthouses since 1832, with good effect. The oil is obtained by expression from the seeds of the rape plant, a small wild cabbage (*Brassica oleracea*), grown to a considerable extent in France and Belgium. Its price per gallon was then 3s. 6d. as against 7s. for sperm, and therefore its adoption effected a large saving. When its employment was under consideration, some trials as to its value as a lighthouse illuminant showed that the lamps then in use with sperm were not suited for burning this vegetable oil; but, by the efforts of Mr. Wilkins, of London, Mr. George Herbert, of the Trinity-house, and Mr. Stevenson, in Scotland, who each designed a lamp suitable for burning rape-seed oil, this difficulty was overcame. It was also found that with suitable burners the light-yielding powers of the fish and vegetable oils were about equal, while there was no material difference as regards consumption. Thenceforward all classes of burners used in lighthouses and on board lightships in the United Kingdom were gradually adapted for the use of the new oil. Its great safety, its effective illuminating power, and its economy as compared with sperm oil, combined to cause it to be regarded as a most desirable illuminant; and, for many years it has been in use, latterly, however, in diminishing quantities. In connection with the contracts made for the supply of this oil for lighthouse purposes, the greatest care has always been exercised to ensure the oil so supplied being of the purest and best quality. The samples submitted with the annual tenders, and the deliveries subsequently made by the contractor, were subjected to severe tests, comprising chemical examination for free acids or adulterating elements, test of capacity to withstand congelation at 25° F., 16 hours' continuous burning, during which period the wick must not be trimmed, and measurements of the illuminating power taken every few hours, and, at the end, the wick carefully examined, to see if any incrustation had formed which would injuriously affect the maintenance of the light. Each cask of oil delivered is sampled, and carefully tested, as above indicated, to ensure its being of a quality equal to that submitted with the tender of the firm holding the contract. Any impurity in colza oil is tolerably certain to make itself evident in the burning: the foreign substance will most probably carbonise

in the wick at the burning point, and will hinder the proper quantity of oil being evaporated, thus impairing the effectiveness of the flame, and, if prolonged, causing it to sink, so as to be of no value as a light. It is obvious that the strictest tests are a necessity. The oil for the Trinity-house service, when approved, is started into large iron cisterns, each capable of holding 9000 gallons, and after being allowed to settle down for a month or two, a process which improves all animal and vegetable oils, is drawn off into iron drums (five gallons each) tinned inside, and despatched by the lighthouse tender to the lighthouse or light-ships.

In 1852, a new Lighthouse Board, for the United States of America was constituted, and one of the first questions they dealt with was that relating to the substitution of another and cheaper oil in place of the sperm oil there in use. Following the lead of France and England they inquired as to the possibility of employing rape-seed oil. The difficulty experienced in their investigation was that this oil would have to be imported from Europe, as no available means existed for its home production. An endeavour was made by the Board to stimulate the cultivation of the rape plant and the manufacture of the oil in America, but without success. While this effort was in progress, Professor Henry made a number of experiments with various oils, but more particularly with lard oil, and arrived at the conclusion that it was possible to burn this oil satisfactorily in lighthouse lamps. Moreover it could with facility be manufactured in America, and supplied at a price considerably less than would have had to be paid for colza. Consequently, about 1861 lard oil became the illuminant in all the light-houses of the United States, a special lamp for burning it having been designed by Mr. Joseph Funck, the foreman of the lamp shop of the United States Lighthouse Board. The principle of the lamp was that of the Argand, but its speciality was that the reservoir for the oil was so placed that the heat of the flame passed through its centre, it being a necessity in order to get the best effects from this oil that it be kept at a high temperature, it having a marked tendency to congeal at temperatures below the normal.

The possibility of using petroleum had been many times mooted in the United States, but no safe methods of burning it at this date seem to have been available. Sundry accidents had happened in its manipulation, and petroleum had gained the reputation of being a dangerous explosive liquid which should only be handled with the greatest amount of caution. It was not, therefore, thought desirable to depart from using the safe lard oil. As late as 1872 a Committee from the Trinity-house of London visited America, and found lard oil in general use in the lighthouses of the country, and it continued to be so employed up to 1879. The average price paid for it was 1 dollar 10 cents per gallon, as against 1 dollar 64 cents for sperm.

Among other vegetable oils which have been used for lighthouses may be mentioned olive and cocoa-nut oils. The former has yielded very satisfactory results in a burning test made at the Trinity-house about six years ago; the illuminating power obtained being quite equal to that obtained from the best colza. The oil, however, was quite solid at 25° Fahr. It was, in former days, used in some Irish lighthouses, and many of the Mediterranean lights were also illuminated by its agency; but its cost, in 1867, was about 6s. per gallon, as against 3s. for colza; therefore it could have no chance in the competition with colza, apart from its liability to congeal. It is still used in some of the small Mediterranean and Asiatic lights.

Cocoa-nut oil has been, and still is, employed to a considerable extent for lighthouses in India and Ceylon, but it is now being displaced by mineral oils. A sample tried at Trinity-house showed that, when kept in a liquid state, it could be burned, and yielded fairly satisfactory illuminating results; but it was necessary to keep a lamp burning under the oil cistern to keep it fluid. It is not at all adapted for illuminating purposes in these latitudes, as it becomes solid at ordinary temperatures. Moreover, its price here would not have allowed it to compete with colza.

The progress made in the further development of lighthouse burners during the period when sperm and colza were the illuminants is worthy of notice, as the additional knowledge gained had doubtless a great deal to do with the further utilisation of oil for lighthouses. The Argand principle had to be adapted to new conditions when the lens system of Fresnel came into use. Previously the great beacon lights on our coasts had been produced by a number of single-wicked Argand burners, each placed in a reflector. If the light was meant to be fixed, *i.e.*, continuously shining, showing with equal effect all over the arc to be illuminated, the lamps and reflectors would be suitably arranged around a cylindrical framework, so that their rays should proceed continuously in the direction required; but if the light were to be revolving or flashing, a certain number of the lamps and reflectors would be fixed on each face of a polygonal framework, and the whole framework set in rotation, whereby each group of lamps on a face would send out a beam of their combined rays, and each beam would successively travel over the seaward arc requiring to be illuminated. This is, as you doubtless are aware, known as the catoptric system of illumination. It is in operation at only a very few lighthouses now, and these will probably be changed to the more perfect or lens system in due course. On board lightships, however, the Argand lamps and reflectors have to be retained in consequence of the movements of the vessel rendering lenticular adjustment very difficult and costly. With the dioptric system one large burner only is used, placed in the centre of the lighthouse lantern and surrounded by a structure of glass lenses and prisms, the use of which is no doubt familiar to all. When Fresnel was completing the application of his lens system, the necessity arose of providing a larger and more powerful burner than the single-wicked Argand, and, in conjunction with his friend, M. Arago, he produced an enlargement of the Argand burner, having four concentric wicks. With all the four wicks alight the flame of this burner was about 4 in. high and about $3\frac{1}{2}$ in diameter. Each wick was independent of the others, air spaces separating the circular wick cases, and the oil was supplied to the wicks by hydrostatic or mechanical pressure. In such burners both sperm and colza oils were freely used, and up to the year 1872 no greater number of wicks than four were employed in any burner, and colza oil was in general use in all British lighthouses.

Sir Lyon Playfair, who has shown his appreciation of the importance of my subject and honoured me, by presiding this evening, will well remember calling the attention of Mr. James Young, in the year 1848, to the oozing out of some petroleum above a coal-working at Alfreton in Derbyshire, and suggesting to him that it might possibly afford a profitable subject for investigation. From that suggestion most important and valuable results have emanated. That particular supply of petroleum quickly gave out, but not until Mr. Young had, after careful observation, formed a theory as to how it had been formed. This theory he subjected to experiment; he followed what he believed to be the natural process by which the petroleum had been formed, and by the slow distillation of coal he produced a liquid (now known as crude oil) somewhat similar to that which had oozed out at

Alfreton. The yield of liquid from a ton of coal was about fifty or sixty gallons; but subsequently Dr. Young's attention was drawn to the Torbanehill or Boghead bituminous mineral, which was found to contain a much larger percentage of carbon than the coals he had previously distilled. Subjecting this new raw material to his process, he succeeded in extracting from it as much as 120 gallons of crude oil per ton. There being extensive fields of bituminous shale in Scotland, the extraction of paraffin oil rapidly grew into an important industry.

Briefly stated, the process is to place the shale in retorts to which a gradually increasing heat is applied. All the volatile constituents of the shale are thus vaporised, and the vapours so formed conducted off by pipes to be condensed. The whole of the resultant condensed liquid is crude oil, a dark-green viscous fluid with a specific gravity of ·870 to ·885. A considerable quantity of the vapour remains uncondensed, and is led off to be utilised for heating purposes. The next process is the distillation of the crude oil in order to obtain from it the various products required. This is also a gradual operation, and is continued until the oil is distilled to dryness. The first application of heat to the still releases the most volatile elements; as the heat is increased, the heavier portions of the crude oil are vaporised. It is important to note this operation, showing the quality of the different paraffin burning oils as extracted. The early distillate is given up to the production of gasoline and naphtha, and is cut off when the condensed vapour in a liquid state has a specific gravity of ·770. These products are highly inflammable, that is to say, they will vaporise at comparatively low temperatures. The next section of the distillate is devoted to burning oils, the specific gravity of which ranges from ·770 to ·850. It is this section with which we are chiefly concerned. The further extension of the distillation yields lubricating oils containing solid paraffin. The burning oil is subjected to chemical treatment for purifying, and a process of fractional distillation to enable the oils to be separated into different qualities to suit the markets. For the general public the lighter oils are appropriated, having a specific gravity ranging from ·795 to ·810, and none of these can be vaporised at temperatures below 90° F. (Abel test). The oil for lighthouses is specially selected, and has a specific gravity of from ·810 to ·820 and cannot be vaporised until subjected to a heat of 145° F. Let me here observe that the temperature at which mineral oil can be vaporised is the test of the safety of any such oil, and is known as its flashing point. The vapour evolved is inflammable in the open, and explosive if confined. I do not mean that any spontaneous inflaming or explosion will take place, but simply that the application of flame to the vapour will ignite it. Specific gravity in itself is not a test to be depended upon. The lighthouse oil, it may be observed, does not give out dangerous vapour until it is heated to a temperature above 145° F.

As I before remarked, the industry of making paraffin-burning oils is a large one in Scotland, the whole having grown out of the enterprise and skill of Mr. James Young, encouraged and assisted by such eminent scientists as our Chairman of this evening.

While Dr. Young was pursuing his investigation with the Boghead mineral, the French lighthouse authorities were making trial of oil extracted by distillation from the bituminous schists of the Department of Allier, and found it possible to burn the oil in a single-wicked lamp invented by a M. Maris. The result of the trials was that a few small harbour lights were illuminated with this oil. Some accidents occurred which had the effect of alarming the authorities, and of causing its use to be proceeded with very cautiously, and it was for several years confined to single-wicked lamps.

In 1868 Captain Doty, who had given some attention to the subject of mineral oil burning, came upon the scene, and put himself in communication with various lighthouse authorities. On his introduction by the late Emperor, Napoleon III., to the French authority, he submitted burners with three and four concentric wicks, which he alleged were suitable for burning the new mineral oil, and in 1869 at the La Canche lighthouses a trial of the Doty lamp with schist oil, as then supplied, was made in comparison with a Colza lamp. But although good results as regards the mineral oil burner followed this trial, the further application of this illuminant for lighthouse purposes was not proceeded with owing to the fear of accident by explosion with the schist oils then in the market, the uneasiness being increased by a report made at the time by the chairman of the United States Lighthouse Board, that although mineral oil was abundant in their country, it was not thought advisable to use it in lighthouses there on account of its inflammability. It is possible that the schist oil was either inherently of inferior quality to the Scotch paraffin or was badly made. But however that may be, Young's Paraffin Light and Mineral Oil Company, which was at that time in existence, submitted to the French authorities the paraffin oil manufactured by them, and as a result of the trial made it was found that the Scotch oil was less inflammable and dangerous, and a better illuminant than the schist oil then in use in single-wicked lamps They further made a careful examination of the relative merits of this oil as compared with all the mineral oils of French origin, with the result that the superiority of the Scotch paraffin was conclusively proved, and in January, 1870, a three years' contract was made with Young's company to supply the oil required. In 1873 we find that the Commission des Phares gave the order for the substitution of mineral oil for colza in all the French lighthouses, on the grounds that its cost was one-half that of colza; that with proper tests on receipt of the oil its safety could be ensured; that the light yielded by it was superior to that from colza, and the lamps with mineral were more easily managed than those burning colza. The burners used were those of Doty and Lepaute, the former gentleman receiving, in recognition of his efforts, a grant from the French Government, in addition to the price of any burners supplied by him.

In this country, the question of using mineral oil in lighthouses had been under consideration before 1868; indeed, both the English and Scotch lighthouse authorities had for some time been inquiring and working at the subject. It is right to say that the intervention of Captain Doty in the investigation and competition helped the matter forward considerably. At first, he submitted to the Trinity Board only a single-wicked Argand burner, adapted for burning mineral oil; but suggestions were made to him at the time as to the mode in which four consecutive wicks were used in some lighthouse oil burners. Upon this hint Captain Doty appears to have acted promptly, for he shortly afterwards produced three and four-wick burners adapted to burn mineral oil, which burners he subsequently, as we have seen, introduced to the French authorities with some success. The Trinity-house engineer, and the engineer to the Commissioners of Northern Lights were at the time experimenting, with the object of adapting the then existing lighthouse burners for the combustion of mineral oil. The Trinity-house proceeded with the investigations and trials, and ultimately the Douglass mineral oil burner was perfected. The Northern Commissioners accepted Captain Doty's burner as furnishing a solution to their inquiry. The deliberate proceedings taken in connection with the introduction of paraffin as a light-

house illuminant, are justified by the important considerations which must be taken into account, before a safe and well-tried oil could be displaced in favour of an oil having, to say the least of it, a doubtful reputation.

Elaborate and careful trials were conducted by Dr. Stevenson Macadam, in Scotland, and Professor Tyndall and Mr. Valentin, in England, ably assisted by the engineers to the respective Lighthouse Boards; and, in 1870, Dr. Macadam reported that "paraffin oil consumed in Doty's lamps, alike from readiness in trimming and lighting up, from steadiness of flame, and from high photogenic power, possesses decided advantages over colza oil for lighthouse illumination; whilst the quality of the best mineral oil now to be obtained in the market renders the employment of paraffin oil practically safe." In 1871, Dr. Tyndall supported Mr. Valentin in a strong recommendation that the use of paraffin oil be extended, stating that "the consensus of evidence leaves no doubt upon the mind that, as regards cost and illuminating power, the paraffin light really possesses the advantages claimed for it;" while, from the practical point of view, Messrs. Stevenson and Mr. Douglass reported most favourably upon the new illuminant, and upon the safety and effectiveness with which it could be used in lighthouses. By the year 1873 all doubt had disappeared, and paraffin was rapidly displacing colza oil in the majority of lighthouses in the United Kingdom.

While European authorities were adopting paraffin as a lighthouse illuminant, the United States authorities again resolved to give consideration to the matter. They had become better acquainted with and possibly less timorous of the petroleum which was spouting up so freely in their country. The action of Mr. James Young, and the development of the paraffin industry, opened their eyes to the possibilities of utilising the rock oil of their country. It is a curious fact that before the Americans knew the value of their petroleum, the process of distilling shale and making paraffin. under Young's Patent, was carried on in America. When they realised what their great possessions were, there was, you may depend upon it, "a boom in oil."

In 1874, the Lighthouse Board investigated and experimented; they tried a great number of mineral oils, and in the end resolved to have petroleum of a certain quality. It took several years to change their burners, but ultimately, I believe in 1879, all were adapted, and lard oil became a thing of the past so far as lighthouse illnmination is concerned.

In Canada the petroleum obtained in the Dominion had been in use for lighthouse lamps before 1870. In those days Canada was less advanced than she is now, and her coast lights were of a somewhat primitive character, although probably sufficiently effective for the purposes required. The lighthouses were simple structures, built of wood from the forest close by; the burners of simple construction in reflectors; the oil from the nearest source. Under the energetic direction of Mr. William Smith, the Deputy Minister of Marine, many of the lights were subsequently improved by the adoption of the large four-wicked concentric burners, but it was then found that the Canadian petroleum was not suitable for these large burners, as under the great heat developed the wicks were carbonised and capillary action checked. Now, I am informed, the oil for these burners is supplied from New York.

The use of mineral oil for lighthouses has not extended very rapidly in other British colonies. To this day colza is largely employed; but as prejudices against the use of mineral oils die out, and the freight for such oils (unreasonably kept up as regards lighthouse oil on the ground of danger) is lowered, and also as the petroleum found in various parts of the world is brought into practical account, we may expect mineral oil to displace all others.

(*To be continued.*)

Parliamentary and Law Proceedings.

Extraordinary Libel upon a Chemist.

At the Dover Police Court on Monday, before J. L. Bradley and F. E. Barton, Esqrs., George West Sargent, a dispensing chemist, carrying on business at 75, Church Street, Kensington, was charged on the information of Alexander Bottle, that he did, on or about December 22 last, in the borough of Dover, unlawfully and maliciously publish a libel in regard to the said Alexander Bottle.

Mr. Forrest Fulton, M.P., instructed by Messrs. Flux, Son and Co., of 3, East India Avenue, London, E.C. appeared for the prosecution, and the defendant conducted his own case.

Mr. Fulton said he appeared for the prosecution in that case. The defendant was summoned for publishing a defamatory libel on Mr. Bottle, a well known inhabitant of Dover, by charging him with a series of offences of one kind and another. The defendant had some feelings of animosity against the Pharmaceutical Society, and more particularly so, it would seem, against the Council of that Society, of which Mr. Bottle was the Vice-President, and he proceeded to send a series of letters to the town clerk of Dover (Mr. Knocker). Counsel then dealt with the letters and said it was absolutely necessary to take steps to stop such attacks upon the Society and its members. He proposed to prove the handwriting and to call Mr. Knocker to prove the reception of the letters, and then to ask them to allow the case to go for trial.

Mr. Edward Wollaston Knocker, solicitor and Town Clerk of Dover, said—On or about November 14, I received the letter produced dated 13th, from G. W. Sargent.

The letter was as follows:—"Dear Sir,—I am instructed to inquire the reasons the Council of Dover have taken no active measures in the prevention of fires and explosions of chemical origin by wholesale druggists and allied trades through illicit carriage, storage, and transit referred to in page 45 of the Pharmacy Act (Inland and Continental). The matter has been before the City and the London County Councils Committees. By Order of the Committee.—Yours truly, G. W. Sargent.—Town Council of Dover."

Witness: I sent a reply on November 14, 1891; I have a copy of it. I received a further letter dated November 16.

The Magistrate's Clerk read this letter as under: "November 16, 1891.—Dear Sir,—I am instructed to inquire if Mr. Alexander Bottle, chemist, Dover, carries on his business in violation of Section 15, page 31 of the Pharmacy Act, 1868, in using the title, and also holds the position of Local Secretary of the Pharmaceutical Society, a member of Pharmaceutical Council, both in illicit practices. I have my instructions should you fail to bring before the Council as under, Alexander Bottle and Co., Dover" (the name was in print).

Witness: I sent a further acknowledgment on November 18, and received the following: "Kensington, W.—Transit of inflammable drugs, etc., etc.—Dear sir, my letters are intended for the Corporation, now for the town clerk to dispose of by side issue. The Corporation have the right to know what is reported in every town in the kingdom badly. As to Mr. Bottle being a member of the Pharmaceutical Council, elected by fraud and illicit practices—Yours, etc., G. W. Sargent."

Witness: I received a further letter dated November 20: "November 20.—Transit of poisons, inflammable drugs, etc.—Dear sir, may I venture to inquire if the Corporation have made investigation of charges of fraud against the President of the Pharmaceutical Council in conjunction with Mr. A. Bottle, also mem-

ber of the Council, 'abstraction of regulations relating to poisons,' etc., from various issues of the Calendar of the Society, which appeared in 1890. Dover seems to be mentioned rather freely throughout the entire trade.—Yours truly, G. W. Sargent."

Witness: I received the following further letter on December 21: "Dear sir, I should be glad to know if my letter under consideration with regard to Mr. A. Bottle, Vice-President and member of the Pharmaceutical Council by fraud, corrupt practices, and also at present filling the position of local secretary to the Pharmaceutical Society; and if any steps have been taken to restrain the said Mr. A. Bottle from administering the Pharmacy Act by fraud, corrupt and illicit practices.—Yours truly, G. W. Sargent."

Witness: I received about January 21 this letter: "January 21, 1892. Transit, storage, etc. Poisons, inflammable drugs. *Re* Alexander Bottle, 37, Townwall Street, Dover. Dear Sir, I am instructed to inquire the reason no criminal proceedings have been instituted against the above with regard to the abstraction of poison regulations from various issues of the Calendar of the Society which appeared in the issue of 1890, page 45. The Corporation of Dover continue to be reported badly, and placed the country into confusion and alarm. Yours truly, G. W. Sargent."

Witness: All the letters came through the post, and were received at my office in Dover.

The Defendant proceeded to ask each of the solicitors and the Magistrates what constituted a libel. He was, however, directed to cross-examine Mr. Knocker upon the evidence he gave, if he wished to do so.

The Defendant: What constitutes a libel?

Mr. Knocker: My opinion would not be taken as evidence.

The Magistrates' Clerk: He has deposed to certain facts, and you can cross-examine him.

Alfred John Chater, clerk in the office of the Registrar to the Pharmaceutical Society of Great Britain, was then called. He said: On the 6th instant I went to the defendant's shop, 75, Church Street, Kensington, and saw him there. I handed him a prescription to be made up, and he made it up in my presence. My name was on the prescription, and he wrote my name upon the prescription envelope (produced), and also the directions on the label which he affixed to the bottle (produced), "The sixth part to be taken three times a day." I have seen the letters, and the writing is similar to the writing on the label and envelope, and I should think they were written by the defendant.

The Clerk: Do you wish to ask the witness any questions?

Defendant: No, it is quite correct.

Alexander Bottle, pharmaceutical chemist, carrying on business at 37, Townwall Street, Dover, said: I am the Vice-President of the Council of the Pharmaceutical Society of Great Britain. I have been a member of the Council for some thirty-four years. I am the member of the Society referred to in the letter dated November 20 and sent to Mr. Knocker. My attention has also been directed to the letter of December 21, 1891, and I am the Mr. Bottle referred to in that letter as well as in the one dated January 21, 1892. I am the Alexander Bottle referred to in the heading of the last letter—there is no other person of that name residing at 37, Townwall Street, Dover. I know the defendant by sight, but I have no personal knowledge of him. I may have seen him at some of the meetings of the Society.

Mr. Fulton then asked for the case to be sent for trial.

The defendant was cautioned in the usual way, and upon being asked if he had anything to say, said: The letters were written under great impulse of feeling at the time in corresponding with various parts of the kingdom, town clerks and public bodies through the absence of those recommendations referred to in page 45 of the Calendar of the Pharmaceutical Society of Great Britain, 1890, and not in the issue of 1885, creating the necessity of duplicating and sometimes triplicating the letters written. The recommendations contained in the issue of the Calendar of 1890 ought to appear in the Calendar of 1885, which at that time gave rise to my writing in the manner I did.

The defendant afterwards said: Is not that establishing the charge of fraud?

Mr. Fulton pointed out to the bench that they could not go at that time into the question of justification of the matter—that could only be done at the trial.

By the wish of the defendant, the Magistrates' Clerk perused several letters which he handed in. The Clerk said they were not evidence in that case at all. The letters were from Mr. Thompson, Caledonian Railway; Cambrian Railway Company, the *Guardian*, and the *Commercial Union*.

The Defendant: The extractions from the Calendar of the Society——

The Clerk: The charge is one of libel—charging Mr. Bottle with fraud. These letters have nothing to do with it.

The Defendant: They establish a fraud against the Society.

The Clerk: You cannot go into that now, but you can at the trial.

The Defendant: Would Mr. Bottle like to dispose of the case in any way?

The Clerk: Mr. Bottle cannot do it.

Defendant: I have been greatly upset by the matter, and only received it (the summons) a few days ago, so that I am somewhat in a state of perplexity. Cannot it be disposed of by fine or any way?

The Clerk: Cannot do it.

Mr. Fulton said he did not think there was any idea of pressing the charge unduly, but the practice must be stopped. This was not the only case, for charges had been sent broadcast over the country. In this particular instance a gentleman who had occupied the position of Mayor of the town had been vilified. It was not to be tolerated, and if defendant had any explanations he could give them at the proper time when before the judge at the assize.

The Defendant: I am willing to offer every apology. At the time I was in a great state of feeling by the extractions from the Calendars of the Society. They were recommendations, the property of twenty years duration. It has been a great error of judgment on my part, that I firmly believe. I was driven by impulse and a natural feeling to benefit the whole trade, and not a section of the trade. If he (Mr. Bottle) could yield in any way I should be glad to assist him in his duties. I have been put to enormous inconvenience.

Mr. Fulton said that the defendant should have thought of that before, he must be made an example of, for this sort of annoyance had been going on for years.

Defendant said he was not aware he was libelling.

The Magistrates then said the case must go for trial at the Assizes.

Mr. Fulton said he did not propose to ask for bail, if defendant was bound in his own recognisances to appear it would be sufficient. If a complete apology were offered they might recommend the defendant for the further consideration of his Lordship.

Defendant: Cannot you settle it now?

The defendant was bound in the sum of £50 to appear at the Assizes.

LIBRARY ST. BARTHOLOMEW'S

Obituary.

WILLIAM DITTMAR, LL.D., F.R.S.L. AND E.

The death is announced of Professor Dittmar, of the Glasgow and West of Scotland Technical College, after a brief illness, the immediate cause of death being failure of the nerve centre regulating the breathing, together with cerebral hemorrhage. Born at Umstadt, near Darmstadt, in the year 1833, he was intended to follow the profession of pharmacy. Entering, however, in 1857 the laboratory of Bunsen, he was appointed assistant to that celebrated chemist, and in that capacity made the acquaintance of Sir Henry Roscoe, whom he subsequently joined. We next find him as chief laboratory assistant to Dr. Lyon Playfair. Returning later to Germany he acted for three years as a "Privat Docent" and lecturer on meteorology at Poppelsdorf, then removed to Scotland to assist Professor Crum Brown. For a brief time he occupied the newly-instituted chair of practical chemistry at Owens College, Manchester, but again returned to Scotland on the invitation of the trustees of the Anderson's College, Glasgow. In this position he performed his functions with characteristic ability and was untiring in his efforts to further the interests of the College. As a lecturer he was admired for the clear way in which he conveyed his ideas, as a laboratory teacher he was endowed with enormous fertility of resource. Commercial men knew his worth as a practical analyst, and the scientific world generally has acknowledged the thoroughness of his investigations. He took part in the work connected with the "Challenger" expedition, was an authority on the chemical balance, contributed to several British and foreign cyclopædias, and to some of the chief continental scientific periodicals. As a crowning honour the Graham medal was conferred upon him for his investigation of the "Gravimetric Composition of Water."

H. W. BATES, F.R.S.

It is with regret we announce the death of Mr. Henry Walter Bates, F.R.S., the distinguished traveller and naturalist, on Tuesday, February 16. From an early age and throughout his life Mr. Bates manifested an intense love for natural history in its various branches. He was associated with Mr. A. R. Wallace in his exploration of the Amazons, and is best known perhaps by his work 'The Naturalist in the River Amazons,' of which Darwin wrote:—"It is the best work of natural history travels ever published in England." For the last twenty-seven years Mr. Bates occupied the position of Secretary of the Royal Geographical Society.

Notice has also been received of the death of the following:—

On the 29th of January, William Bond Strange, Chemist and Druggist, Kingswood Hill. Aged 70 years.

On the 2nd of February, Richard James Manning, Pharmaceutical Chemist and Local Secretary, Wells, Somerset. Aged 66 years.

On the 3rd of February, William Edwards, Chemist and Druggist, Llangefin. Aged 78 years.

On the 5th of February, Lawrence Lord, Chemist and Druggist, Rawtenstall. Aged 74 years.

On the 8th of February, Henry Allen, Chemist and Druggist, Basingstoke. Aged 61 years.

On the 11th of February, Howell Jenkins, Chemist and Druggist, London. Aged 52 years.

On the 14th of February, Alfred Chaplin, Pharmaceutical Chemist, Worthing. Aged 70 years.

On the 15th of February, John Moore Price, Chemist and Druggist, London. Aged 73 years.

Review.

EPIDEMIC PNEUMONIA AT SCOTTER AND NEIGHBOURHOOD: Its History, Causes, and Future Prevention. By T. B. FRANKLIN EMINSON, medical officer of the Scotter district of the Gainsborough Union.*

In the study of epidemic diseases no class of investigations is likely to prove of greater value than those systematically undertaken within definite and limited areas. This little work is the record of the struggle with a disease which, during the last eighteen months, has attacked one in every twenty-one, and killed one in every forty-one of the inhabitants of the village of Scotter in Lincolnshire. The author is an old student and prizeman of the Society's School who subsequently embraced the profession of medicine, and he here deals with his subject in an eminently systematic manner. The following extract from a chapter on the "Method of Extension of the Pneumonia to Neighbouring Places" will afford a fair example of his style, and it will be noted that there is a singular freedom from technicalities:—

"The autumn of 1889 and following winter were peculiarly favourable to low forms of life, and the winter was unusually mild. One phenomenon, showing the unusual nature of the season, came under my own observation early in the winter before influenza made its appearance. The clover hay had been gathered by the farmers of this neighbourhood, in very good condition, about June, 1889, there being no rainfall upon it; the meadow hay was got in almost equally fine order later on. In December, however, when the clover stacks were cut into, a foot or more of outside was found so full of mould, that the men were enveloped in clouds of whitish spore dust. The ordinary hay was not so bad, though more or less affected. This mould was not due to dampness, nor was it due to exposure of the stacks in bleak situations, for it was equally marked in stacks sheltered by buildings. The trussers, who were engaged trussing hay for sale, agreed that its extent was something out of common observation, and they attributed it to peculiarity of season. Now the fact that the outside part only of each stack was affected, shows, I think, that the cause lay in the atmosphere; that the mould spores were filtered from the air as it penetrated into the hay, and then grew. The hay in other parts of each stack was perfectly sound and sweet, contrary to what is found when dampness is the cause of mould. The disease attacked the stacks after they were built, and this, with the fact that all clover stacks suffered alike, shows that the atmosphere was the medium through which the mould was conveyed, and that the spores were widely distributed through that medium.

"An eminent observer, Nägeli, has demonstrated that the micro-organisms of specific fevers, etc., are incapable of escaping into the atmosphere from moist surfaces. If this be so (and many medical men accept his conclusions), it affords a rational and satisfactory explanation of what was observed at Scotter—the continuance of the pneumonia during the dry weather, and its abrupt decline when the heavy rains of May 10th washed out the most part of the sewer."

BOOKS RECEIVED.

COCA AND COCAINE, their History, Medical, and Economical Uses, and Medicinal Preparations. By WILLIAM MARTINDALE. Second Edition. London: H. K. Lewis. From the Publisher.

VICTORIA PHARMACEUTICAL REGISTER for 1891. Melbourne: A. H. Massina and Co.

* London: Henry Kimpton. Small 8vo. Price 1s. Pp. i.-viii., 1-66.

PHARMACOPŒIA OF THE UNIVERSITY COLLEGE HOSPITAL, 1891. Edited by A. W. GERRARD, Dispenser and Teacher of Pharmacy to the Hospital. London: James Truscott and Son. From the Editor.

SAINT BARTHOLOMEW'S HOSPITAL REPORTS. Edited by W. S. CHURCH, M.D., and W. J. WALSHAM, F.R.C.S. Vol. XXVII. 1891. London: Smith, Elder, and Co. From the Publishers.

THE LIFE-HISTORY OF TENNESSEE C. CLAFLIN (now Lady COOK). London. 1892. From the Publishers.

THE MEDICAL PROFESSION OF GREAT BRITAIN AND IRELAND AND OPIUM. London: Eyre and Spottiswoode.

HANDWÖRTERBUCH DER PHARMACIE. Edited by A. BRESTOWSKI. Leipzig: Wilhelm Braumüller.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

STAMPED MEDICINES, AND POISONS, ETC.

Sir,—Much has been said and written on this subject, but nothing yet has been arrived at. The Manchester meeting last week was in most respects similar to the one held some fifteen months ago, and the result as then—nil. This is likely to continue so, in my opinion, so long as the 17th section of the Act remains as it is; it requires altering (as I pointed out at the meeting), and the sooner it has the attention of the Pharmaceutical Council the better it will be for chemists and the public generally. Ever since 1868 has this Act apparently satisfied the trade. We want, and ought to have, all stamped scheduled poisonous medicines in our own hands, and all proprietors of such ought to be compelled to label them "Poison" before selling the same. I do not consider it advisable or desirable for chemists to label anybody's stamped medicine "Poison" (except their own, of course), and I do think, with Mr. Lane, that to use a modified or graduated label for poisons would be the best course to pursue at present. My principal object in writing is to urge all registered chemists to join the Society. They can now do so for one guinea per annum, the great stumbling block of a three guinea entrance fee having been removed; in fact they ought to feel it their duty to do so; it would be to their interests and a means of strengthening the hands of the Society, and I should think, an inducement for the Society to set about seeing to the very much desired alteration of the Act, at the earliest possible opportunity.

Manchester. G. W. PRATT.

CHEMISTS AND PHYSICIANS' PRESCRIPTIONS.

Sir,—I was interested in reading Dr. Julius Althaus' letter to your valuable Journal, *re* chemists making remarks on doctors' prescriptions. I think there is a much more important matter in the hands of our friends, and that is the constant and sometimes yearly making up our patients' prescriptions without their coming to us for further advice. A gentle hint to the patient when such is the case, would put the doctor and chemist on much better footing. It is not always well for our patients to go on taking the same old physic without a word of advice, and doctors as well as chemists know that they very often do.

London. JAMES STARTIN.

ARTIFICIAL HUMAN MILK.

Sir,—With reference to a paper published in the Journal for the 13th inst., by T. Maltby Clague, entitled "Artificial Human Milk," I must lay claim to prior publication with regard to the central idea, viz., the dilution of cow's milk with water and subsequent treatment with milk-sugar and fat in order to make it similar to human milk in percentage composition, and beg to refer Mr. Clague to a "Note on the Dilution of Cow's Milk in Infant Feeding," published by me in the *Pharmaceutical Journal* for July 6, 1889, in proof of this statement.

Finsbury Park, N. GEORGE SMITH.

THE OPIUM OF INDIA.

Sir,—From the tenor of Dr. Warden's letter published in your last issue (p. 667), I fear that the object of my paper on the "Opium Used in Medicine," read before the Pharmaceutical Conference at Cardiff last August, has been misunderstood. With your permission I will recapitulate it in a few words. It was to draw attention to the following points:—

1. There is no reason why India, instead of Turkey, should not supply the world with medicinal opium.
2. The chief differences between Indian and Turkish opium exist in the appearance, and in the relative percentage of morphia and narcotine contained in the crude drug.
3. The difference in appearance, etc., is in all probability due chiefly to the method of preparation adopted.
4. To meet the requirements of the European drug market it is very necessary that the opium should resemble that of Turkey in appearance, and that the process of manufacture in Turkey should be studied before the manufacture is commenced in India.

It is evident that Dr. Warden does not understand the importance of the last sentence. If Indian opium is to replace Turkish opium in world-wide use, it must at least be equal to Turkish opium in appearance and in quality. That this ideal is easy of attainment I have not the slightest doubt. Whether opium could be made in India to compete also in price with Turkish opium I have no knowledge, but I should imagine, however, that labour as cheap and as skilled could be obtained in one country as in the other. I am aware that opium manufactured in India is used by the Indian Medical Department, but it is the probability, not the possibility of its use in England that is in question. The question I raised in my paper was, why should the world purchase its medicinal opium from Turkey when India can prepare an identical article, if her Government chooses? E. M. HOLMES.

LIQUOR STRYCHNIÆ.

Sir,—Having occasion to make large quantities of liquor strychnine I have almost invariably found that if made strictly according to the Pharmacopœia (1 in 100) crystals of strychnia hydrochlor. are found at the bottom of the bottle, and often to a considerable extent. Have any of your numerous readers had a similar experience, and what is the best preventive, still maintaining the official strength? LEWIS OUGH.

CHEMICAL RELATIONS OF FLUORINE.

Sir,—May I be allowed to make a few remarks on the extraordinary and original theory which Mr. Davis propounds with reference to the chemical relations of fluorine, in your last issue. In the first place, the comparisons he draws are quite superficial. That two elements are very energetic towards other elements, is scarcely enough in these days of experimental science, to show that they are identical; then the electrical comparison is quite fallacious. Fluorine is isolated by electrolysis from its compounds, and when water, for instance, is electrolyzed, we obtain not ozone, but oxygen, O_2. It is the action of the electric discharge between conductors of very high potential difference, upon ready formed O_2, which gives us ozone O_3. Furthermore, how can the "new theory" account for the molecular or atomic weights of fluorine, 38 and 19 respectively. If oxygen has the atomic weight of 16, how can any modification of it have the atomic weight of 19? To meet Mr. Davis's theory we must give up Dalton's atomic theory, or accept Prout's hypothesis in a very extreme form. ERNEST J. PARRY.

NOTICES OF MEETINGS.

Chemists' Assistants' Association.—Thursday, February 25.—Paper: "Milk" (with experiments), by A. W. Stokes, F.I.C., F.C.S.

Erratum.—Page 648, line 20 from top, *read* "containing over two per cent. of proof spirit."

Phosphate.—We believe the substance you name is the subject of a patent, and that the name is registered by the makers.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Kinninmont, Maiden, Attfield, Thomas.

"THE MONTH."

Assimilation of Green Parasitic Plants. Professor Bonnier advocates the theory that the relationship between the mistletoe and the tree on which it grows is not one of simple parasitism. In the summer-time the leaves of the mistletoe disengage carbon dioxide to the amount of about one-sixth per weight, or of about one-third per unit of surface, of that disengaged by the leaves of the host; and it must, therefore, depend, for the larger part of its nutriment, on its parasitism on the latter. In the winter these conditions are reversed, and the increase in weight of the mistletoe is less than the amount of carbon obtained from the atmosphere; in other words, it gives up a portion of assimilated substance to its host. Other green parasitic plants present all intermediate stages between one totally dependent on the host and one which profits only by the mineral substances taken up by the roots of the host. The relationship to their host of parasitic plants belonging to the same natural order may differ. Thus *Melampyrum* and *Euphrasia* possess similar chlorophyllaceous tissues, but have a very different mode of assimilation. *Thesium humifusum* and various species of *Pedicularis* have leaves of a deep green colour, but their assimilation is much less active than that of *Melampyrum*.

Fertilization of the Casuarinaceæ. Few botanical papers have been published of recent years of greater importance than one contributed by Dr. M. Treub, the Director of the Botanic Garden at Buitenzorg, Java, to the *Annales* of that institution, in which he makes the startling announcement of the discovery of a mode of fertilization of the ovule which differs in essential points from the normal one in flowering plants. The natural order *Casuarinaceæ* consists solely of the genus *Casuarina*, the "beef-woods," between twenty and twenty-five species of trees with remarkable leafless jointed stems, somewhat resembling *Ephedra* in appearance, and nearly confined to Australia. The order is generally placed among the *Incompletæ*, near *Myricaceæ* and *Betulaceæ*; the flowers are arranged in catkins, and are of very simple structure. Each ovary contains two ovules, springing from the base of the ovary by funicles, but attached also to the base of the style by a structure composed of cellulose, which Dr. Treub calls the "bridge." In the nucellus of the ovule are produced a number of cells corresponding to the "megaspores" of the heterosporous vascular cryptogams, and one of these developes into an embryo-sac. When the pollen-tube has made its way down the style, it does not enter the ovary, and never approaches the micropyle of the ovule. The hinder portion of it disappears, the terminal portion breaks off, and it alone takes part in the process of fertilization. This portion crosses the "bridge" and the tissue which unites the ovule to the wall of the ovary traverses the chalaza and becomes firmly attached to the wall of the embryo-sac, always at some distance from the sexual apparatus, but the actual process of fertilization and of the passage of the male element into the embryo-sac has not yet been followed out. From these remarkable peculiarities Dr. Treub proposes to separate the *Casuarinaceæ* as a distinct primary section of Angiosperms under the name *Chalazogams*, classing the Monocotyledones and Dicotyledones together as *Porogams*.

Fertilization of Gymnosperms. Of scarcely less interest are the observations of M. Belajeff of Moscow, on the process of fertilization in Gymnosperms, made chiefly on *Taxus baccata*, which seem to negative the prevalent theory that the smaller cells in the pollen-grain of Gymnosperms are a survival of the male prothallium contained within the microspore of vascular cryptogams. According to M. Belajeff, these are cut off in succession from the large cell; and it is one of these small cells, and not the large one, which is the active factor in fecundation. In the course of the development of the pollen-tube, this small cell becomes detached and wanders to the extremity of the tube, in company with the nucleus of the large cell. As the pollen-tube advances, the nucleus of this "wandering cell" overtakes that of the large cell, and divides into two. One of these two daughter-nuclei, with the protoplasm that surrounds it, then passes into the oosphere or female generating cell, and fecundates it. The fate of the nucleus of the large cell he has been unable to follow out.

Tests for Cellulose. In the *Comptes Rendus* of the Paris Academy of Sciences, M. L. Mangin gives a useful epitome of the chemical and micro-chemical properties of cellulose. (1) It is insoluble in ordinary solvents; (2) it is transformed by oxidizing agents, first into oxycellulose, then into oxalic acid; (3) it is soluble in an ammoniacal solution of cupric oxide; (4) it is transformed by sulphuric acid or zinc chloride into hydrocellulose or amyloid, which is coloured blue by iodine. Submitted to the action of sulphuric or phosphoric acid, cellulose forms a series of substances of which hydrocellulose may be taken as the type. If the acid is too concentrated hydrocellulose is not formed, but the cellulose membrane is disintegrated or dissolved; if too weak, hydrocellulose is also not formed. Caustic alkalies cause the formation of an analogous substance, and the cupro-ammoniacal reagent has the same effect. There are three series of characteristic staining reagents for cellulose: (1) Iodine reagents, such as the mixture of iodine and sulphuric acid, chlor-iodide of zinc, iodized calcium chloride, and iodized phosphoric acid; (2) substances which stain cellulose in an acid bath, such as orseilline, crocéine brillante, etc.; (3) substances which stain cellulose in an alkaline bath, such as congo red, Corinth congo, heliotrope, etc. In addition to these, other staining reagents have been proposed, as methyl-blue by Gardiner, aniline brown and quinoline-blue by Van Tieghem, etc.

Pectic Substances in Plants. M. L. Mangin gives also, in Morot's *Journal de Botanique*, an exhaustive account of our present state of knowledge of the pectic substances found in vegetable tissues, and their relationship to the "intercellular substance" of Mohl, described by later writers as "primary membrane," "median lamella," and "outer lamella." He regards this group of substances as autonomous, and as among the fundamental substances of cell-wall, of equal rank with cellulose. The following are the chief chemical and physical properties of pectic substances. They are soluble in Schultze's reagent and in caustic alkalies, but insoluble in sulphuric

acid; they are always optically isotropous; they rarely give the reactions of cellulose, but sometimes those of lignin. It is these substances which are dissolved in the processes of fermentation and putrefaction; and it is they that form the so-called "protoplasmic" lining of intercellular spaces.

Vegetable Perfumes. In the *Mittheilungen des Naturwissenschaftlichen Vereins Steiermark*, Dr. M. Buchner describes a method of obtaining the fragrant vegetable essential oils in exhausted vessels at the ordinary or at very low temperatures. He states that most of these oils consist either of terpenes with the formula $C_{10}H_{16}$, or of polyterpenes with the formula $(C_5H_8)_x$.

Physiology of Seeds. According to Herr A. Tschirch, the seeds of those monocotyledons which are provided with a tissue containing a store of food material—endosperm or perisperm—always have an absorbing organ which remains in the seed during germination and absorbs the nutrient tissue. There are three types of this organ in the dormant condition:—(1) the Gramineæ type, where it has the form of a scutellum; (2) the Zingiberaceæ type, where it is club-shaped, leaf-like, or filiform; (3) the Palm type, where it is short and of indefinite form, and increases rapidly during germination, forcing its way into the endosperm. This structure corresponds to a similar organ in *Gnetaceæ* and *Cycadeæ*, and possibly to the "foot" of the embryo in vascular cryptogams, and to the "foot" of the capsule in mosses. In those families of monocotyledons which are destitute of endosperm—*Helobiæ* and *Naiadeæ*—the organ, which forms a sheath round the plumule, is certainly a cotyledon; while, on the other hand, in the second and third types, the absorbing organ and the cotyledonary sheath—the pileole or "coleoptile"—together constitute the cotyledon; this, therefore, consists of a sheathing portion, which at first envelopes the plumule, of an absorbing portion which remains in the seed, and of a neck or elongated portion, which unites the other two. Even in the Gramineæ type and in seeds with a "swollen hypocotyl," the pileole is the cotyledon; while the morphological value of the scutellum and of the "swollen hypocotyl" is doubtful. The cotyledon of *Ruppia*, *Pothos*, etc., the "germinal tubercle" of *Orchideæ*, and the "protocorm" of *Lycopodiaceæ*, appear to be functionless or abortive absorbing organs. In some families of monocotyledons the seed is furnished with fleshy structures, which serve to assist its germination and the complete absorption of its nutritive tissue.

Cause of Cambial Activity of Trees. E. Mee has contributed some valuable information relative to the starting and cessation of the activity of the cambium in trees (*Comptes Rendus*, cxiv., p. 242). His experiments have been made on isolated trees and on trees growing in a more or less crowded state. The trees were of different species and of different ages. He has noticed in young trees that the woody zones are often larger in the middle and upper part of the trunk than at the base. In older trees, on the contrary, the lower rings become more enlarged than the upper ones. In the trees examined, including the oak, beech, hornbeam, lime, poplar and fir, he has observed that the activity of the cambium commences in the youngest shoots of the branches and stem and that it extends sometimes successively, sometimes almost simultaneously, to the older part of the branches and the middle and base of the trunk. It does not begin in the roots until ten or fifteen days later, and then extends downwards, from the larger parts to the radicles. In isolated trees the branches are generally well-developed and swollen at the junction with the trunk. This swollen part was observed to be the seat of a cambial development almost simultaneous with that of the extremities. The activity of the cambium diminishes progressively until the end of summer. In trees grown close together it disappears first in the lower branches and the basilar and median parts of the branches, before those of the summit. But in isolated trees the activity disappears first in the extremities of the branches, proceeding towards the swelling at the base of the branches, where it persists longest. Similarly, in the trunk it is arrested first at the summit, proceeding downwards to the base. If vegetation is not very active it ceases sooner in the basal region. The portion of the trunk immediately below the soil is the part to which the cambial activity is ultimately confined.

Wax in Leaves. Étard has described a triatomic alcohol, œnocarpol, that is found in combination with palmitic acid in the pericarp of the white grape, a diatomic alcohol, vitoglycol, in the leaves of the vine, a monatomic alcohol, medicagol, in the leaves of the lucerne, and a hydrocarbon, bryonane, in the leaves of *Bryonia dioica*. These bodies are white, crystalline and fusible; their appearance, as well as analysis, show a relation to cholesterin. The extractive matters sometimes designated under the vague name of the wax of leaves are believed by Mons. Étard to belong to this class of bodies. He compares the affinity of chlorophyll for these substances to that of vegetable fibre for certain colouring matters (*Comptes Rendus*, cxiv., p. 364). Their connection with chlorophyll naturally suggests whether the production of wax in leaves and fruits may not in some way be connected with the development of chlorophyll.

Male Flowers of the Walnut. It is well known that in many of the *Rosaceæ* the flower buds are fully formed a long time before the flowering commences, as in the apple, pear, and cherry. Russell has carried the knowledge we possess a little further and has shown that in the walnut the male catkins begin to develope towards the end of April, at the expense of their axillary bract, and are entirely formed in the month of July of the year previous to their flowering (*Revue Gén. de Botanique*, January, p. 18).

Pteris Aquilina on Calcareous soil. An important observation has been made by Masclef, on the common bracken, which illustrates what may be called the law of adaptation to circumstances possessed by plants. The bracken is essentially a lover of siliceous soil, in which it reaches its full development. When grown on a calcareous soil, the author observed that the rhizomes are shorter, the roots more numerous and more developed, and the structure of the subterranean stem showed a remarkable reduction of the tissue devoted to the storing up of reserves. Specimens in soil containing 5–7 per cent. of calcareous matter showed an intermediate condition (*Revue Gén. de Botanique*, p. 7, January). It appears, therefore, that the nature of the soil may

affect microscopical structure as well as the external form of plants.

Bacillus denitrificans. A new bacillus, which has the property of decomposing nitrates, has been described by MM. E. Giltay and J. H. Aberson in the *Arch. Néerlandaises des Sc. Ex. et Nat.*, i., xxv., p. 341. It agrees with the *Bacterium denitrificans* α and β of Gayon and Dupetit in some particulars, but differs in certain respects. The *Bacterium denitrificans* α, in a nutritive fluid containing asparagine and nitrates, entirely decomposes the nitrate without formation of nitrous acid, and gives as products gaseous nitrogen and monoxide of nitrogen; the *Bacterium denitrificans* β leaves much of the nitrate undecomposed, always gives nitrite and only nitrogen as a gaseous product. The *Bacillus denitrificans* decomposes all the nitrate, does not form nitrite, and gives off only nitrogen. It has been found that the presence of carbonate of lime favours the action of the bacillus, which in its development covers the minute crystals of carbonate.

Botany of Gambia. An additional list of the economic and medicinal plants of Gambia extracted from the French report of the Gambia Delimitation Commission is published in the Kew *Bulletin* for February, p. 45. The plants of medicinal or pharmaceutical interest mentioned in this list are the castor oil plant and *Cassia fistula*, which are abundant; the cowhage plant, or "N'gagna" (*Mucuna pruriens*, D.C.); the tamarind and "Acajou a pommes" (*Anacardium occidentale*); the orange and lemon; Capsicum; the papaw; the Shea butter tree (*Butyrospermum Parkii*); and the Inéc (*Strophanthus hispidus*). *S. Kombe* is said also to grow in the woods, but this statement must be regarded as open to question. The bark of a plant called "Néto" is used by the Mandingoes for toothache.

Chloroform. At a recent meeting of the Berlin Pharmaceutical Society Schacht discussed the subject of purification of chloroform, and objected to the statement of du Bois Reymond as to the stability of Pictet chloroform being due to its superior purity. The sample examined by him had a sp. gr. 1·4848, and was assumed to contain 1 per cent. of alcohol. When washed sufficiently to remove the alcohol it suffered the usual decomposition when exposed to light. Schacht is of opinion that this change takes place the more rapidly the purer chloroform is and that it results from absence of alcohol, not from the presence of foreign substances as du Bois Reymond thinks. In a paper by Biltz read at the same meeting a similar opinion was expressed on the basis of comparative trials of ordinary chloroform and that prepared by Pictet's method. Biltz regards the decomposition that takes place under the influence of light and air as a natural characteristic of chloroform, and not as a result of the presence of impurities in minute proportions. He also disputes the assumption that in this case crystallization can be an efficient means of purification, and he considers that if the Pictet method be really an improvement in the purification of chloroform, evidence of that must be given by proving the separated impurities to be hurtful in themselves, and the prejudicial influence of the amounts present in ordinary chloroform to be such as would render their removal necessary or advantageous. In the discussion on this subject R. du Bois Reymond replied more from the medical point of view as being in his opinion of paramount importance, but the general feeling of the meeting appeared to be in favour of the view that physically and chemically there is no sensible difference between the chloroform prepared by Pictet's method and any other kind of well-purified chloroform. (*Pharm. Centr.*, xxxiii., 80). The experimental data that have been put forward to prove a difference between the effects of pure chloroform and those of the impurities stated to be present in ordinary chloroform are not favourably received by medical critics, and the absence of any chemical evidence as to the nature of the impurities alleged to be present in chloroform and separated by Pictet's method leaves much room for doubting the value of that method.

Vanillin and Isovanillin. On the assumption that the two hydroxyl groups of protocatechuic aldehyde possess different degrees of affinity, Bertram has devised methods of obtaining the two isomeric methyl ethers of protocatechuic aldehyde. By acting upon the dimetallic salts of that compound with haloid methyl compounds the sodium compound of vanillin is produced:—

Vanillin.

$$C_6H_3\begin{cases}ONa\ (4)\\ ONa\ (3)\\ CHO\ (1)\end{cases}+CH_3I=C_6H_3\begin{cases}ONa\ (4)\\ OCH_3\ (3)\\ CHO\ (1)\end{cases}+NaI$$

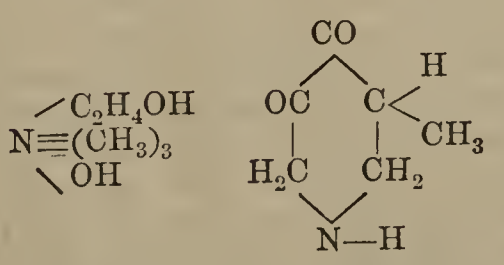
and by the action of the same methyl compounds upon the monometallic salts of the aldehyde, isovanillin is produced:—

Isovanillin.

$$C_6H_3\begin{cases}ONa\ (4)\\ OH\ (3)\\ CHO\ (1)\end{cases}+CH_3I=C_6H_3\begin{cases}OCH_3\ (4)\\ OH\ (3)\\ CAO\ (1)\end{cases}+NaI.$$

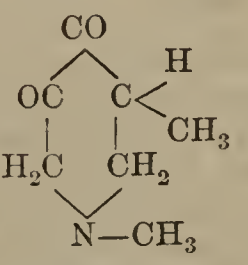
The mono-acetyl compound of protocatechuic aldehyde also yields vanillin by reaction with sodium methylate. The diacetyl compound yields acetisovanillin, which is convertible into isovanillin by heating with dilute caustic potash. For purifying the vanillin obtained by the first method it is treated with boiling chloroform, which dissolves vanillin and leaves undissolved any adhering unaltered portion of the protocatechuic aldehyde. After evaporating off chloroform the vanillin is distilled in vacuo. It melts at 81°·5 and boils at 170°. Isovanillin melts at 115°–116° and boils at 179° (*Pharm. Centr.*, xxxiii., 78).

Akaloids of Areca Nut. In a lengthy paper in the *Archiv d. Pharm.*, xxix., 669, Jahns gives further results of his investigation of these bases. He represents their constitution by the following formulæ:—

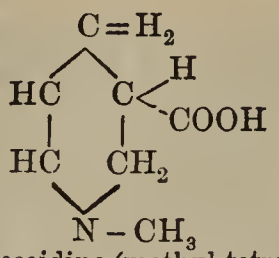


Choline. $C_5H_{15}NO_2$.

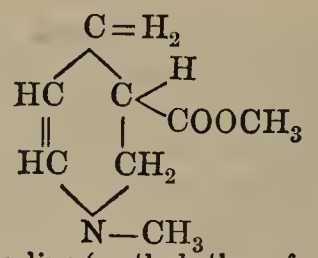
Guvacine. $C_6H_9NO_2$.



Arecaine. Methylguvacine. $C_7H_{11}NO_2+H_2O$.



Arecaidine (methyl tetra-hydro-nicotinic acid). $C_7H_{11}NO_2$.



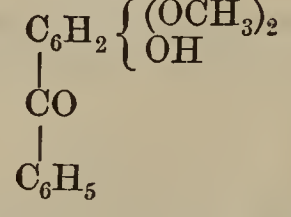
Arecoline (methyl ether of methyl tetra-hydro-nicotinic acid). $C_8H_{13}NO_2$.

The last two bases have also been prepared synthetically, and found to be perfectly identical with the natural bases. According to Marmé, arecoline is the base to which the physiological action of areca nut is due ; the other bases have no action. The poisonous effects of arecoline resemble in part those produced by pelletierine and in part those of muscarine and pilocarpine.

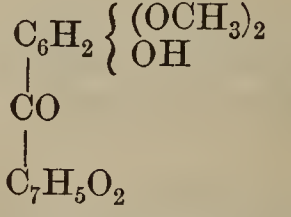
Apoatropine and Atropamine. E. Merck states that the base recently described by Hesse, under the name of atropamine, is really apoatropine, *Jahresb.* He also describes as pseudotropine a base melting at 242°, and found in crude belladonnine of German origin.

Hydrocotoin and Protocotoin. Ciamician and Silber have found that commercial hydrocotoin, from paracoto bark, contains another substance, to which they give the name of protocotoin, $C_{16}H_{14}O_6$. Being less soluble in alcohol, it may be separated from hydrocotoin by repeated recrystallization. The constitution and relations of these bodies are probably represented by the structural formulæ—

Hydrocotoin.



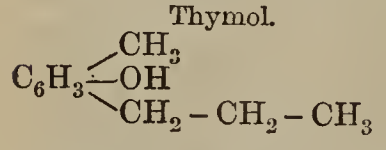
Protocotoin.



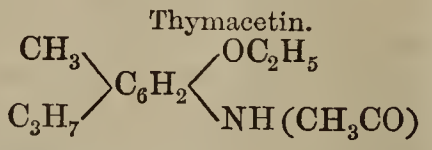
Protocotoin forms pale yellow prisms and melts at 142° C. It appears to be of a ketone nature (*Pharm. Post*, xxv., 4).

Thymacetin. This compound bears the same relation to thymol as phenacetin to phenol. It has been used by Jolly as a remedy for nervous headache. Its constitution and derivation from thymol are represented by the formulæ—

Thymol.



Thymacetin.



Thymacetin is a white crystalline powder sparingly soluble in water. A dose of 2 grammes has no poisonous effect upon a dog. For adults it has been given in doses of 4 to 15 grains. In some instances it acts as a hypnotic.

New Method of Preparing Salol. It is commonly stated that salicylic acid sublimes without decomposition when carefully heated, but that when heated rapidly or for a long time it is for the most part converted into carbonic acid gas and phenol. According to Wierp and Ernert those statements are not quite correct, and they find that by heating salicylic acid, without access of air, to a temperature of 160°–240° it is converted into salol with separation of water and carbonic acid gas. This change may take place in two ways. The phenol resulting from the decomposition of a molecule of the acid may at the moment of its liberation react with another molecule of the acid so as to form phenyl salicylate and water—

$$C_6H_5OH + C_6H_4\begin{matrix}OH\\COOH\end{matrix} = C_6H_4\begin{matrix}OH\\COOC_6H_5\end{matrix} + H_2O$$

or the change may more probably consist in the formation in the first instance of anhydride of salicylic acid by separation of water—

$$2C_6H_4\begin{matrix}OH\\COOH\end{matrix} = H_2O + \begin{matrix}C_6H_4\begin{matrix}COOH\\O\end{matrix}\\C_6H_4\begin{matrix}\\COOH\end{matrix}\end{matrix}$$

and at a later stage this product is transformed with evolution of carbonic acid gas and formation of the phenyl ester of salicylic acid—

$$\begin{matrix}C_6H_4\begin{matrix}COOH\\O\end{matrix}\\C_6H_4\begin{matrix}\\COOH\end{matrix}\end{matrix} = CO_2 + C_6H_4\begin{matrix}OH\\COOC_6H_5\end{matrix}$$

Wierp and Ernert have suggested the adoption of this method for the production of salol, and they state that by operating in a suitable manner the yield amounts to very nearly that indicated by theory (*Pharm. Centr.*, xxxiii., 27).

Nitration of Hydrocarbons of the Methane Series. It has been considered that in hydrocarbons of the methane series an atom of hydrogen cannot be replaced by the group NO_2. However, Konovaloff has succeeded in effecting this replacement by operating upon the hydrocarbons with weak nitric acid. Normal hexane, heated with nitric acid of 1·075 sp. gr. to a temperature of 130° or 140° in sealed tubes, yielded 50 per cent. of the theoretical amount of nitrohexane. A similar result was obtained in operating with octane. The author considers that the principal products are secondary nitro compounds. By their reduction with zinc powder corresponding amines and ketones are formed (*Comptes Rendus*, cxiv., 26).

Reduction of Benzene Hexachloride. Meunier has effected the complete reduction of this compound by the action of zinc, and benzene is thus produced so easily that the method may be of service for obtaining it in a state of purity. The product distils almost entirely between 80° and 81°, and it gives no blue coloration when treated with isatine and sulphuric acid, thus showing the absence of thiophene and the difference between it and the benzene from coal tar (*Comptes Rendus*, cxiv., 75).

Tariric Acid. The oily seeds of a shrub abounding in Guatemala and belonging to the genus Picramnia, have been found by Arnaud (*Comptes Rendus*, cxiv., 79) to contain a peculiar fat acid of the composition $C_{18}H_{32}O_2$ and melting at 50·5° after repeated recrystallization from alcohol. The fat contained in the seeds amounts to as much as 67 per cent., and it may be crystallized from boiling ether in fine nacreous crystals.

Action of Carbon upon Sodium Sulphate in Presence of Silica. It has generally been held that the reaction of alkaline sulphates with carbon in presence of silica in the making of glass is represented by the equation $2\,RSO_4 + C = 2\,SO_2 + CO_2 + 2\,RO$. The proportion of carbon is of importance. If it were too small the glass would be incompletely formed and would contain alkaline sulphate ; if it were too large the glass would be sulphurous. However, it has been noticed by Scheurer-Kestner (*Comptes Rendus*,

cxiv., 117) that the quantity of carbon necessary for the purpose is much greater than is indicated by the above equation. That may be increased threefold without causing formation of sulphide, while quite twice the quantity must be used for effecting complete decomposition of sodium sulphate. He has, therefore, studied this subject by analysing the gases produced in the operation, and has thus arrived at the conclusion that the sulphur of sodium sulphate is disengaged in the free state as vapour mixed with much carbonic acid and a less proportion of carbonic oxide. He found that when there was a large excess of sodium sulphate (the oxidizing substance) the proportion of carbonic oxide in the gas still remained considerable and formed one-sixth part by volume of the gaseous products. Hence he infers that this gas results from a decomposition giving rise to sulphurous acid, which is itself decomposed by carbon at a high temperature. Berthelot has shown that by the reaction of carbon and sulphurous acid carbon oxysulphide is formed, and that by heat it is converted into carbonic oxide. Consequently the reaction taking place in the formation of a silicate may be of such a nature that the sodium sulphate is partially decomposed by silica, the sulphuric anhydride liberated being immediately converted into sulphurous acid and oxygen. Carbon reacting with the first products of decomposition would give rise to a mixture of sulphur, carbonic acid and carbonic oxide. It has been assumed from the presence of sulphurous acid in the furnace gas of glass works that it is one of the direct products of the decomposition of sodium sulphate. More probably it is only the final product resulting from the contact of sulphur vapour with an oxidizing atmosphere, that is to say, with the gaseous products of combustion. On this basis the formation of sodium silicate would be represented by the equation—

$$3SO_4Na_2 + 6SiO_2 + 5C = 3S + 4CO_2 + CO + 3(Na_2O \cdot 2SiO_2).$$

According to this view sodium sulphate would require 14·8 per cent. carbon for decomposition, and a gas would be produced containing 25 per cent. carbonic oxide. The presence of sulphide in glass made with too much carbon is thought by the author to be probably due to a secondary reaction, from want of contact between the sodium sulphate and the silica, and it may partly be due to the fact that the sulphide thus produced resists the action of silica. The traces of sulphide produced under such conditions are not proportionate to the excess of carbon, but they increase in a much smaller ratio.

Lithium Nitride. By heating lithium in a current of nitrogen gas, Ouvrard (*Comptes Rendus*, cxiv., 120) has obtained a product containing 35·86 per cent. nitrogen, and his analysis leads him to conclude that the compound formed may be represented by the formula Li_3N, or ammonia in which the hydrogen is replaced by three atoms of lithium.

Puleone $C_{10}H_{16}O$. This isomer of camphor has been obtained by Barbier from the oil of *Mentha pulegium*, in which it exists ready formed (*Comptes Rendus*, cxiv., 126). It is a colourless liquid, having a specific gravity of ·9482 at 0° and ·9293 at 23°, boiling at 222°–223°, soluble in alcohol, ether and benzene. It is dextrorotatory, its rotatory power for the ray D being $[\alpha]_D = -25°{\cdot}15$. Like camphor it contains the group CO, characteristic of ketones. It combines with hydroxylamine, yielding puleonoxim $C_{10}H_{16} = AzOH$. The substance having the composition $C_{10}H_{16}O$ obtained by Kane from oil of pulegium (*Phil. Mag.*, xiii., 442) boiled at 182°–183° C., a difference which points to the isomerism of that substance with the one now obtained by Barbier.

Iodide of Starch. From a series of observations Rouvier concludes that in the presence of an excess of starch an iodine compound is formed different from that formed in presence of an excess of iodine and not hitherto observed. The further investigation of this compound will be followed up by the author (*Comptes Rendus*, cxiv., 128).

Action of Boric Acid on Germination. Peligot observed that bean plants were quickly killed when watered with a solution of boric acid (*Comptes Rendus*, lxxxiii., 686), and further experiments by Morel have led him to the conclusion that boric acid solution retards and even puts a stop to the germination of seeds if the solution be sufficiently strong and the contact with it prolonged. Solution of borax acts in the same manner. It is therefore probable that boric acid would be useful in preventing mildew in the vine ergot in corn and other cryptogamic diseases of plants (*Comptes Rendus*, cxiv., 131).

Colouring Material Produced by Bacteria. In a previous investigation of the influence of schizophytes in the coloration of distilled water it has been shown by Barnouvin that sometimes the coloration is due to masses suspended in the liquid and sometimes the colouring material is actually in solution. Some of these dissolved pigments have been isolated by Viron, and he has succeeded in cultivating the microorganisms producing them. Orange flower water of a pale green tint left on evaporation a residue consisting of 69 milligrammes of organic material and 1 milligramme of ash. Three different colour substances were isolated by means of solvents from the organic portion. By cultivating on plates by Koch's method several chromogenic colonies were obtained. In one instance a brown pigment was produced which appeared to be a variety of the *Micrococcus cyaneus* (Schröter). A second colony to which the name of *Bacillus aurantii* is given produced a soluble yellow pigment, and a third produced a green pigment soluble in water. A fourth colony liquified gelatine and gave it a fluorescent greenish yellow colour. It resembled the *Bacillus fluorescens liquefaciens*. The liquid in which it developed produced intense inflammation when injected into animals, and generally they died in a few days (*Comptes Rendus*, cxiv., 179).

Artificial Musk. The trinitro derivative of isobutyltoluene obtained by Bauer's process does not dissolve in water (see *ante*, p. 266). Valentiner has devised a process for obtaining a product soluble in water and, as he thinks, more useful for perfumery. This is effected by nitrating a sulpho-acid of butylxylene. A mixture of isobutyl alcohol and aceto-xylene in equivalent proportions is gradually mixed with 5 parts concentrated sulphuric acid without being allowed to become hot. After some time the mixture is diluted with a four-fold

quantity of water and the oily layer of unaltered material thus separated is removed. The clear rose-coloured watery solution is mixed with saturated sodium chloride solution until the para isobutyl-xylenesulphonic acid is deposited in white crystals, which are collected by filtration, recrystallized and dried (*Pharm. Centr.*, xxxiii., 80).

Active Principle of Boraginæ. Schlagdenhaufen and Reeb have examined the roots, stalks, leaves, and seeds of *Cynoglossum officinale* and *Heliotropum europœum*. Petroleum extracted from the roots a coloured substance analogous to alkanet red. By subsequent treatment with alcohol an alkaloid was obtained which the authors term cynoglossine. It is hygroscopic, combines with acids, forming uncrystallizable salts which are decomposed at 100° C. The base was also found in the seeds, but not in the leaves or stalks. Cynoglossine has a toxic action (*Pharm. Post*, xxv., 1).

Paracresotic Acid as an Antipyretic Egasse draws attention to the advantages of this substance as an antipyretic and suggests that the use of a mixture of the three isomeric forms of the acid may have been the reason of its not being adopted in general practice. The observations of Demme have shown that of the three isomers paracresotic acid is the most effectual and the most inoffensive. Metacresotic acid is less active, and orthocresotic acid possesses decidedly toxic properties, causing paralysis of the cardiac muscle. It is probably to the presence of this body in the cresotic acid hitherto employed that the observed prejudicial effects are to be attributed. According to Demme the sodium salt of paracresotic acid may be taken to the extent of 3 or 4 grammes without producing any ill effect. He did not find it influence the temperature, and he did not experience any gastric disturbance. Loesch states that the acid is eliminated partly in the pure state and partly in association with glycosuric acid. Its presence in the urine may be recognized by perichloride, which gives a violet coloration. Demme has used it for children in the Jenner Hospital at Berne. As an antipyretic it is inferior to salicylic acid, but, on the other hand, it is free from some of its disadvantages, being better tolerated by the digestive organs and not producing the congestion which salicylate sometimes causes (*Bull. Therap.*, cxxii., 85).

Digitaline. A comparative study of the different kinds of digitaline met with in commerce has been carried out by Fouquet and he arrives at the conclusion that digitalis contains a well defined active principle digitaline which possess all the properties of the plant. Other substances more or less active may be obtained from digitalis, and they are sometimes sold under the name of digitalin. These may be classed in two distinct groups.

1. Digitalines soluble in chloroform and insoluble in water.	Crystalline digitaline. Amorphous „ Digitoxine
2. Digitalines insoluble in chloroform and soluble in water.	German digitaline. Digitalein.

Those of the first group are, when pure, of equal activity. They are the only forms that should be used in medicine, but preference is to be given to the crystalline digitaline. The pharmaceutical form in which digitaline is administered is considered to be of importance. The use of granules is condemned as involving uncertainty and preference is given to a standard solution made with glycerine, alcohol and water containing in one cubic centimetre one milligramme of digitaline (*Bull. Therap.*, cxxii., 74).

Coloration of Hypobromite Solution. Denigès has ascertained that the red colour sometimes acquired by a solution of sodium hypobromite on keeping is due to the action exercised upon manganese in the glass of the bottle, and the formation of a minute trace of alkaline permanganate. The action, however, is not sufficient to cause any sensible alteration of the hypobromite, or to interfere with the use of the reagent in the determination of urine, although the colour might sometimes raise suspicion (*Journ. Ph. and Chim.* [5], xxv., 54).

A Beaver Farm. In the *Revue des Sciences Naturelles Appliquées* there is an interesting account of a farm, established at Bascom, Georgia, for rearing beavers. There are 200 of these animals, of which about 20 are killed annually. The young are born in April and May and, since the females bear two to six each year, the families increase rapidly. They are fed with a mixture of green foods with a little maize. This is distributed to them upon the banks of the stream forming the marsh in the midst of which the farm is situated.

London Fog in Parliament. On Friday, February 12, Viscount Midleton asked, in the House of Lords, whether it was proposed to appoint a Royal Commission to inquire into the causes of the prevalence of fogs in London. It was computed that in the metropolitan area 480 tons of sulphur were daily emitted into the atmosphere from the chimneys of some 700,000 dwelling houses. The result of that was that during last year there were about 150 days on which fog more or less prevailed. The Marquis of Salisbury said the fog itself depended upon natural causes which could not be remedied, but the evils might be modified if everyone were compelled to burn anthracite coal, as suggested by Professor Frankland. He was unwilling, however, to accept the responsibility of issuing a Royal Commission.

Exalgin Poisoning. In the *British Medical Journal* is reported a case in which 17½ grains of exalgin had been given, owing to the prescriber confusing the dose with that of sulphonal. The patient became convulsed and unconscious almost immediately. Hypodermic injections of muriate of apomorphine with digitalin were administered and, after profuse vomiting, the patient gradually rallied.

Effects of the Electric Light upon the Eyes. The results of an investigation as to the form of artificial illumination best suited to the eye are given in an article in the *British Medical Journal*, by Gustavus Hartridge, F.R.C.S. Taking sunlight as the standard of comparison he finds that the electric light in the incandescent form possesses advantages which no other illuminator can claim and must be considered, when carefully shaded and judiciously placed, as the best and most satisfactory form of artificial illumination. The arc light is unsuitable for indoor illumination because of its intense brilliancy, un-

steadiness, and large proportion of violet and ultra-violet rays which cause a certain amount of fatigue.

Preventing Coagulation of the Blood. The Vienna correspondent of the *Lancet* reports upon the experiments of Dr. Ernest Freund, who points out that coagulation of the blood is due to phosphate of lime being formed and becoming insoluble. It has been found by Arthus and Pagès that rendering the lime salts insoluble by the addition of ammonium oxalate prevents coagulation, whilst this condition can be produced by adding a solution of calcium chloride. Dr. Freund has now found that by receiving the blood into a vessel containing small quantities of ammonium or sodium citrate it loses its coagulability and the phosphate of lime is kept dissolved.

Prophylactic Influence of Tobacco. Dr. V. Tassinari, of the Institute of Experimental Hygiene attached to the University of Rome, has been experimenting with a view to demonstrating the prophylactic advantages of tobacco smoking. As a result, he maintains that the smoke either entirely destroys, or in any case retards, the development of cholera, anthrax, and pneumonia bacilli.

Injurious Effects of Sulphonal. In some cases treated at the Baden Baden Sanatorium it was found that the patients were unable to write straightly and distinctly. The characters were unsteady and in an ascending line from left to right. In two of the patients the sulphonal habit had become a perfect mania, and when supplies of the drug were stopped similar symptoms were caused to those experienced when overcoming the morphia habit. In other cases this effect was not noticed, but serious symptoms were evident (*Lancet*, p. 436).

Poison Bottle-stand. A correspondent of the *Lancet* describes an ingenious electrical contrivance which he saw in a seaside pharmacy some time ago. Under each poison bottle was a small metallic disc in connection with a battery. When a bottle was removed a bell rang and continued to ring until the bottle was replaced.

Washing out the Stomach in Chlorosis, etc. The *Wiener Klinische Wochenschrift* refers to a communication by Dr. Pick, whose observations upon the relations existing between affections of the stomach and cases of chlorosis exhibiting symptoms of a gastric character tend to establish the value of washing out the stomach and thus preventing abnormal decomposition. In the current number of the *Practitioner* there is a paper by Dr. Harvey Attfield, describing the process in detail as applied in the treatment of chronic gastric affections. The "stomach-tube," made of elastic covered silk, is half-an-inch in external diameter and about thirty inches long. Slipped over the open end of this is a piece of red rubber tubing about forty inches long, attached to the extremity of which is a vulcanite funnel.

Eczema and Hatbands. A medical man writes in the *British Medical Journal* that his attention has been drawn to some obstinate cases of local eczema occurring on the foreheads of men. He attributes these to arsenic and other irritating substances which he finds are used in finishing the leather linings of hats.

Earthworms and Bacillus Tuberculosis. In a note communicated to the Paris Academy of Sciences (*Comptes Rendus*, cxiv.) by MM. Lortet and Despeignes it was stated that, following on the lines laid down by Pasteur in his investigations into the part played by earthworms in bringing the spores of bacteria to the surface of the soil, they had succeeded in demonstrating that the tubercle bacillus might be disseminated by this medium. They believe that this is the first occasion upon which invertebrates have been shown to be susceptible to tuberculisation.

Copper in Galenicals. In the *American Journal of Pharmacy* for January appeared a paper by F. W. Haussmann upon the presence of copper in some galenical preparations. Out of eight different makes of fluid extracts tested only two gave no sign of this metal. Most of the samples by the other makers contained it in greater or less degree. Alcoholic fluid extracts were found to be practically free from copper, about 50 per cent. of the solid extracts examined were contaminated with it, whilst powered extracts for the most part yielded negative results. Another paper on the same subject was recently read before the Chemists' Assistants' Association, by W. Watson Will, and is reported in our pages. It would seem that the best preventive of the presence of the metal in preparations is to use only copper vessels which have been *thoroughly* cleansed before use.

A METHOD OF EMBEDDING DELICATE OBJECTS IN CELLOIDIN.*

BY FRANK S. ABY, PH.B.

The object, properly fixed and hardened, is placed for twenty-four hours in a mixture of equal parts of alcohol and ether. It is then transferred to a thin syrupy solution of celloidin, made by dissolving celloidin in a mixture of equal parts of alcohol and ether. After remaining in this solution for about twenty-four hours, the object is covered with a thicker solution of celloidin and is allowed to remain in the same for about twenty-four hours, when it is ready to embed on cork.

When ready to embed the object, a small quantity of the celloidin solution is spread on clean glass (a slide will answer the purpose) and allowed to dry; then another coat is applied and allowed to dry. This affords a firm celloidin bed upon which the object is placed and arranged, care being taken to place it in the desired position as quickly as possible before the celloidin begins to harden. The whole is now covered with successive layers of the celloidin solution, until a firm support is built up for the object. When sufficiently dry, the celloidin is removed from the glass by means of a sharp knife and, if necessary, a pair of scissors is used to trim the bed to the proper size and form. It is now ready to embed on cork.

The top of a cork is coated with celloidin solution and allowed to dry. This is done to prevent air from rising from the cork and forming bubbles in the celloidin. The object, in its matrix of hardened celloidin, is placed in the desired position on the cork, and fastened to it with celloidin. After drying in the air until a layer is formed on the outer surface firm enough to retain the shape, the cork is dropped into 50 per cent. alcohol. Usually the object is ready to cut after remaining one hour.

---

* From the *Microscope*. Reprinted from the *West Druggist*.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, FEBRUARY 27, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

TRADE REPRESENTATION.

As this number of the Journal will be sent to every registered member of the trade in the kingdom the opportunity thus afforded for addressing those who are not connected with the Pharmaceutical Society in reference to the subject of trade representation may appropriately be taken advantage of. Though there is not in reality very much to be said upon that subject which has not been said often before, it may at least be assumed that, in a certain degree, there has been some new light thrown upon it within the last few years by the growing recognition of the fact that the Pharmaceutical Society is the only body by which the pharmacy or the drug trade of this country can be represented. During the past year it has been noticeable on all sides that this opinion is gaining ground. It has been repeatedly expressed by members of the trade holding the most opposite views in regard to general policy; by those who represent old fashioned antagonism to the Society, as well as by those who seek to augment its influence for the benefit of the trade by enlisting in its ranks all or the greater majority of the registered chemists of the country. Evidence is thus furnished of a general advance towards agreement with that view of trade organization which originally formed the basis of the constitution of the Pharmaceutical Society, viz., that the entire trade should be united for the purpose of protecting its general interests, and represented for that purpose by the Society. If that view had been accepted forty or even twenty years ago and acted upon by the trade throughout the country the Pharmaceutical Society would before this time have become sufficiently powerful and influential, as a representative body, to have done much for the protection of the trade. But that was not the case, antagonism prevailed widely and only a small minority supported the Society in the endeavours that were deemed appropriate and requisite for protecting and advancing the position of chemists and druggists. It is unnecessary to revert to the circumstances, sometimes extremely trivial, which gave rise to that state of things in times now past, for, as already remarked, there is reason to believe that much of the antagonism once manifested to the Society has become an old fashioned relic which few are disposed to wear as the garb of to-day. But it is more to the purpose to point out the fact that notwithstanding the abstention of the greater number of chemists and druggists in this country, the Pharmaceutical Society has, nevertheless, become a powerful and influential body, recognized by the public, by the medical profession, and by scientific bodies, as an organization having laudable aims, engaged in useful work, and exercising beneficial influence within the legitimate range of its operations. And, as a consequence, the Society is necessarily recognized by the Government and charged with the performance of functions of great importance to the public as well as to the trade.

Of the facts to which attention has just been directed there cannot be any question, and such being the case, it is equally certain that it is a striking anomaly that while the Pharmaceutical Society is officially recognized as the representative of pharmacy and of the general drug trade, three-fourths of those engaged in that business still remain unconnected with the Society and take no part in the work in which it is engaged. In view of the extremely democratic constitution of the Society, the opportunity for the exercise by its members of internal control of trade affairs, and the ample provision made for the representation of all views and sections, such an anomalous state of things is in itself sufficiently remarkable. But it becomes still more remarkable when it is remembered that at the present time and for some years past the practice of pharmacy and the drug trade generally has been subjected to the influence of untoward conditions, for the effectual amelioration of which it is impossible to entertain any hope except from the agency of an influential corporate body, such as the Pharmaceutical Society, adequately supported by the whole of those whom it now, to a very large extent, only nominally represents. While that singular anomaly, unequalled in any other class of the community, continues to exist, the full efficacy of the present pharmacy laws cannot be exercised to the extent that is desirable; the possibility of further legislative amendment of the law is rendered dubious, and chemists remain like sheep without a shepherd, discontented and helpless victims of their want of co-operation. It is, therefore, proper now to call attention to the fact that the Executive of the Society has recently adopted further measures to facilitate a union of chemists in its ranks. As regards those who were placed upon the Register when the Pharmacy Act of 1868 was passed, in virtue of having been previously engaged in the

business, the entrance fee of two guineas on becoming a member of the Society has been abolished, and the removal of this obstacle to a general consolidation of the trade leaves no excuse for continuing to abstain from that co-operative union which is universally admitted to be essential for the advancement and protection of the common interests of all sections of the trade. The fee for restoration to membership has also been practically done away with. There is, therefore, nothing to prevent a large number of the trade from becoming members of the Society and giving their assistance in devising means for more effective enforcement of the provisions of the law as it now stands, and for attempting its amendment in the future. As regards the rapidly increasing class of associates of the Society little can now be done without further legislative powers ; but the Council has manifested a disposition to comply with the desire of associates to be placed in the position of members, and that disposition will no doubt be adhered to in any future Bill that may be introduced into Parliament. In regard to the subscription for members of the Society it is scarcely possible to imagine that it can be seriously regarded as an obstacle to such a union of chemists and druggists for their own benefit, as has been sometimes stated. A contribution amounting to no more than a penny each working day is sufficient for the payment of the subscription of a member or an associate in business and for an annual donation of five shillings to the Benevolent Fund. The interests of chemists and druggists as a class must surely be of sufficient importance to every individual engaged in the business to be worth the payment of such a sum as that for the sake of enabling him to exercise his influence as a member of a corporate body, and to act together with others of his own way of thinking in giving effect to their views.

Before leaving this subject it may be fitting to refer briefly to some of the circumstances which are regarded by chemists and druggists as operating to their disadvantage. They are for the most part consequences of that co-operation on the part of the public for the purpose of obtaining all kinds of commodities at low prices. Every branch of trade has suffered from its effects, and it is more than doubtful whether the public has been really benefited. The chemist and druggist has suffered quite as much, if not more severely than those engaged in other trades, for while his business is of such a nature as to require, in the interests of the public, special qualification, the legislative protection accorded to him in its exercise applies to such a small part of his business that it is liable to be interfered with to a very serious extent without breach of the law. And even within the limits of that portion of the chemist's business which is protected by law, the present disorganized condition of the trade affords ample opportunities for its invasion by unqualified traders. Unfortunately, in this country there is really no provision for punishing the illegal exercise of pharmacy which is on the Continent so stringently repressed. Though the Pharmaceutical Society has long sought to obtain protection for the practice of pharmacy, that object still remains to be achieved in the future. The only protection afforded by law to the chemist and druggist is that which incidentally follows from the restriction imposed upon the sale of poison. That is, however, a restriction imposed solely and alone in the interests of the public, and it is only with that object the sale of poison is, by law, placed in the hands of duly registered persons. It is, moreover, only for that reason—the safety of the public—that the persons authorized to sell poison are required to have given proof of possessing special technical knowledge. These facts are too much lost sight of by those who plausibly but inconsiderately declaim upon the rights of chemists. From the point of view of abstract principle the claims urged in regard to the rights of competently educated chemists are reasonable enough ; but they have only that rational foundation, and they are not yet in any degree recognized or established by law. That is a position which may be secured for chemists through the medium of the Pharmaceutical Society and by the united efforts of the trade properly directed. But to attain that end the chemists' claim must be made upon the basis of regard for the public interest, and upon the principle that in the practice of pharmacy as well as in the sale of poison special technical education is essential for the safety of the public. That is the principle by which the whole work of the Pharmaceutical Society has been actuated, it is that which has gained for the Society recognition and esteem, and it is only by supporting the Society in giving effect to that principle that chemists can hope to secure such legal protection in the exercise of their business as they are naturally entitled to. Those who believe that there is any chance of the trade in drugs being restricted to chemists and druggists simply because they are required to give proof of their technical competence to carry on the business are probably now but few in number and it will be well for the interests of the trade when an idea so delusive ceases to exist altogether. We trust that these brief remarks may meet with consideration from many who are unconnected with the Society and that they may have the effect of placing before them in a practical form the actual requirements of the trade, the means by which its improvement may be effected, and also the obligations which lie upon everyone engaged in the calling of a chemist and druggist.

The question raised by Mr. Ough in last week's Journal is one that admits of a very simple solution. The strength of the official preparation he refers to is so near to the limit of solubility of strychnine hydrochloride in the menstruum employed, that a few degrees reduction of temperature has the effect of causing a deposit of the salt by reason of its lesser solubility at a lower temperature. No doubt the precautions recommended by Mr. Umney might effectually prevent the inconvenience resulting from the separation of a deposit in liquor strychniæ. But at best that would be a somewhat troublesome mode of procedure, and if every pre-

paration required to be kept at a particular temperature in order to be fit for use, the dispenser's attention would be too much and unnecessarily taxed in providing for such requirements. A much more effectual and suitable mode of removing any difficulty in the case of liq. strychniæ would be to reduce the strength of the solution to one-half or 1 part in 200. There is no special virtue in the 1 in 100 strength about which the liquors of the B.P. revolve with sufficiently eccentric orbits and it might be useful, in the case of liquor strychniæ, to deviate from that apparently unattainable standard sufficiently to make allowance for the physical characters of strychnine hydrochloride and thus prevent the risk of accidents which may arise under existing conditions.

* * *

A correspondent assumes that in Mr. Lane's paper as well as in this Journal it has been overlooked that the 17th section of the Pharmacy Act applies to wholesale as well as retail transactions so far as labelling every package of a scheduled poison with the name of the article and the word poison. In that assumption he is mistaken, and it must be pointed out that, in regard to the subject dealt with by Mr. Lane and commented upon in last week's Journal, it is not in the present position of matters requisite to consider who is responsible for the proper labelling of secret remedies that may contain scheduled poisons. As those articles are now generally sold the presence of poison in them is concealed, and the seller has therefore no chance of complying with the law or of observing due precautions. He neither knows nor has he the right to inquire whether such an article contains poison, and therein lies the danger. The fact of the presence of poison in such articles must first be established by a competent authority acting on behalf of the public. If it be then shown that the preparations containing scheduled poisons are being sold without observance of the precautions demanded by the law, the sellers must be prosecuted and, if convicted, left to seek any remedy they may have against the wholesale dealers who supplied them. We thoroughly agree with Mr. Pickard that the obligation of complying with the law in the matter of labelling, to indicate the presence of poison and its nature, lies as it ought to do, upon the manufacturer of proprietary articles ; but the point now to be considered is that so long as those facts continue to be concealed, it is only an academic proposition to say that the manufacturer is responsible, and that the obligation to obey the law lies with him. The thing to be done, in order to be able to deal with that part of the affair, is to obtain a practical demonstration of the fact that the law in regard to the sale of poison is being habitually and extensively broken.

* * *

A farewell address has just been presented to Professor Williamson on the occasion of his retirement from the Chair of Botany in the Owens College, Manchester, after occupying it for more than forty years. He intends in the future to reside near London, and it is to be hoped he may long be enabled to continue his researches in palæobotany.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

February, 1892.

Present:—Mr. Carteighe, President; Mr. Bottle, Vice-President; Messrs. Blunt, Bowen, Corder, Davies, Druce, Fletcher, Gerrard, Greenish, Holmes, Ransom, Saul, Symons, Tanner, and Taylor.

Dr. Stevenson was also present on behalf of the Privy Council.

MAJOR EXAMINATION.

Twenty-seven candidates were examined. *Twelve* failed. The undermentioned *fifteen* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Button, Arthur Edward.....Lincoln.
Carter, Thomas .....Hereford.
Cocker, Horace Edward.....Ripponden.
Cooling, Francis Charles .....Bath.
Davidge, Henry Norris .....Langport.
Emmons, Charles .....Kidsgrove.
Gillies, William ....Manchester.
Goodwin, Francis Arthur .....Hampton Bishop.
Hale, Giles .....London.
Hudson, John Edward .....Manchester.
King, Edgar James.....Wootton Bassett.
Lawrenson, George.....Manchester.
Postlethwaite, Thomas .....Kirkby-in-Furness.
Randall, Bruford Henry .....Wareham.
Whitehouse, John William ...Bradford.

MINOR EXAMINATION.

Fifty-seven candidates were examined. *Thirty-three* failed. The undermentioned *twenty-four* passed, and were declared qualified to be registered as Chemists and Druggists:—

Appleyard, Francis Henry ...Bradford.
Birch, Charles William .....King Stanley.
Brooke, Benjamin .....Scarborough.
Cameron, Lauchlan .....Brighton.
Chaplin, Albert Edward .....Taunton.
Dunlop, Thomas William .....Berwick-on-Tweed.
Emlyn, James Seymour.....London.
George, Francis Joseph.....Aberdeen.
Godber, James.....Alfreton.
Griffiths. Charles John .....Shanklin.
Harvey, William Whilton.....Derby.
Heanley, Alfred Vergette.....Peterborough.
Jowett, Hooper Albert D. .....Lancaster.
Long, Sydney George Hadlow.Dover.
Makepeace, Arthur Benedict...London.
Peet, Major Flintham .....Sheffield.
Plomley, Francis John .....Maidstone.
Richards, Fred ....Grampound Road.
Sarjeant, Alfred .. ..Ramsey.
Shaw, George Arthur..... ..Stockport.
Simpson, James .....London.
Taylor, Charles .....Tregoney.
Williams, Arthur John Berry...Wolverhampton.
Wright, Charles George... .....London.

FIRST EXAMINATION.

Certificates by approved examining bodies were received from the undermentioned in lieu of the Society's examination:—

Beesley, John William Cowley.West Malling.
Bennett, Charles Thomas .....Camborne.
Cooper, Albert John Bullen ...London.
Corke, Edward Stanton.....Ticehurst.
Evans, John .....Aberayron.
Heraughty, Thomas .....Perth.
Palmer, Edwin.....London.
Shattock, John B. ....Bradford.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of the Chemists' Assistants' Association, held at 103, Great Russell Street, on Thursday, February 11, Mr. W. Lloyd Williams, President, in the chair, a paper was read on—

Aqua Destillata.

BY J. C. HYSLOP.

"Cleanliness is next to Godliness," so the adage goes. But the pharmacist who hopes for final success must pitch his ideal far higher. The assertion that dirt is but matter in the wrong place comes home to him at times with terrific force; his proverb might better run thus—"Cleanness is synonymous with Godliness," dirt is disorder, cleanness is order; he works from the one towards the other as far as ever he can get, and knows of no halting point between.

All reformation, worthy of the name, that from which is evolved substantial progress in improvement, refinement, and perfection of every kind, consists of so many steps in the straight path towards greater simplicity, cleanness, and order.

What we may term the earliest history of clean water is wrapped up in much obscurity. With the alchemists of antiquity the great medium for working purposes was Fire; this one great pure and purifying agent, *per se*, was equally indispensable to them for analytical and synthetical purposes alike, their chief work being the study of metals and mineral substances in their native states. Yet we cannot but suppose that in the remotest times of which we are speaking, those worthy harbingers of modern discovery must have used, and, as a consequence, prepared for themselves water of tolerable purity. Certain it is that chemists must have used aqua destillata long before it was introduced into medical practice or became recognized in our Pharmacopœia. In the earliest of these official guides various aromatic distilled waters abound from the first, both simple and compound ones, and from what is now known as to the unstable nature of waters thus impregnated with plant-odours there could not have been very much uniformity of result in the dispensing of those times. Still, the aromatic waters being free necessarily from most of the earthy impurities of ordinary water, they became convenient vehicles for the administration of alkalies and salts of ammonia, potash, and soda, and hence their vaunted popularity in medical practice, and hence most likely the reason that not until 1788, on the publication of the sixth London Pharmacopœia, does aqua destillata make its appearance "by authority." Here is the first formula—

Aqua Destillata.

℞ Aquæ congios decem;
Destillent primùm octarii quatuor,
quibus abjectis, destillent congii quatuor.
Aquam destillatam in lagendâ vitreâ serva.

In the seventh and eighth P.L., which brings us to 1824, this formula is repeated word for word; in the ninth, 1836, a slight change occurs. Two pints only instead of four are to be thrown away at the commencement of the process, and eight gallons instead of four are allowed to be retained for use, a decided boon to the conscientious pharmacist, for which we feel sure he was duly grateful. The words are these:—

℞ Aquæ congios decem;
Destillent primùm octarii duo, quibus
abjectis, destillent congii octo.
Aqua destillata in lagendâ vitreâ serva.

This last note, repeated from the previous edition word for word, shows that the compilers of the P. L. from 1788 to 1836 had their eyes open to a very important item that ever since seems to have been lost sight of altogether.

"Keep distilled water," say they, "in glass vessels." We fear that the long-cherished custom of keeping all sorts of aqua vita in stoneware has led to the defilement of innumerable tons of aqua destillata that had been properly distilled.

False analogy is the cause of much mischief everywhere, and here the easy-going pharmacist of the past may have been lulled to sleep, we fancy, by the fact that he could keep his s.v.r., his old Irish or Scotch or his Hollands in stoneware without detriment to their quality, and why not his aqua dest.? But he forgot, or perhaps never knew, never gave it a thought, that the purer your aqua the easier does it become defiled, from its high solvent power of dirt in almost every shape or form, whilst with s.v.r. the reverse holds true; it will fly away, it may set fire to your establishment or destroy your own mental equilibrium if its departure be too rapid; but if you keep it tightly under control it will preserve from putridity and purify dirtiness with very little detriment to itself, because its solvent powers, as we all know, are exerted upon resinous and oleaginous matters only, which are themselves of an antiseptic quality.

In the tenth, the last of those sweet little books that one could carry about in his breast-pocket and use for keeping bright his Latin grammar, his chemistry and his pharmacy alike, aqua dest. is transferred to the materia medica with the following tests added as a means of determining its purity:—

"Addito vel liquore calcis, vel barii chlorido, vel argenti nitrate, vel ammoniæ oxalate, vel acido hydrosulphurico, limpide perstat."

We part (with deep regret) with our little Latin friend, and are bound to take in hand the bouncing Britisher of 1864, where first the common element "aqua" becomes recognized in the materia medica, and "aqua dest." is relegated once more to the preparations and compounds.

"Take of water free from taste and odour ten gallons, distil from a copper still connected with a block tin worm, reject the first half gallon, and preserve the next eight gallons."

"*Tests.*—A fluid ounce of it evaporated in a clean glass capsule leaves no visible residue. It is not affected by sulphuretted hydrogen, oxalate of ammonia, nitrate of silver, chloride of barium, or solution of lime."

These tests are all right as far as they go, especially the "*no visible residue.*" The formula, however, we think, imposes upon the pharmacist burdens oppressive and unnecessary, which tend to terrify him from the attempt to perform some of his obvious duties. He must operate upon ten gallons at once, he must employ a copper still only; then follows an injunction that no chemist need be told of, and that no man other than a chemist would be likely to pay any attention to, "throw away the first half gallon and preserve the next eight," but nothing now about how this precious liquid is to be preserved, nothing about its being kept in glass vessels only: "*O tempora, O mores!*"

In the next British Pharmacopœia, 1867, where we get, for the first time, materia medica and preparations and compounds all thrown together by the accident of the alphabetical order of their Latin names, the directions for preparing distilled water remain word for word as in the previous edition, one word only being dropped out, the important little word no, for which read "*scarcely any.*" Evidently the revisers had themselves failed to obtain water in a pure state, in spite of the injunctions about a 10-gallon copper still; and, indeed, where would be the use of using even platinum for your 10-gallon still, worm and all, if, after getting the water, it be stowed away in earthen

jars in which, I am credibly informed, men plunge a light, be it a piece of lighted paper or a match, to see that the inside is clean before filling in the contents, and then closing the neck with a bung around which leather that has been dressed with lime is stretched for greater security.

No hint is yet given of a test for organic impurity, and this may perhaps be logically connected with the change from "*no visible*" to "*scarcely any visible impurity*."

Coming now to the third, the present Pharmacopœia published in 1885, we find the formula the same. The same heavy burden of a 10-gallon copper still, enough of itself to intimidate the pharmacist from attempting to produce the article for himself, however great difficulty he may find in obtaining it from the usual business sources; enough without the additional bugbear of 10*s.* per year for a licence imposed by the Inland Revenue.

At length, however, we do get a gentle advance in the tests for purity, although—"tell it not in Gath"—the odious "*scarcely any*" remains, instead of the honest "*no.*" We have now for the first time a test for nitrites and one for organic matter, to both of which additions are proposed (to which we hope to allude immediately) which make them practically perfect; so that in the next edition let us hope to have a series of tests that no chemist need be ashamed of quoting.

Meanwhile we assert and are in a position to show that perfectly distilled water may be procured that shall give equal satisfaction to the chemist, the pathologist, or the bacteriologist, by means of a 2-gallon tin still, working over a gas-stove or even a common fireplace; and I think we shall make it quite as evident that, considering the vast importance of having one's "aq. dest." fresh and bright, and that it be consigned to vessels that are perfectly clean whilst it is being kept for use, vessels that can be seen through, so that the slightest appearance of dirtiness may be detected by anyone, each pharmacist should be encouraged to prepare it for his own use, and to this end the Board of Inland Revenue should be memoralized to remit in this case the duty of 10*s.* per year for keeping and using a still, provided always such still be used for preparing distilled water and for no other use whatever.

The literature of "aqua destillata" is surprisingly scanty. Here we have at hand an increasingly valuable encyclopedia of pharmaceutical development entitled the *Pharmaceutical Journal and Transactions.* Searching through its fifty volumes covering the period of as many eventful years, we find no paper devoted to this subject until we arrive at the forty-ninth. Here at length, amongst some proceedings of the Edinburgh Chemists' Assistants' Association, we meet with a short but valuable note by Mr. G. Coull, and another by Mr. Rutherford Hill, read on the same occasion.

Mr. Coull, taking it for granted that aq. dest. should be synonymous with aqua pura, points out that the test for nitrites wants completion by the addition of acetic acid, and this suggestion becomes more cogent still when we reflect that the iodide at hand for testing is not pure, but only the P.B. article, approximately so, always containing some carbonate, at any rate enough to vitiate an analysis such as this.

That by Mr. Hill relates to a sample of distilled water that he met with in practice which possessed a distinctly acid reaction, and from the experiments by which this observation was followed up it was found that carbonic acid, when once imbibed by pure water, will cling to it much more tenaciously than would have been expected, even to the extent of resisting the process of boiling for some considerable time. This same sample was found to contain likewise a small proportion of iron, although it gave no reaction with the sulphuretted hydrogen test. The author suggests, therefore, that the test in the B.P. should run thus:—"it is not affected by sulphuretted hydrogen either alone or after the addition of ammonia," the subsequent addition of a little ammonia being the means by which the impurity was in this case detected, verified afterwards by adding a solution of the ferrocyanide of potassium.

The truth, the conclusion of the whole matter is that all along to the present time aqua destilllata has been seldom met with except when obtained direct from some unimpeachable chemical manufactory in a condition to satisfy even the moderate demands of the Pharmacopœia, much less those of the scientific man, be he chemist, microscopist, or bacteriologist; and evidence might be adduced in many quarters where a long and laborious course of important investigations has been rendered more irksome than needs be, and conclusions mystified through an impurity in this otherwise most serviceable liquid.

The chemist and druggist has never before held the position of honour that he holds at the present time, and it greatly concerns him to keep his position with quiet tenacity and to advance step by step in the right direction. For, as we have hinted at starting, he knows well how to do it, he needs not cry out for extraneous assistance; such a cry for help is usually insincere, and—

> "None sends his arrow to the mark in view
> Whose hand is feeble or whose aim untrue."

Of all men in the world a pharmacist ought to know how to help himself forward, and so he does know, and he knows how to help his neighbour, and that is the next step; so the whole craft will become more distinguished and its glory become reflected more and more upon each individual member, and so may it be largely by remembering the wealth of philosophy in those words of our greatest teacher, "Make clean first the inside of the cup and of the platter," with which agrees the caution contained in the tender strains of our Gallic poet—

> "Un vase *impur* aigrit la *plus douce* liqueur."

The President (Mr. W. Lloyd Williams) said that the subject which Mr. Hyslop had dealt with had undoubtedly not received the attention from pharmacists and chemists that might have been expected. At a recent meeting of the Society of Chemical Industry attention had been drawn to the non-existence of a reliable process for estimating the amount of organic matter contained in water. An instance had also been quoted in which the distilled water used by a certain firm of mineral water manufacturers was found to contain an appreciable amount of phosphate, the presence of which, on investigation, was found to be due to the solvent action of the water on the animal charcoal through which it was passed for the purpose of brightening and revivifying. He questioned if the Excise authorities would entertain the proposal of granting the boon of free stills for the preparation of distilled water; at the same time, he thought some facility ought to be granted in this direction.

Mr. McFall asked if Mr. Hyslop had tried a process of continuous distillation, in which sulphuric acid was added to the contents of the still before commencing, so as to fix any ammonia present. There was also a method of distilling, in which sulphuric acid and potassium permanganate was used. He had not tried either, but would like Mr. Hyslop's opinion of them.

Mr. Fell remarked that the last mentioned process was generally employed by analysts for preparing distilled water for analytical purposes. The solvent action of water on glass was well known, and he questioned if the use of glass in preference to stoneware had any advantages in the storage of distilled water.

Mr. H. H. Robins remarked upon the luting in-

variably used, and asked Mr. Hyslop if he had noticed an odour peculiar to distilled water, which he (the speaker) attributed to this cause, and from which he had never been able to get a sample quite free. A trace of alkali was nearly always present in the water supplied by wholesale houses, which might be traced to the priming of the still. He thought stoneware more useful than glass for the general purposes of storage and transport. It was his opinion that the Revenue authorities would not sanction the use of stills without licence for the preparation of distilled water.

Mr. Daniels remarked upon the fungoid growth frequently to be noticed in distilled water after it had been distilled but a short time.

Mr. Walton thought the quotation with reference to the "cup and platter" very *àpropos*. Stoneware was generally used in pharmacies for the storage of distilled water, and he had recently seen an instance where organic impurity was introduced into the containing vessel (and consequently to the water, in which, on standing, fungoid growth was observed to form) by the process of intended cleansing. This process consisted of washing out and then drying with a cloth. No doubt the cloth left some impurity behind, for since its use had been discontinued and the vessel simply scalded out and rinsed, no fungoid growth had made its appearance. He thought that distilled water might easily be contaminated with organic impurity from the unclean outside of the vessel.

Mr. Parry said that a great deal of the distilled water supplied consisted of engine waste from an iron boiler, condensed in iron pipes and under copper pans, and was contaminated with iron and ammonia. For diluting spirits wine-merchants would not have this article, but were willing to pay a good price for water properly prepared with a zinc coil. The solvent action of water on glass was no doubt greatly influenced by the temperature. The higher the temperature the greater the quantity of the constituents of the glass taken into solution, as shown where glass in any form was kept in boiling water under pressure for any length of time, for on withdrawal it would be found to be corroded and incrusted. He thought the terms "pure water" and "distilled water" were synonymous. Pure water was practically unknown. Samples of water had been obtained which did not boil at 135° C. The boiling point of pure water was probably about 150° C.

Mr. Seccombe remarked upon the usefulness of potassium chromate for testing for lead in water. He asked if Mr. Hyslop had had any experience in the use of the microscope in judging the comparative purity of water.

Mr. Hyslop, replying, thanked the members of the Association for their discussion of his paper. He had not tried the processes mentioned for continuous distillation. He had noticed that where a distilled water bottle was kept partially filled the contents soon showed signs of contamination, and if a little water were placed in a vessel in the warm atmosphere at the top of the shop a cloudiness soon made its appearance. He did not use a 10-gallon still, as he found one of smaller dimensions was quite sufficient for his purpose. He felt perfectly certain that the excise would be favourable to making exception in the case of stills used for preparing distilled water, for if they were used for other purposes it was bound to be detected. A still used for distilling anything other than water would contaminate water afterwards distilled for an indefinite period. He had especially noticed this on more than one occasion, and stills used for liquids containing essential oils were useless for preparing distilled water. He would draw attention to a point in dispensing which ought not to be lost sight of. It was the indiscriminate use of the distilled water bottle for filling up different mixtures. The mixtures constantly contained ingredients, such as aromatic spirit of ammonia, etc., which gave to the water remaining in the distilled water bottle a distinct odour, and in some cases taste. They could not too carefully guard against this. The solvent action of water on glass and stoneware was well known. It must be remembered that water was a general solvent, and the greater its purity the more powerful its solvent action.

Miscible Liquid Extract of Cascara.

BY JOHN MOSS.

This was a report of experiments conducted with a view to avoiding the deposition which takes place in making the official liquid extract. It was found possible to make a preparation of full activity which did not turn muddy when mixed with water and from which the nauseous taste and smell were entirely eliminated by simply exhausting young bark with water alone, evaporating on a water bath until a brittle residue was left, and treating the cooled extract with cold water until disintegrated. The liquid was strained through flannel, the product from each pound of bark evaporated to 12 fluid ounces, and 4 fluid ounces of rectified spirit added.

The solid extract may be prepared by proceeding as above, except that instead of adding spirit to the strained liquor the latter should be evaporated to the necessary consistency on a water bath.

Mr. Robins said Mr. Moss had undoubtedly had extensive experience with cascara sagrada preparations, and any communication from him on this subject was very acceptable.

Mr. W. L. Williams said Mr. Moss had dealt so ably and fully with the subject that there was no further comment to be made. Pharmacists generally ought to take advantage of the communication. Manufacturers did not usually take their clients so fully into their confidence; but he thought it was to the manufacturers' advantage to enlighten their customers on such preparations as the one before them. Undoubtedly most of the trouble with the cascara sagrada extract arose from the long boiling necessary. By conducting the process *in vacuo* a product is obtained which is practically soluble. It would be most interesting to have a continuation of the work of Messrs. Miller and Thorp, and to have the connecting link between the active principles of *Rhamnus frangula* and *Rhamnus purshianus* traced.

At a meeting of this Association, held at 103, Great Russell Street, on Thursday, February 18, Mr. W. Lloyd Williams, A.I.C., President, in the chair, the following paper was read:—

The Purity of Extracts.

BY W. WATSON WILL.

The intention of the following notes upon this class of pharmaceutical preparations, which are of complex character, is chiefly to emphasise the observations made by Mr. J. R. Hill in a paper read before the British Pharmaceutical Conference at Hastings in 1884, which dealt with the presence of copper in pharmaceutical preparations. Extracts are a class of preparations which readily lend themselves to adulteration, and amongst the commonest of agents employed by unscrupulous manufacturers are to be found dextrin, gum, starch, graphite, lycopodium, oxide of iron, albumen and the chlorides and nitrates of potassium and calcium, the latter in quantities far in excess of

those in vegetable juices. Different methods have been proposed for the determination of organic impurities, but that of Goldschmidt appears to afford most concordant results, viz., the determination of the substance precipitable by means of a standard solution of plumbic acetate; however, this process can only be an approximate one at best. During the last six months I have had occasion to examine the ash obtained from various extracts, and was forcibly struck by the continual presence of copper which occurred in varying quantities, but at times in very high proportion. As copper is not a normal constituent in plant tissues its presence in vegetable extracts must proceed from the apparatus employed in the concentration of the juices or aqueous extract of the drug. Copper has long been employed as the material for the manufacture of evaporating pans and to a certain extent it has claims over other metals, but long ago Mr. O. Corder, of Norwich, drew attention to the advantage of tinned copper vessels. The claims of enamelled vessels have also been advocated, but apparently little attention has been paid to either, and I presume that so long as chemists are content to be merely buyers and retailers, this condition of things will remain.

In the manufacture of an extract one has first to consider what changes may be likely to take place during the process of evaporation, and if the liquors are of an acid character whether metallic vessels are suitable for concentration. Plants contain various principles which, while contained within the cell-wall or vessels, are originally colourless, but under the influence of heat and air very readily assume a dark colour and in most cases an acid character. This chemical change is undoubtedly one of absorption of atmospheric oxygen. With the formation of organic acids and humin, this change but feebly affects the well-defined constituents of the juice, such as alkaloids, glucosides, etc. Hence, although the resulting extract may contain the active principle of the drug, as normally occurring in the plant, the basis of an extract in many cases is altogether different from the soluble contents of the juice when originally removed by pressure or extraction with solvents. Bearing these facts in mind, I have little hesitation in saying that amongst metals employed for evaporating purposes, copper should be the last resorted to. Silver-lined vessels are too expensive, and iron is unsuitable for most extracts on account of many being astringent. From observations made during the last two years in the analysis of different substances, I should like to advocate the claim of nickel pans, which are inexpensive, or, in their place, well-enamelled vessels which are unaffected by the liquid even if moderately acid during evaporation.

In reviewing the extracts of the Pharmacopœia which I have examined for copper, it will be advantageous to consider them in some order, such as green extracts, consisting of inspissated and clarified juices; alcoholic extracts, which are highly resinoid; and hydro-alcoholic, which are allied to the two preceding; and lastly the acid extracts.

The process employed in the determination of the copper was the colorimetric one of Carnelly which is very serviceable in estimating small quantities, provided due precaution be taken to exclude iron.

The ash from a weighed quantity of extract was dissolved in some strong hydrochloric acid, a little potassium chlorate added and the boiling continued until all free chlorine was expelled; then ammonia was added to the cooled solution until strongly ammoniacal. This completely precipitates any iron or ferric hydrate; the liquid is then filtered and washed with a little water containing a small quantity of free ammonia, and the filtrate boiled until free from ammonia; if the proportion of copper present be very small it is advisable to still further concentrate the solution. This solution is then placed in a cylinder and half a c.c. of potassium ferrocyanide solution (1 in 25) added; the same quantity of ferrocyanide solution is placed in a cylinder of equal capacity and some distilled water added, then measured quantities of standard copper solution added until the two colours agree; from the quantity employed the proportion of copper present is readily determined. The addition of a small quantity of ammonium nitrate to the solutions renders the reaction much more delicate. The standard copper solution contains ·393 grains copper sulphate in 1 litre = 1 c.c. = 1 milligram Cu. For the detection of extremely minute quantities of copper Bresti's zinc platinum process is the best, allowing the liquid to stand at least ten hours before the removal of the platinum wire which is afterwards submitted to the fumes of impure hydrobromic acid evolved by the action of sulphuric acid in potassic bromide. The wire acquires a deep violet colour by this method; ·000001 grain of copper can be detected.

All the green extracts of the Pharmacopœia were examined and, without exception, were found to contain copper, the extracts of belladonna and henbane showing the higher proportions of copper, ·42 and ·36 per cent. of Cu = 1·722 and 1·476 per cent., calculated as crystallized cupric sulphate. The other green extracts yielded smaller results, but none were without copper. Of the alcoholic extracts those of cannabis indica, belladonna, and cimicifuga showed the higher ratio; the liquid extracts of ergot, of cinchona, and bael contained very marked quantities of copper, whilst the other liquid extracts only contained traces; and of the aqueous extracts, gentian, liquorice, quassia, and pariera contained the greater quantity, as also the ethereal extract of mezereon.

Extracts of stramonium, rhubarb and calabar bean were free from copper.

Two samples of extract fucus vesiculosus and one of acetic extract of ipecacuanha contained very high quantities of copper and I have little doubt, from observations made upon other preparations such as concentrated decoctions and infusions, that it is an impurity of very common occurrence.

That this should be so does not reflect much credit upon manufacturers and still less upon the dispensing chemist, who should be his own manufacturer and in this way avoid the pitfalls of adulteration and the results of ignorant manipulation, of which the preceding remarks are but an imperfect indication.

The President (Mr. W. Lloyd Williams) urged the necessity of examining extracts, and where copper was found to publish the fact and so compel attention. An infusion of ergot would become acid in a very short time, and when concentrated in copper pans in making the liquid extract the acid it contained would act on the copper oxide present. He had found that not only infusion of ergot but other simple infusions soon became acid. By using bright copper vessels free from oxide this objection to their use would be avoided, but the cleaning would necessitate much scrubbing and scraping, and the pan would soon wear out. Copper mechanically detached from the pan when getting out extracts was also frequently to be observed. He thought nickel had a great future in store. The late Mr. Powell had drawn attention to its usefulness for pharmaceutical utensils, especially for evaporating pans, and had shown that the cost of the metal was not prohibitive. Other substitutes for copper were earthenware and enamelled iron. The great objection to enamelled iron was its liability to chip. The pans being steam-jacketed the variation of temperature soon told upon them, and as the enamel cannot be renewed this meant a serious loss. Some manufacturers use silver pans for granular preparations. Mr. Will had not mentioned glucose in his

paper. He (the speaker) thought glucose for the purpose of standardizing extracts a most suitable diluent, as it most nearly approached the natural constituents. In boiling down extracts there invariably separated humin or apotheme or a humin-like substance which precipitated and formed the basis of the extract, probably originating from the broken-down cell contents. The colorimetric method for the estimation of copper gave good results, and was evidently the best for estimating the amount of that metal in extracts. It appeared strange that copper should be found in extract of Indian hemp and not in that of calabar bean, as the processes for their preparation were similar.

Mr. Stead thought that enamelled pans could hardly be recommended for the evaporation of juices and infusions. It was well known that the silicates employed were readily attacked by vegetable acids, hence in using glass or enamel there was a similar danger as with copper. In his opinion nickel would be most serviceable for evaporating pans.

Mr. Sage remarked that clean copper pans would not cause any contamination. Enamel certainly was objectionable as vegetable acids take up a certain quantity of its constituents. He thought some attention ought to be paid to the tendency of the extract of nux vomica to vary in alkaloidal strength on account of the evaporation of moisture and hardening of the extract, so that tincture made with an old extract would be stronger than required by the Pharmacopœia. He had noticed that extract of Indian Hemp after having been kept some time became less soluble, probably because of oxidation. He had also noticed the presence of particles of copper in extracts which had evidently been detached from the pan in getting out the extract.

Mr. McDiarmid said that it was very desirable that evaporating vessels should be made of other metal than that in general use; copper was very objectionable and some progress ought to be made. In his opinion manufacturers ought to use nickel; tin, he thought, was too soft. We had been shown that traces of copper in food were not harmful, but that was not the question with pharmaceutical preparations; they ought to be free from contamination.

Mr. Morris observed that a simple method of removing copper from a fluid extract was to suspend in the liquid for a short time a clean iron chain, the copper being deposited on the iron.

The President, in concluding the discussion, said although no doubt a saturated solution of the acids would attack enamel, yet he did not think ordinary vegetable juices and infusions would have such an action. Besides ergot, bael fruit caused some trouble on account of its containing a considerable quantity of acid. He then proposed, and Mr. Stead seconded, a hearty vote of thanks to Mr. Will, for his useful and interesting paper. This was carried with acclamation.

The proceedings then terminated.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting was held on Thursday, February 18, Mr. H. Garnett, Vice-President, in the chair.

The following paper was first read:—

True and Commercial Pareira.

BY F. A. RINGER AND E. BROOKE.

Some time ago Mr. E. M. Holmes, the Curator of the Society's museum, informed us that he had a sample of a substitute of pareira which had recently come into the market in large quantities, its botanical origin being unknown. At his recommendation we determined to investigate the chemical characters of this root, and compare the results with those obtained from the roots of *Chondodendron tomentosum*.

Examining these preliminarily we noticed that the genuine root cut like very hard wax, whereas the spurious one when cut crumbled into pieces. The powder of the true *Pareira Brava* is also much lighter in colour, but heavier bulk for bulk than the substitute.

The cooled aqueous decoction of the latter drug did not give any coloration when treated with iodine, and therefore does not answer the Pharmacopœia description in this respect.

The amount of moisture in the two roots was practically the same, both drugs being dried at a temperature of 110° C. In the case of chondodendron it amounted to 9·30 per cent., and in the substitute to 8·99 per cent. of the whole weight.

The total ash was next estimated, and was found to be 4·29 per cent. in the original drug, and in the substitute 1·32 per cent. When chemically and spectroscopically examined the same metallic and acidulous radicals were found in each. This result was confirmed by repeating the experiment on two other portions of the drugs. The metallic radicals present were iron, aluminium, calcium, sodium and potassium, whilst the acidulous ones were phosphates, sulphates and silicates. The root of chondodendron, exhausted by petroleum ether and the percolate evaporated to dryness in a current of air, yielded a large residue of a dark colour which had two or three small, roughly defined crystals scattered through it. This residue had a melting point of 47° C. It was then treated with absolute alcohol, the solution yielding on evaporation a dark amorphous fat, which floated on the surface, and a number of crystals like small cauliflower heads which formed at the bottom of the vessel. These crystals were recrystallized several times, the melting-point then taken, and a weighed quantity of both the crystals and the fat neutralized by a centinormal soda solution. From this it was found that the total residue, which amounted to 8·67 per cent., consisted of seven-eighths of free fatty acid, mainly stearic, the remaining eighth being a neutral liquid oil, which was obtained in too small a quantity for further examination.

The percolate from the substitute was of a light yellow colour and after evaporation left a much smaller residue, amounting to 0·28 per cent. This residue was acid to litmus but being in too small a quantity to determine the fatty acid present, we assumed it to be near that of palmitic; if that assumption be correct, then half the residue estimated volumetrically would be fatty acid.

The marc left from the two previous percolations was then dried at the ordinary temperature, exhausted with ether and the percolate evaporated to dryness.

Practically nothing resulted from this treatment in the case of chondodendron; but the false drug gave a residue to which a trace of volatile oil probably adhered, as evidenced by a strong, peculiar odour.

This residue, which occurred to the extent of 0·24 per cent., was insoluble in water and dilute sulphuric acid, did not answer the tests for gallic and tannic acids and gave no precipitate with Mayer's reagent. It was tasteless, melted on the application of heat and dissolved in solution of caustic potash with the production of a dark colour. Being acid to litmus and freely soluble in absolute alcohol, it was considered to be an acid resin.

The residues left from the previous ether percolations were dried and exhausted with absolute alcohol, the percolates measured and a known quantity evaporated to dryness, then incinerated and the ash deducted. This gave the total amount of organic solids present, soluble in absolute alcohol.

The remainder of the alcoholic percolates were evaporated to dryness, the resulting residues di-

gested in water and the mixture filtered. The solutions thus obtained were then divided into two parts (A and B) and a definite portion of A evaporated to dryness to ascertain the amount of the organic solids soluble in water. The remainder of A was tested for tannin and alkaloids, both of which were found present in each drug.

The second part (B) was then concentrated and neutralized with sodium carbonate until no further precipitate ensued, the precipitate being then dried and exhausted with ether. The ethereal solutions evaporated to dryness and weighed gave the amount of alkaloid present.

The aqueous filtrate after precipitation was neutralized with acetic acid and then treated with acetate of lead, as recommended by Dragendorff, but no results worth mentioning were obtained by this method. The residues from the previous treatment with alcohol, after being dried, were exhausted with water, the percolates measured, and certain portions evaporated to dryness.

From this was ascertained the total solid residue, which amounted in the case of chondodendron to 11·76 per cent., and in the substitute to 6·05 per cent.

About 10 c.c. of the percolates were then mixed with twice their volume of absolute alcohol and allowed to stand for twenty-four hours, when a large precipitate occurred in the liquid obtained from the genuine drug, showing that a large quantity of mucilaginous substances were contained in it. The percolate from the substitute showed scarcely any precipitate.

Percolations were also made with dilute soda solution and dilute hydrochloric acid, but they were not carried far enough to put the results in this paper.

The following table will show the results of our analyses by this process as far as we have conducted them—

Analyses.

	Per cent. from True.	Per cent. from False.
Moisture (110° C.)	9·30	8·99
Ash (containing Fe, Al, Ca, Na, and K, also phosphates, sulphates, and silicates)	4·29	1·32
Fats and Fatty Acids (petroleum ether extract)	8·67	0·28
Acid Resin (ether extract)	none	0 24
Alkaloid (Extracted by absolute alcohol.)	0·819	0·143
Tannin, etc. (Extracted by absolute alcohol.)	1·261	2·497
Phlobaphene (Extracted by absolute alcohol.)	0·52	0 53
Mucilaginous and Albuminous Substances (extracted by water)	11·76	6·05
Substances extracted by Soda (0·1 per cent. solution)	none	none
Starch, Lignin, Cellulose, and non-extractive matter (by difference)	63·38	79·95
	100·00	100·00

We think from these results the conclusion may safely be drawn that the root of chondodendron is much richer in chemical and extractive principles than the substitute.

The root of chondodendron gave 13·67 per cent. and that of the substitute 9·73 per cent. of extract. These extracts were made with boiling water, as directed in the Pharmacopœia, and were thoroughly dried at a temperature of 110° C. These figures show that the true root affords a much larger yield of extract than the substitute.

In the meantime, whilst these analyses were proceeding, we extracted the alkaloid by another method. The drugs were reduced to the finest powder possible and 100 grammes of each taken and thoroughly exhausted in the cold with 1 per cent. solution of sulphuric acid; then a solution of sodium carbonate was added to the percolate until a precipitate ceased to form. We noticed that in the case of chondodendron the precipitate left off forming when the solution was exactly neutral, whereas in the substitute it continued forming long after neutrality was reached. This precipitate was thoroughly dried, then digested with successive portions of ether until nothing else was dissolved, and the ethereal solution evaporated and weighed. The alkaloid was thus obtained in a nearly pure state, and was present to the amount of 0·840 per cent. in the true root, and 0·166 per cent. in the substitute, thus nearly corresponding with the results obtained in the previous analyses. The filtrates after the previous precipitation were evaporated to dryness and the residues digested in ether, but practically nothing was dissolved by this treatment.

In purifying these alkaloids it was found that on filtering alcoholic solutions through or digesting them in charcoal, the alcohol only passed through the filter leaving the alkaloid behind. They were separated again by digesting the charcoal in dilute sulphuric acid, and then precipitating with ammonia or sodium carbonate.

The alkaloid isolated by this method from the true root was at first of a white colour, but on drying changed to a light yellow. It was amorphous, and did not readily melt at 145° C., although a change occurred at that temperature. When heated strongly in a dry test tube it melted, charred, and swelled up, giving off a strong, peculiar odour which somewhat resembled that obtained from beberine.

The alkaloid from the false was of a somewhat darker colour than that from the true and on drying still further darkened. The melting-point of this was not taken on account of the small quantity obtained for experiment. It also was amorphous.

Both alkaloids were insoluble in water, but freely soluble in absolute alcohol and ether.

The following experiments were made on both alkaloids :—

Colour Reactions.

False.	Reagent.	True.
Dirty green changing slowly to brown, finally to slate colour.	Fröhde's.	Brownish - green changing to light-brown.
Red-brown, remaining so.	Nitric acid.	Vandyke or black-brown becoming lighter.
Slight green tint, then deep brown.	Sulphuric acid.	Light brown.

The alkaloids were then converted into the hydrochlorides and eventually with great difficulty were obtained in a partially crystalline form by slow evaporation from alcohol. Both salts were similar, the crystals being needle-shaped and very small.

They were then converted into the platino-chlorides, which seemed to resemble one another very closely, being both amorphous and of the same colour, almost insoluble in cold and sparingly soluble in boiling water. The melting point of the platino-chloride from the true was 242° C., whilst that obtained from the substitute was 221° C.

We do not think these melting points can be taken as indicating different alkaloids, as the salts were prepared in a slightly different manner, but we are inclined to think after summing up the previous results that both drugs contain the same alkaloids. These alkaloids doubtless require further investigation, and we intend to more fully examine them and give the results obtained in a future paper.

In conclusion, the chemical difference between the two roots may be summed up as follows—

The substitute contains much less ash, less mucilage, less alkaloid, a much smaller proportion of fats and fatty acids, a small quantity of an acid resin, no

starch, and affords a much smaller quantity of extractive matter.

The Chairman, in opening the discussion, read the following letter from Mr. E. M. Holmes:—"I regret that I shall not be able to be present this evening, but desire to express the pleasure it gives me to find that the students in the Laboratory take such an interest in materia medica. The authors of the paper are to be congratulated on the thorough and conscientious way in which they have carried out an original investigation, and the practical results to which it will probably lead. It is necessary whenever a drug becomes scarce and goes up in price, to be on the look out for substitutions or adulterations. Thus *Pareira Brava* has come from the Congo in Africa, balsam of copaiba and white hellebore have also found their way to this country from West Africa, while neither of these has any claim to be called by the name of the official article. I may here mention that the best character by which to recognize the true *Pareira Brava* is the greater breadth of the concentric rings, and the yellowish-grey, not white, tint of the medullary rays."

After some further remarks and questions by Mr. Sturton and the Secretary, and a reply from Mr. Brooke, the following "Report on Inorganic Chemistry," by Mr. E. White, was read by the Secretary—

Report on Inorganic Chemistry.

BY EDMUND WHITE.

The Atomic Weight of Fluorine has been determined by Moisson by converting pure Na_2CO_3 into NaF by means of HF, and then converting the fluoride into sulphate. The hydrofluoric acid was obtained from the well-known potassium hydrogen fluoride. Oxygen being taken as 16, the values found for fluorine by five determinations varied between 19·04 and 190·8.

Purification of Iodine from Chlorine.—F. Musset suggests the following process:—Fuse the iodine beneath a solution of potassium iodide sufficiently concentrated not to boil at the temperature employed. Any chlorine which may be present will decompose an equivalent amount of KI, liberating a corresponding amount of iodine. The solution of potassium iodide adhering to the iodine is easily removed by draining and washing.

Utilization of Atmospheric Oxygen—G. Kassner. This author describes a process working on similar lines to Brin's. A mixture of calcium carbonate and lead oxide are heated in a furnace, supplied with an adequate draught of air. Under these circumstances oxygen is taken up and calcium plumbate Ca_2PbO_4 formed. By the action of carbon dioxide on this—the air current being shut off—oxygen is evolved according to the following equation:—

$$Ca_2PbO_4 + 2\,CO_2 = 2\,CaCO_3 + PbO + O.$$

It will thus be seen that the lead oxide and calcium carbonate are regenerated, rendering the process continuous; the process practically consisting in heating the calcium carbonate and lead oxide alternately in air and carbon dioxide. The formation of the calcium plumbate may be thus expressed:—

$$2\,CaCO_3 + PbO + O = Ca_2PbO_4 + 2\,CO_2.$$

The author claims for his process the following advantages:—the calcium plumbate is formed in a few minutes and its decomposition by carbon dioxide is complete. Also the cost of material, plant and working expenses is very small.

Iodometric Estimation of Nitric Acid in Nitrates, by G. McGowan.—This is founded on the decomposition of nitric and hydrochloric acids, when heated together, in accordance with the following equation:—

$$HNO_3 + 3\,HCl = NOCl + Cl_2 + 2\,H_2O.$$

The details are as follows:—The substance to be estimated is placed in a flask, connected on the one hand with an apparatus for supplying pure carbon dioxide, and on the other with a tower containing broken glass, moistened with potassium iodide solution. All air is first carefully driven out of the apparatus by a stream of CO_2, and then hydrochloric acid is added to the substance under examination, contained in the flask. The contents of the flask are now carefully heated, when the decomposition, above shown, takes place, a gentle current of CO_2 being meanwhile passed through the apparatus. The chlorine liberates its equivalent of iodine from the KI solution in the glass tower, and this is estimated by the well-known method of titration with sodium thiosulphate. The carbon dioxide is absolutely essential, since, if any air were present, re-oxidation of the nitric acid would take place, causing the liberation of too large a quantity of iodine.

Volatile Compound of Iron and Carbon Monoxide, Quincke and Mond.—These chemists have previously described a compound of nickel and CO having the formula $Ni(CO)_4$, and now bring forward a corresponding iron compound. It is, however, not so readily formed as the nickel carbon oxide. Iron oxalate heated in a current of hydrogen yields metallic iron in a finely divided condition, and by heating 12 grams of this iron in a current of carbon monoxide during six weeks about 2 grammes of it were volatilized in combination with the CO. The analysis of the compound was rendered very difficult by the fact that the issuing gas contained at no time more than ·01 gramme Fe per litre, which corresponds to about 2 c.c. of the compound $Fe(CO)_4$. The formula $Fe(CO)_4$ is the one obtained by analysis in the following manner:—The gas issuing from the apparatus is passed through mineral oil, which absorbs, although not easily or freely, the volatile iron compound. By heating this oily solution to 180° C. a black precipitate of iron is formed and carbon monoxide evolved.

The heating is carried out over mercury in a burette at a pressure of 500 m.m., until the volume in the burette remains constant. The apparatus is then cooled, the pressure adjusted to 760 m.m., and the volume of CO read off. The iron in the oil is collected on a filter, after dilution of the oil with ether, converted into oxide and weighed.

Mr. Donington then moved, "That for the future the reading of reports at meetings of this Association be discontinued," explaining that the object of the motion was not to prevent the presentation of reports to the Association, but that as they were generally of an advanced character and difficult to follow, it would be better to take them as read and print them in the Transactions.

The motion was seconded by Mr. Patchitt, and was debated for some time by Messrs. J. P. Brooke, R. H. Jones, Ringer, Fuge, Harrison and the Secretary.

An amendment, proposed by Mr. Taylor and seconded by Mr. Ringer, having been defeated, the original motion was carried.

After some further miscellaneous business, the meeting adjourned.

Provincial Transactions.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

A meeting of the above Association was held at the Mason College, Birmingham, on Tuesday, February 16, at 8.15 p.m., when the following papers were read:—"Coal and Coal Gas," by Mr. H. D. Adcock (Alcester), and "The Accuracy of Chemical Thermometers," by Mr. J. F. Liverseege, F.I.C. Mr. A. Southall, President, occupied the chair.

Notice of receipt of the following books was announced by the Secretary and thanks were voted the donors on the proposition of Mr. Southall, seconded by Mr. Perry:—Six volumes of *Pharmaceutical Journal*, 1841–1846, from Mr. J. F. Liverseege, F.I.C.; 'Calendar of the Pharmaceutical Society,' 1892, from Mr. R. Bremridge; and 'Year-Book of Pharmacy,' 1891, from the Pharmaceutical Conference authorities.

Coal and Coal-Gas.

BY H. D. ADCOCK.

Commencing with an explanation of the chemistry of plant decomposition, the author proceeded to speak of the probable origin of coal. The chief varieties of this substance were then described in detail and special reference made to their relative values as gas-producers. Next the history of gas-lighting occupied attention and the methods adopted in gas-works were explained by the aid of diagrams. This part of the subject was treated of very fully and the different products of coal distillation received individual attention.

A short discussion followed the reading of each paper, and thanks were voted to the authors on the proposition of Mr. A. Southall, seconded by Mr. E. J. P. Ferriday, and carried unanimously. There was a fair attendance.

NEWCASTLE-ON-TYNE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The seventh meeting of the session was held in Lockhart's Café, St. Nicholas Square, on the evening of Wednesday, February 17, at a quarter past eight o'clock. Mr. G. F. Merson, President, read a "Note on some of the B.P. Liquors."

A discussion followed the reading of the paper, and was taken part in by Messrs. Bennet, Kellet, Ord, Simpson, Pattinson and Arrowsmith, some of whom commented upon the remarkable differences between some of the samples of the preparations which formed the subject of the paper.

A hearty vote of thanks having been awarded to the author, the meeting then closed.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The eighth meeting (being the third open meeting of the session) was held in the large hall of the Y.M.C. Association, 14, South St. Andrew Street, on Thursday, February 18, at 9 p.m., Mr. John Lothian, President, in the chair. There was a crowded attendance of members and their friends, including a large number of ladies.

The minutes of last meeting having been read and approved, the chairman said the lecturer of the evening, Mr. J. Laidlaw Ewing, was so well known, both from his official position as chairman of the Executive of the North British Branch of the Pharmaceutical Society and also from his business connection as a member of the firm of Messrs. Duncan, Flockhart and Co., that it seemed needless that he should say anything by way of introducing him to such an audience. The association was highly honoured in having such an opportunity of seeing and hearing something of Russia, a country which was attracting great attention at the present time, and he was sure they would listen with much interest to the lecture he now had the pleasure of calling upon Mr. Ewing to deliver.

Mr. Ewing then proceeded to give a most interesting account of his personal experiences during a "Holiday trip to Russia, Finland and Sweden." The lecture was admirably illustrated by an extensive series of coloured and uncoloured photographic views shown by the oxyhydrogen lantern, and including the principal places of interest in St. Petersburg, Moscow, Stockholm, Helsingfors, etc. One point of special interest in the lecture was Mr. Ewing's account of his adventure when arrested by the Russian authorities as a Nihilist suspect. At the close of the lecture the chairman proposed a hearty vote of thanks to Mr. Ewing, which was awarded with acclamation.

In acknowledging the vote Mr. Ewing proposed votes of thanks, which were cordially awarded, to Mr. Rutherford Hill, for assistance in making the arrangements, and to Mr. John Banks, who had proved so efficient a lantern operator, and who had also very skilfully prepared a number of the views shown on the screen.

The next meeting of the Association, which will be conducted by Mr. George Lunan, Ex-President, takes place on Wednesday, March 9, at 9.15 p.m., in the Pharmaceutical Society's House.

GLASGOW CHEMISTS AND DRUGGISTS' ASSISTANTS' ASSOCIATION.

At a meeting on the evening of Tuesday, February 16, Mr. Alex. Laing, Vice-President, in the chair, a lecture was delivered by Mr. J. Rutherford Hill on "The History of the Official Alkaloids."

At the conclusion of the lecture a cordial vote of thanks was awarded Mr. Hill for his interesting lecture.

Parliamentary and Law Proceedings.

The Crieff Poisoning Case.—Weed-Killers. Cramb, etc. *v.* Caledonian Railway Company, etc.

At the Court of Session, Edinburgh, Friday, February 19, 1892, before Lord Stormonth Darling.

In this action, William Cramb, engine-driver, Sticks, by Aberfeldy, and six others, the children of the late Peter Cramb, carter, Alicmore, Crieff, and his wife, Mary Cramb, sued the Caledonian Railway Company and Thomas M'Ewen, junr., and Co., grocers, Bridgend, Crieff, for £1200 damages for the death of their parents on April 10 and 11, 1891, respectively, from the effects of arsenical poisoning. The poison was contained in sugar purchased by the mother from M'Ewen, junr., and Co., on April 3. Frederick Cramb also partook of the poisoned sugar, and became seriously ill in consequence, and had since, it was averred, remained in a very bad state of health. The sugar was conveyed by the Railway Company, and in transit came in contact with a consignment of weed-killer sent by the Boundary Chemical Company, Liverpool, to be forwarded to Comrie. The box containing the weed-killer was found to be leaking, and thus part of the sugar became impregnated. The action, so far as directed against the Chemical Company, as was mentioned recently, was settled by their paying the pursuers 200 guineas. In defence the Railway Company said that the box was forwarded as an ordinary package, at the ordinary rates of carriage, and that they had no reason to suspect that any part of the consignment contained anything of a poisonous description. Thomas M'Ewen, jun., and Co., stated that one of the bags of sugar on delivery was found to be wet at one place, but the carrier of the Railway Company explained that the bag had been wet by rain-water dripping from his tarpaulin hat.

Lord Stormonth Darling, in giving judgment to-day, narrated the circumstances of the case, and mentioned that other persons, to the number of nearly a hundred

were affected in somewhat the same way as Frederick Cramb had been, but there were no deaths other than the parents of the pursuers; that the poison was at once traced to the sugar, and that on examination the weed-killer was found to contain so large a quantity of arsenic that there was enough in one gallon of it to poison about seven thousand people. With regard to the Railway Company, his Lordship was clearly of opinion that negligence was proved. With regard to the grocer, he had come to the conclusion, though not without difficulty, that he was entitled to absolvitor. For the Railway Company it was strongly urged by the Solicitor-General that weed-killer was a commodity the poisonous properties of which were unknown to their servants, and that there could be no liability without positive knowledge of the danger to which others were exposed by the acts complained of. His Lordship did not doubt that weed-killer was a somewhat unfamiliar article to the porters at Stirling and Crieff, and certainly they could not be expected to know how exceedingly poisonous it was. But he thought a very little reflection would have shown them that a liquid intended to kill vegetable life was not likely to make a safe mixture with a highly absorbent article of human consumption like sugar; and it was not, in his opinion, exacting an excessive degree of intelligence or care on the part of the porters at Stirling to require that when they found a liquid of unknown composition (to put it no higher than that) leaking from a box, they should not have placed that box in contact with what they knew to be an edible substance packed in a jute bag. It would have been the easiest thing in the world to keep the leaking box apart from other goods, or, at all events, apart from any other goods which it could by any possibility injure. By acting as they did they as truly compounded a poisonous article for human consumption as if they had used a pestle and mortar in a chemist's shop. Similarly, as regarded the porters at Crieff, they saw that the sugar-bag was saturated with a liquid which was not mere water, and which they assumed to be sheep-dip. A little more attention to the marking on the box would have shown them that it was weed-killer and not sheep dip; but even if it had been sheep dip, his Lordship thought they were not entitled to conceal the fact from the consignee on the chance of the sheep dip being of a non-poisonous description. It might be all very well as a general rule to leave consignees to find out for themselves the defects in an article delivered to them, but surely that rule must suffer exception when the article was an edible subject, and when the foreign matter with which it was seen to have become impregnated was either suspected to be deleterious or was an unknown composition. His Lordship's opinion, therefore, was that on both heads of negligence alleged against the Railway Company the case of the pursuers was made out. With regard to M'Ewen and Co., he could not say that the evidence disclosed an altogether satisfactory state of things. He did not blame the lad of seventeen who took delivery of the bags if he thought that in accepting the lorryman's explanation of the cause of the stains and emptying the contents of the bag into the tierce without telling his master anything about the state of the bags, he was only following what he had come to recognize as an ordinary practice. It was not comfortable to consumers of sugar to learn that grocers were in the habit of selling sugar out of wet bags on the assumption that the wet was caused by rain water, but he thought that the fault of the Railway Company's servants in not telling what they knew went far to relieve the grocer of liability, for his Lordship thought that he, or rather his assistant, for whom he was responsible, was fairly entitled to expect that if the stain had been caused by contact with other goods of deleterious or doubtful character, he would have received notice from the Railway Company to that effect. He still might have been guilty of negligence if during the time when the sugar lay in his cask any change of a suspicious kind had appeared in its condition, but he thought it was proved that no such change took place. On the whole his Lordship was of opinion that though greater vigilance on the part of M'Ewen and Co. might have prevented the deplorable consequences which ensued, they were not chargeable with such a degree of negligence as to make them liable in damages to the pursuers. It was alleged that the settlement with the Chemical Company had the effect of freeing the other defenders from all liability, but he could not assent to that view. The sum paid by the Chemical Company was admittedly to be taken into account. His estimate was that the pursuers William, Duncan, Peter, and Daniel Cramb, should each receive £50 as solatium for the death of their parents; that Maggie Cramb, who had to give up her place in order to go home and attend to the house and the patients, should receive £60; that Helen Cramb, who was only seventeen at the time, and seemed to have suffered somewhat in health from the shock, should also receive £60: and that Frederick Cramb, besides receiving £50 of solatium like his brothers, should get £50 as damages for the suffering, loss of health and incapacity for work, which were the results of the poisoning in his case. These sums together amounted to £420, and deducting the £210 recovered from the Boundary Chemical Company, there remained £210, for which he gave decree. He found the pursuers entitled to expenses as against the Railway Company, and ordered M'Ewen and Co. to pay their own expenses.

Counsel for the Pursuers—Mr. Shaw and Mr. Dove Wilson. Agent—David Ritchie, W.S.

Counsel for the Caledonian Railway—The Solicitor-General, Q.C., and Mr. Dundas. Agents—Hope, Mann and Kirk, W.S.

Counsel for M'Ewen and Co.—Mr. H. Johnston and Mr. Aitken. Agents—Forrester and Davidson, W.S.—*Scotsman.*

Adulterated Oil of Eucalyptus.

In the Liverpool police court, on February 17, before Mr. Stewart, Amelia Warhurst,* 401, Great Homer Street, was summoned, under the Food and Drugs Act, for having sold oil of eucalyptus which was adulterated with 24 per cent. of alcohol. Arthur Lloyd asked for three ounces of oil of eucalyptus, and received a bottle purporting to be that liquid, for which he paid 6*s*. The certificate of Dr. Campbell Brown stated that it contained 24 per cent. of alcohol, and that the remainder of the contents of the bottle was very crude. Mr. Moss, who prosecuted, said a demand had arisen for eucalyptus oil in consequence of the influenza. The manager for the defendant stated that he never suspected that the eucalyptus had been adulterated. Owing to the great demand that had arisen for it he was compelled to procure his supplies from various sources. The defendant was fined 5*s*. and costs, 20*s*. in all.

Obituary.

Notice has been received of the death of the following:—

On the 5th of February, John Simkin, Chemist and Druggist, London. Aged 77 years.

* This name does not appear in the Register of Chemists and Druggists for 1892.

On the 11th of February, J. M. Buckley, Chemist and Druggist, London. Aged 68 years.

On the 18th of February, James Garner, Chemist and Druggist, London. Age 58 years.

On the 22nd of February, Henry R. Peatson, Pharmaceutical Chemist, Salford. Aged 68 years.

BOOKS RECEIVED.

London Water Supply. Report by Wm. Crookes, F.R.S., Wm. Odling, M.B., F.R.S., and C. Meymott Tidy, M.B. London: Wertheimer, Lea and Co., 1892. From the Publishers.

Dictionary of Materia Medica and Therapeutics. By C. Henri Leonard, A.M., M.Dy., and Thomas Christy, F.L.S. From the Publishers.

Outlines of Theoretical Chemistry. By Lothar Meyer. Translated by P. Phillips Bedson, D.Sc. and W. Carleton Williams, B.Sc. London: Longmans, Green and Co. From the Publishers.

The Book of Prescriptions. By Henry Beasley. Seventh Edition. London: J. and A. Churchill. From the Publishers.

Epitome of Mental Diseases. By James Shaw, M.D. Bristol: John Wright and Co. London: Simpkin, Marshall, Hamilton, Kent and Co., Limited. From the Publishers.

Pye's Surgical Handicraft. Edited by T. H. R. Crowle, F.R.C.S. Bristol: John Wright and Co. London: Kegan, Paul, Trench, Trübner and Co., Limited. From the Publishers.

Correspondence.

**** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Re Liquor Strychninæ Hydrochlor.

Sir,—There are three sources of uncertainty in the formula for this preparation that surely may be attended to and remedied in another edition of the Pharmacopœia.

1. The contraction in bulk when spirit and water are mixed, which has already been noted in *Pharm. Journ.*, [3], xvi., 284, 483 and 540.

2. The loss of water in the form of steam whilst dissolving the strychnine by heat in the acidulated water.

3. If the B.P. directions be strictly followed, a large proportion of alcohol becomes volatilized by the warmth of the liquor to which it is added.

All these might be remedied by directions to make up the product to a stated bulk at the finish, but meanwhile the precaution should always be taken of performing the heating process in a flask, with a good long, narrow neck, so that the steam may in great part condense and trickle back into the hot fluid. Also, if at the end of the process we add first the remainder of the water and lastly the spirit, two at least of these sources of uncertainty are reduced to a minimum.

And would not our B.P. be increased in value and regarded with more respect in general if the various "abouts," "almosts," and "scarcely anys," with respect to articles that are "of a definite chemical composition," were altogether expunged, and the actual figures stated which a chemist would expect to find? For surely the chemist and druggist of 1892 is not so lame in his right foot as to demand such artificial contrivances as these.

West Marylebone. J. C. Hyslop.

Liquor Strychniæ.

Sir,—In reply to the query of Mr. Lewis Ough it has long been known that hydrochlorate of strychnia is not soluble to the extent of 1 in 100 in cold water, and the liq. strychniæ, B.P., will always deposit crystals below a certain temperature. The danger resulting is that in winter a considerable proportion may be deposited and, when the warm weather returns redissolved in a diminished quantity of solution, whereby the patient may get a dose much larger than the prescriber intended.

In order to avoid this I have for years used acetic acid to dissolve the strychnia, the spirit ordered being quite sufficient to prevent any decomposition taking place in the solution. Nitric acid might be used, as the nitrate is soluble 1 in 60 at 60° F., but as the solution is sometimes ordered with $FeSO_4$, it would, in that case, not be so advisable.

Hull. John S. Linford.

Sir,—In your issue of the 20th inst. Mr. Ough asks for experience of others as to the deposit of strych. hyd. in the official liquor. Personally I have never found any separation at all, but my operations are limited to small quantities—four ounces or so at a time. The whole is kept in the poison cupboard in the shop, where during the night temperature may fall to about 40° F., but does not remain so for many hours. However, the trouble is not a new one, as I recollect reading of such crystallizations in cold weather soon after the new P.B. was issued. Turning to the *Pharmaceutical Journals*, 1887, we find complaints on page 581, January 15, on page 624, January 29, and page 800, March 26. Probably the best suggestion is by Mr. Farr, who finds a lower percentage of spirit avoids the crystallization. This will no doubt receive the attention of the Editors of the next edition of the P.B. For the present, dispensers should take care that liq. strych. hyd. is not exposed to a low temperature.

In the 'Year Book of Pharmacy,' 1889, Mr. H. W. Jones suggests hypophosphorous acid instead of hydrochloric, as making a more stable solution. Of course this could not be done except "by authority."

Northampton. J. Clower.

Sir,—While waiting with interest for some replies to Mr. L. Ough's letter of this week's *Pharmaceutical Journal*, I should like to state the following:—

About a month since, requiring some liq. strychniæ for a medical man, 8 ozs. was prepared with crystallized strych. precisely according to the P.B. plan. Four ounces was sent to the doctor and the remainder placed in the cellar. A few days afterwards it was returned with the suggestion whether it had been correctly prepared. A dense sediment appeared at the bottom of the solution, composed of small crystals of strych., representing, I should think, most of the alkaloid.

Upon examining our preparation crystals had formed much larger, but not in such numbers. Thinking, perhaps, the acid. mur. was at fault, a fresh supply was obtained and another batch made, with exactly the same result. I may add that the crystals redissolve with a very little heat, and the sol. remains bright as long as it is kept in a warm situation, but will deposit again if exposed to the cold, and I shall be glad if some of our brethren can give us their experience of the same.

207, *Copenhagen Street, Islington.* W. N. G. Lance.

If Mr. Lewis Ough will refer to the *Pharmaceutical Journal*, [3], xvii., page 580, he will find, in the results of some observations made in my firm's laboratory by Mr. E. H. Farr, an answer to his question.

Since that date the following printed label of caution has been affixed to every bottle of liq. strychniæ, B.P., 1885:—

"This preparation should not be kept in a store room of low temperature, as the hydrochlorate of strychnia is liable to crystallize when so stored.

"It is suggested that the solution be kept in a temperature of 60° Fahrenheit or thereabouts, in order that the whole of the strychnia (1 per cent.) may be fully retained in the solution." John C. Umney.

Southwark.

ST. BARTHOLOMEW'S

PROPRIETARY MEDICINES CONTAINING POISON.

Sir,—With regard to the labelling of proprietary medicines containing poison, Mr. Lane, in his paper, and you in your leading article, appear to fail to take account of the fact that the 17th clause of the Pharmacy Act applies to sales by wholesale as well as by retail. The section exempts wholesale dealers from the special regulations relating to part one of the schedule and from affixing their names and addresses, but it clearly insists that every package of a scheduled poison must bear the name of the article and the word poison, whether sold by wholesale or retail. The obligation of indicating that an article contains poison is thus placed, where it ought to be, on the person originally offering it for sale, and when such indication is made the retailer has only to affix his own name and address to comply with the requirements of the section.

I am not "learned in the law," but I think it is the case that if any loss occurred to the retailer which could be shown to be caused by the illegal act of a wholesale dealer in supplying any poison without the needful label such dealer could be compelled to pay compensation.

3, *West Kensington Terrace.* W. PICKARD.

THE SOCIETY AND OUTSIDERS.

Sir,—No doubt the intention of sending a copy of the Journal to every one on the Register is to show them "what the Society is doing," and what some of the trade are doing, and to induce all to do likewise.

Of course it is well known that the Benevolent Fund was one of the objects in view in forming the Society for the benefit of any of its members in distress, and very properly for those only in connection with it. But on the passing of the Act in 1868 that benefit was thrown open to all chemists. It is, therefore, useless taking up the old bugbear, "What has the Society done for me?" Here is one thing of inestimable advantage, and curiously more outsiders than those connected with the Society are glad to avail themselves of it. As it is quite apart from any other function of the Society, every chemist is, in honour and duty, bound to contribute.

Another object is to try and get in more members, and this, I think, would be quite as much advantage to them as to the Society; it is perfectly ridiculous that a large, powerful, and wealthy Society should gratuitously offer membership to all comers, and the not embracing that offer is a reflection on the men themselves. I think we had better, once for all, announce the first and leave the trying to induce others to join to the Pharmaceutical Secretaries.

I wish very modestly to say (as some may not be aware), on the establishment of divisional secretaries in London, at a conference of them with the President and Council, I told them I should endeavour to start a chemists' association in my borough, and immediately set to work and soon received the co-operation of eleven other divisional secretaries, and thus we now number nearly 140 members, and others are continually joining. It is by associations like these, which have been already formed in many provincial towns, that additional members for the Society and subscribers to the Benevolent Fund are likely to be found. HENRY LONG.

London.

"ARTIFICIAL HUMAN MILK."

Sir,—In reply to Mr. G. Smith's letter in your issue of last week, I wish to say that I did not know of his article on "Artificial Human Milk," or I should certainly have noticed it if only for the sake of criticizing. He published on July 6, 1889, but for more than a year previous to that date our firm had been making and selling a milk made by the process described in my article.

I have read Mr. Smith's note and would like to take this opportunity of remarking that the dilution of cow's milk with water and the addition of milk sugar in order to imitate human milk had been freely recommended and used for twenty or thirty years. What was new in Mr. Smith's note was the addition of butter and of oatmeal. To my mind the butter addition is not a good one. It forms an inelegant compound, and presents the fat in a condition not readily assimilated; compared with cream it is very unsatisfactory.

Why the oatmeal, too, I may ask? Possibly to lessen the unsightliness of the compound. But for the cases I have had to deal with it was altogether unsuited; there are many infantile digestive conditions in which it is absolutely inadmissible.

Newcastle-on-Tyne. T. MALTBY CLAGUE.

CHEMISTS AND PHYSICIANS' PRESCRIPTIONS.

Sir,—Most chemists quite agree with Dr. Althaus, and are studiously careful of tendering any remarks on a prescription.

I think Dr. Startin's complaint is one that should seriously be taken in hand by the councils of the medical and pharmaceutical societies. As the law now is, chemists are powerless in the matter of repeating prescriptions.

Several of the leading surgeons in this district dispense their own medicines but tell me they would gladly hand the dispensing over to the chemists were it not for the repetition of their prescriptions without their consent, this being both injurious to the patient and causing a loss of fees to themselves.

In other countries a chemist is not allowed to dispense an old prescription unless initialled by the prescriber.

I believe if Parliament was approached by the medical faculty, and it was shown (as it could easily be) there was great danger in repeating prescriptions without the doctor's consent, an Act would be passed prohibiting chemists from repeating prescriptions without an order from the prescriber.

If Dr. Startin would endeavour to use his great influence in moving the leaders of his profession in this direction they would receive the cordial support of chemists, and without doubt their Council, provided that the doctors will give over that part of their calling appertaining to the chemist, excepting, of course, in remote places where there are no chemists.

I am quite satisfied there would be no difficulty in the matter, so long as both bodies were agreed and both were willing to study to the full the interests of each other.

South Hampstead. ARTHUR SANGSTER.

A CORRECTION.

Sir,—In the 'Year Book of Pharmacy' for 1891, p. 278, the following powder is recommended for Migraine:—

Caffeinæ citras	10 grams.
Phenacetin	12 ,,
Milk sugar	25 ,,

This is for *one*. If necessary the dose may be repeated after two hours.

There is evidently some mistake here. Even if grains were intended where the word grams is printed the dose would be excessive. I suppose this quantity is really intended for a number of doses, and I should be glad to know how many. A PUZZLED STUDENT.

*** On communicating with the Editor of the 'Year Book of Pharmacy,' we are informed that a decimal point should precede each of the above quantities.—Ed. *Ph. J.*]

NOTICES OF MEETINGS.

School of Pharmacy Students' Association.—The next meeting of this Association will be held on Thursday, March 3, when a paper on "Laboratory Apparatus" will be read by Mr. G. A. Shaw, and some "Dispensing Notes," by Mr. R. H. Jones.

Newcastle-on-Tyne Chemists' Assistants' and Apprentices' Association.—The next meeting will be held in Lockhart's Café, St. Nicholas Square, on Wednesday, March 2, at 8.15 p.m., when Mr. T. Maltby Clague will give some demonstrations on the use of the microscope for pharmacy students.

Chemical Society.—Thursday, March 3, at 8 p.m.

"*Impos.*"—Refer to index of last volume.

P. B. Kenrick.—Your letter is forwarded to the publishers, 11, New Burlington Street, to whom it should have been addressed.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Harrington and Son, J. Barker Smith, Stead, Bradley, Siebold, Hill, Robertson, Allen and Hanburys, D. S. Davies.

BENEVOLENT FUND.

STATEMENT OF RELIEF GRANTED DURING 1891.

ANNUITANTS.

			£	s.	d.	£	s.	d.
37	Annuitants	@ £35 per annum	1295	0	0			
8	do.	@ £30 „	240	0	0			
1	do.	@ £35 „ (three quarters)	26	5	0			
2	do.	@ £35 „ (two quarters)	35	0	0			
						1596	5	0

Total number of Annuitants during the year ... **48**

TEMPORARY GRANTS.

Amount granted in **50** cases after investigation by the Committee...	...	**494**	**0**	**0**
Total amount of Relief granted during 1891	...	**£2090**	**5**	**0**

ABSTRACT OF RULES IN REFERENCE TO VOTES AT THE ELECTIONS OF ANNUITANTS.

Annual Subscribers of—

Half-a-crown are entitled at each election of Annuitants to ONE Vote.
Five Shillings ... ... TWO Votes.
Half-a-guinea ... ... FIVE Votes.
One Guinea ... ... TEN Votes.

And to increase in the same proportion.

Donors of—

Five Guineas are entitled to ... ... FIVE Votes for life.
Ten Guineas ... ... TEN Votes for life.

And to increase in the same proportion.

Should any Subscriber or Donor, or the widow of any Subscriber or Donor, become a Candidate for an annuity, such number of votes shall be placed to his or her credit, at the first succeeding election, as shall be represented by the whole amount of subscriptions or donations to the Benevolent Fund he or she (or, in the case of a widow, her husband) may have contributed.

BENEVOLENT FUND.

LOCAL LIST OF SUBSCRIPTIONS & DONATIONS

RECEIVED DURING 1891.

	£	s.	d.
Aberavon.			
Loveluck, G. D.	0	2	6
Aberdare.			
Jones, D. W.	0	5	0
Smith, Morgan	0	2	6
Aberdeen.			
Coutts, C.	0	5	0
Cruickshank, Geo. P.	0	5	0
Davidson, Charles	1	1	0
Giles, William	0	5	0
Glover, W. K.	0	5	0
Gordon, William	0	5	0
Johnston, John	0	5	0
Kay, James P.	0	10	6
Kemp, James	0	2	6
Paterson and Sons	0	10	6
Strachan, Alexander	0	5	0
Aberfeldy.			
Macnaughton, H. B.	1	1	0
Abergavenny.			
Pryer, Henry	0	5	0
Rosser, W. H.	0	5	0
Abergele.			
Hannah, Charles (Pensarn)	0	10	6
Aberystwith.			
Davies, David J.	0	2	6
Ellis, Robert	0	2	6
Wynne, Edward P.	0	10	6
Abingdon.			
Lacey, R.	0	5	0
Rickarby, A. G.	0	2	6
Smith, William F.	0	5	0
Aboyne.			
Petrie, James J.	0	5	0
Addiscombe.			
Townsend, Charles	0	10	6
Alcester.			
Adcock, H. D.	0	10	6
Overbury, Henry	0	5	0
Aldershot.			
Williams, James	0	10	6
Alexandria (N.B.).			
McFarlane, Peter	0	5	0
Alfreton.			
Evison, Alfred	0	2	6
Robinson, Joseph S.	0	10	6
Alnwick.			
Newbigin, James L.	0	10	6
Newbigin, Lesslie	0	5	0
Alresford.			
Richardson, J. H.	0	2	6
Willis, William	0	5	0
Altrincham.			
Clarke, J. T.	0	5	0
Unsworth, J. W.	0	5	0
Ambleside.			
Herd, Henry W.	0	2	6
Ampthill.			
Allen, George	1	1	0
Andover.			
Bienvenu, John	0	10	0
Gradidge, W. T.	0	5	0
Arbroath.			
Burn, David H.	0	5	0
Naysmith, Andrew	0	5	0
Robertson, John	0	5	0
Shield, Mill and Jack	0	5	0
Ashbourne.			
Bradley, Edwin Sylvester	0	10	6
Greaves, Frederick W.	0	5	0
Osborne, James	0	5	0
Reckless, A. H.	0	5	0
Ashby-de-la-Zouch.			
Bullen, George W.	1	1	0
Ashford (Kent).			
Brothers, John	1	1	0
Forth, W. P.	0	5	0
Ingall, Joseph	1	1	0
Stedman, F. W.	0	5	0
White, Charles Thomas	0	5	0
Ashton-under-Lyne.			
Belfield, William	0	5	0
Bostock, J. W.	0	5	0
Bostock, William	0	5	0
Hall, J.	0	2	6
Phillips, J. J.	0	5	0
Potts, R.	0	5	0
Sharp, S.	0	5	0
Thatcher, T.	0	2	6
Waterhouse, J. and Co.	0	10	6
Ashwell.			
Harrison, G. W.	0	5	0
Atherton.			
Fletcher, Ellis	0	5	0
Heywood, John H.	0	10	6
Attleborough.			
Muskett, F. J.	0	2	6
Aylesbury.			
Dickins, Rowland	0	10	6
Palmer, Edwin T.	0	5	0
Wood, J.	0	5	0
Aylsham.			
Hill, John	0	2	6
Bakewell.			
Carrington, Edward G.	0	5	0
Baldock.			
Bally, Edward F.	0	5	0
Banbury.			
Ball, George V.	0	10	6
Bartlett, H.	0	5	0
Gilkes, Fredk. G.	0	5	0
Watts, W.	0	5	0
Banchory.			
Lunan, Alexander	0	5	0
Banff.			
Alexander, W.	0	5	0
Bangalore (India).			
Forster, J. B.	0	3	0
Bangor.			
Jones, Owen	0	5	0
Pierce, R. W. C.	0	5	0
Webster, Thomas	0	5	0
Barking.			
Ridley, C. H.	0	5	0
Barnsley.			
Mitchell, J. S.	0	5	0
Barnstaple.			
Britton, Wm. B.	0	5	0
Goss, Samuel	0	10	0
Partridge, James	0	5	0
Pratt, Edward	0	5	0
Barrow-in-Furness.			
Sansom, E.	0	2	6
Barton-on-Humber.			
Smith, Richard F.	0	5	0
Bath.			
Addis, T. J.	0	2	6
Alcock, Henry	0	5	0
Appleby, E. J.	0	10	6
Blagg, Eli	0	2	6
Bright, W.	0	5	0
Capper, Edmund	0	5	0
Clarke, B. G. K.	0	2	6
Cooper, A. H.	0	10	6
Dunn, Richard	0	10	6
Griffin, Alfred W.	0	5	0
Harding, R. O.	0	5	0
Marsh, John H.	0	10	0
Masters, Henry James	0	5	0
Merrikin, John B.	0	10	6
Partington, J. J.	0	5	0
Potts and Co.	1	1	0
Sharp, Benjamin	5	5	0
Snow, A. L.	0	2	6
Thomas, Henry J.	0	10	6
Thring, E. J. H. (Monkton Combe)	0	10	6
Tilsley, George	0	10	6
Whiston and Co.	0	10	6
Williams, Mrs. Sophia	0	10	6
Wilson, Joseph	0	10	6
Beaumaris.			
Roberts, W.	0	2	6
Slater, John	1	0	0
Bebington (Cheshire).			
Fawcett, J.	0	10	0
Beccles.			
Flower, William	0	5	0
Plumbly, Walter	0	2	6
Beckenham (Kent).			
Bright, Frederick	0	5	0
Bedale.			
Pratt, William (West Burton)	0	5	0
Swinbank, J.	0	5	0

Bedford.	£	s.	d.
Anthony and Biss	0	10	0
Cameron, William Alexander	0	5	0
Corrie, A. A.	0	2	6
Corrie, Isabella A.	0	5	0
Ekins, John	0	10	6
Hester, Charles	0	5	0
Norman, Joseph S.	0	5	0
Taylor, J. B.	0	5	0
Thompson, H.	0	5	0
Beer Alston (Devon).			
Skewes, S. D.	0	5	0
Bedlington.			
Foggan, George	0	5	0
Belfast.			
Green, Thomas	0	5	0
Leslie, J.	1	1	0
Yoxall, Henry	0	5	0
Belper.			
Calvert, James	0	5	0
Berkhamsted.			
Bosher, Alexander	0	2	6
Rippon, R. O.	0	10	6
Berkeley.			
Osborne, G. C.	0	5	0
Beverley.			
Fields, T. W.	0	5	0
Bexhill.			
Brisley, George	0	5	0
Bexley Heath.			
Mason, Alfred J.	0	5	0
Bicester.			
Bates, John	0	5	0
Coleman, T.	0	10	6
Bideford.			
Betty, S. C. (Bowood)	0	10	0
Griffits, John A.	0	5	0
Hogg, Mrs. Mary	0	5	0
Biggar.			
Eunson, J.	0	2	6
Biggleswade.			
Evans, John	0	5	0
Spong, D. M.	0	5	0
Birkenhead.			
Barber, George	0	10	6
Brookes, A. F.	0	2	6
Dutton, John	0	10	6
Ellithorne, A. H.	0	10	0
Field, H. E. (Executors of)	0	5	0
Jennings, W. H. (West Kirby)	0	2	6
Kemp, W. C.	0	5	0
Stewart, J.	0	10	6
Woolliscroft, H.	0	5	0
Birmingham.			
Adam, Frederick	0	5	0
Adams, W.	0	5	0
Arblaster and Churchill	1	1	0
Asten, W.	0	2	6
Atkins, W. S.	0	10	6
Ayris, H. C.	0	2	6
Barker, Thomas	0	10	6
Barrass, T. E.	0	5	0
Bates, J.	0	2	6
Bayley, R.	0	5	0
Beech, J., jun.	0	2	6
Bellamy and Wakefield	1	1	0
Bird, Alfred	1	1	0
Blackbourne, A.	0	5	0
Blackwell, J.	0	5	0
Bradley, F.	0	10	6
Brady, B. F.	0	10	6
Brevitt, W. Y.	0	10	6
Brunt, G. H.	0	5	0
Campion, R.	0	2	6
Cattell, J. T.	0	2	6
Cattell, T. B.	0	2	6
Chapman, T. W.	0	5	0
Chase, Thomas	1	1	0

Birmingham—continued.	£	s.	d.
Clark, T. P.	0	5	0
Clayton, Francis Corder	1	1	0
Corfield, E.	1	1	0
Cornforth, Edwin	0	2	6
Cripps, R. A.	0	10	6
Critchlow, H.	0	2	6
Cross and Son	0	5	0
Evans, J. C.	0	2	6
Evans, W. B.	0	2	6
Foster, Alfred H. (Executors of)	0	5	0
Foster, James Alfred	0	5	0
Frobisher, F.	0	5	0
Greatrex, H.	0	5	0
Grieves, A. S.	0	5	0
Griffin, J. F.	0	2	6
Harris, P. and Co.	1	1	0
Hedges, W. R.	1	1	0
Hodgetts, N.	0	2	6
Horner, F. G.	0	5	0
Horton, G. D.	0	10	6
Horton, J. J.	0	5	0
Howes, H.	0	10	6
Kneale, J. C.	0	2	6
Lowther, T. W.	0	5	0
Luckman, C.	0	5	0
Mackenzie, J. C.	0	10	6
Magor, M.	0	10	6
Mantell, Charles	0	10	6
Mantell, Charles, jun.	0	10	6
Moate, B.	0	10	6
Mott, John C.	0	5	0
Naish, C. E.	0	10	6
Onion, J.	0	2	6
Page, C.	0	5	0
Pegg, Herbert	1	1	0
Perry, George E.	0	5	0
Perry, William Henry	0	5	0
Poole, J.	0	5	0
Price, W.	0	5	0
Prosser, Frank H.	0	10	6
Radford, J. A.	0	5	0
Reedman, W. H.	0	5	0
Reeve, T. L.	0	5	0
Richards, F. J.	0	5	0
Roberts and Son	0	2	6
Smith, E.	0	2	6
Smith, N.	0	2	6
Southall Bros. and Barclay	1	1	0
Spencer, J.	0	10	6
Sturdy, J. R.	0	5	0
Thompson, Charles	0	10	6
Thompson, M.	0	5	0
Thompson, William	0	5	0
Thonger, G.	0	2	6
Twivey, A.	0	5	0
Wakefield, T.	0	5	0
Watson, E. J.	0	2	6
Whitehouse, J.	0	5	0
Wilcox, George	0	5	0
Wilkes, G. W.	0	5	0
Wilkinson, G. H.	0	10	6
Bishop Auckland.			
Dobinson, Thomas	0	5	0
Harburn, Alfred	0	5	0
Townend, Thomas F.	0	5	0
Bishop's Stortford.			
Hardy, John	0	5	0
Speechly, George	0	10	6
Blackburn.			
Ainsworth, B.	0	2	6
Butterfield, William	0	5	0
Clayton, Jowett and Ward	0	10	6
Critchley, T.	0	5	0
Farnworth, Walter	0	10	6
Farnworth, William	1	1	0
Garland, A. P.	0	5	0
Harrison, J.	0	2	6
Hindle, H.	0	5	0
Hindle, James	0	2	6
Hindle, Joseph	0	5	0
Paffard, Frank	0	10	0
Pickup, W.	0	5	0
Wells, W.	0	5	0
Blackpool.			
Carter, Thomas	0	10	6
Jackson, Joseph	0	5	0
Laurie, John	0	5	0
Blagdon.			
Dudden, R. M.	0	5	0

Blandford.	£	s.	d.
Burgess, J.	0	5	0
Groves, Richard H.	1	1	0
Humby, L. W.	0	5	0
Bognor.			
Long, Alfred T.	0	10	6
Bolton.			
Blain, William	0	10	6
Blain, W. R.	0	5	0
Dearden, W.	0	10	6
Fawthorp, Joah	0	5	0
Forbes, James W.	0	10	6
Hart, James	0	10	6
Mather, James	0	10	6
Teebay, J.	0	5	0
Bombay (India).			
Davies, R. (Byculla)	0	5	0
Prebble, John G.	0	5	0
Robertson, R.	0	2	6
Stephenson, T. B.	0	10	6
Bonby (Lincs.).			
Herbert, H. W.	0	5	0
Bonnyrigg.			
Hutcheon, W.	0	5	0
Boston (Lincs.).			
Grimble, Albert	0	5	0
Haller, F. W.	0	5	0
Kent, B. J.	0	5	0
Boulogne-sur-Mer.			
Chamonin, L.	1	0	0
Parsons, J. Vincett	0	5	0
Bourne (Lincs.).			
Mills, Robert M.	0	10	6
Bournemouth.			
Beale, J. H. T.	0	5	0
Bilson, F. E.	1	1	0
Bridge, G. E.	1	1	0
Endle, Frederick	0	10	6
Faraday, G. (Pokesdown)	0	2	6
Hardwick, Stewart	0	10	6
Haynes, J. A.	0	5	0
Hazard, James D.	0	10	6
Jones, William	1	1	0
Shipman, John J.	0	10	6
Spinney, Frank	0	10	6
Taylor, George	0	5	0
Toone, J. A.	0	10	6
Wilkes, T. J.	0	5	0
Williams, J. H.	0	5	0
Worth, Edwin	1	1	0
Yates, S. P.	0	5	0
Bourton-on-the-Water.			
Miles, George	0	2	6
Bowness-on-Windermere.			
Birkett, Charles	0	5	0
Bracknell.			
Sandwith, W. H.	0	5	0
Bradford (Lancs.).			
Lambert, Thomas	0	5	0
Bradford (Yorks.).			
Blackburn, Bailey	2	2	0
Cocker, Justus J.	0	5	0
Harrison, Parkinson and Co.	2	2	0
Lister, Simeon (Great Horton)	0	10	6
Rimmington and Son	1	1	0
Stephenson, Robert	0	5	0
Watts, John	0	10	6
Brading (I.W.).			
Bonn, J. E. J.	0	5	0
Braintree.			
Blomfield, F. H.	0	5	0
Row, George C.	0	5	0
Branscombe.			
Cooper, George	0	10	6
Braughing.			
Franklyn, Thomas	0	5	0

Brechin.	£	s.	d.
Hodgeton, D.	0	5	0
Brecon.			
Meredith, John	0	10	6
Morris, J. C. B.	0	5	0
Tudor, W. T.	0	10	6
Bridgend.			
Jenkins, D.	0	5	0
Bridgnorth.			
Cooper, H. S.	0	2	6
Hughes, Hubert	0	5	0
Bridgwater.			
Basker, J. A.	0	5	0
Bridlington.			
Dewing, J. E.	0	5	0
Gatenby, Robert	0	5	0
Wrack, F. G.	0	2	6
Bridlington Quay.			
Dickins, Miss	0	2	6
Jackson, Henry J.	0	5	0
Bridport.			
Beach and Barnicott	1	1	0
Beach, James	0	10	6
Beach, Thomas E.	0	5	0
Beach, W. B.	0	2	6
Brightlingsea.			
Cooper, George B.	0	5	0
Brighton.			
Adams, F.	0	10	6
Arnold, J.	0	5	0
Ashton, C. S.	0	10	6
Barton, Charles	0	10	6
Barton, Henry	0	10	6
Bathe, R. S.	0	10	6
Blacklock, P.	0	5	0
Caton, E. C.	0	10	6
Chambers, Herbert	0	5	0
Chemists' Ball, per Mr. Marshall Leigh	5	0	0
Churchill, H.	0	10	6
Colby, Mrs. G.	1	1	0
Collett, W. J.	0	2	6
Costerton, H.	0	10	6
Cox, Arthur H.	1	1	0
Edwards, J.	0	5	0
Else, William	0	10	6
Gibson, W. H.	0	5	0
Glaisyer, E.	0	10	6
Glaisyer, Thomas	0	10	6
Guy, Frederick	0	10	6
Gwatkin, James Ross	0	10	6
Hardcastle, S. B.	0	10	6
Harris, E. R.	0	5	0
Hickley, G.	0	10	6
Histed, E.	0	10	6
Hornsby, George G.	0	10	6
Jeeves, Thomas	0	10	6
Kemp, John	0	10	6
Leigh, Marshall	1	1	0
Llewellyn, Peter H.	0	5	0
Marten, J. R.	0	2	6
Metherell, K.	1	1	0
Mills, C. T.	0	2	6
Muston, G. G.	0	5	0
Padwick, John	0	10	6
Parris, T. W.	0	5	0
Pears, H. W. K.	0	10	6
Pears, Kilby	0	10	6
Perress, J. C.	0	5	0
Robson, Thomas	0	10	6
Salmon, E. F.	1	1	0
Savage and Son	1	1	0
Smith, Walter Henry	1	1	0
Smithson, J.	0	10	6
Stableforth, J. W.	0	5	0
Sussex Drug Company	1	1	0
Vizer, Edwin B.	0	10	6
Watts and Co.	1	1	0
Williamson, J.	0	5	0
Wyborn, E.	0	10	6
Yates, C. G.	0	2	6
Brill (Bucks).			
Tottenham and Holmes	0	10	6

Bristol.	£	s.	d.
Allen, Benjamin	0	10	6
Barton, J. B. (Kingswood)	0	5	0
Bennett, Joseph	0	5	0
Berry, William	0	10	6
Boucher, C. E.	0	5	0
Boucher, John	1	1	0
Bramald, F. D.	0	5	0
Butler, Samuel	1	1	0
Dibble, J. W.	0	10	6
Fardon, A. E.	0	10	6
Freestone, R. H.	0	5	0
Freestone, Thomas M.	0	10	6
Hemmons, John	0	5	0
Howell, H.	0	5	0
Humpage, Miss	1	1	0
Isaac, G. W.	0	10	6
Jeffery, Henry	0	10	6
Jennings, T. H.	0	5	0
Jones, William W.	1	1	0
Keen, Benjamin	0	10	6
La Trobe, Henry	0	5	0
Llewellyn, David	0	2	6
Long, John T.	0	10	6
Moore, J. E.	0	5	0
Newman, Robert	0	5	0
Patrick, H. W.	0	2	6
Pitchford, William	0	10	6
Pitman, John	1	1	0
Plumley, James G.	0	5	0
Presley, Edward	0	5	0
Schacht, G. F.	1	1	0
Spill, Thomas	0	10	6
Stroud, John	1	1	0
Towerzey, Alexander	0	10	6
Townsend, Charles	1	1	0
Townsend, Henry H.	0	10	6
Troake, R. J.	0	10	6
Turner, George T.	0	10	6
Vinden, F. W.	0	2	6
Wade, Thomas T.	0	2	6
Warner, G. O.	0	5	0
Warren, Algernon	1	1	0
Watson, E. M.	1	1	0
Weeks, A.	0	5	0
Whineray, Edward	0	5	0
White, James W.	0	10	6
Williams, J. H.	0	5	0
Briton Ferry.			
Olive, W. T.	0	5	0
Bromley (Kent).			
Goulden, Herbert	0	5	0
Shillcock, G.	0	5	0
Skinner, Richard	0	10	6
Bromyard.			
Jones, Charles	0	5	0
Broughty Ferry.			
Fleming, E.	0	5	0
Park, William	0	5	0
Brynmawr.			
Evans, Alfred E.	0	5	0
Jones, Alfred M.	0	10	6
Buckingham.			
Kingerlee, George	1	1	0
Burgess Hill.			
Adams, G.	1	1	0
Burnham (Bucks).			
Heald, Alfred J.	0	10	6
Burnham Market.			
Spencer, William Henry	0	5	0
Burnley.			
Barlow, Joseph A.	0	2	6
Brown, J.	0	2	6
Cowgill, Brian H.	0	10	6
Evans, Thomas	0	5	0
Francis, Mrs.	0	5	0
Heaton, Martha	0	2	6
Hitchin, Robert	0	5	0
Munn, Robert	0	5	0
Parkinson, I.	0	5	0
Parkinson, William	0	5	0
Walker, Sandford	0	5	0
Wright, John W.	0	2	6
Burntisland.			
Bisset, James	0	2	6

Burry Port.	£	s.	d.
Thomas, T. Rees	0	5	0
Burslem.			
Blackshaw, Thomas	0	10	6
Hewitt, J. F.	0	2	6
Leicester, Thomas	0	10	6
Oldham, William	0	10	6
Wardle, Thomas	0	2	6
Burton-on-Trent.			
Ottey, Thomas	0	5	0
Wright, George	0	10	6
Bury.			
Crompton, Alfred	0	5	0
Crompton, H.	0	10	6
Hulme, T.	0	5	0
Bury St. Edmunds.			
Brain, F. S.	0	5	0
Clark, Owen A.	0	5	0
Crassweller, W. E.	0	5	0
Floyd, J.	0	5	0
Hardwicke, J. E.	0	5	0
Kirkham, Thomas	0	2	6
Last, A. J.	0	2	6
Portway, John	0	2	6
Summers, Frank	0	5	0
Summers, Thos. D.	0	5	0
Youngman, Edward	0	5	0
Buxton (Derbyshire).			
Wright, Robert	0	10	6
Cambridge.			
Beall, George	0	5	0
Beall, Samuel S.	0	5	0
Church, H. J.	1	1	0
Cook, H. F.	0	5	0
Deck, Arthur	0	10	0
Greenwood, D.	0	5	0
Hutchin, L. A. J.	0	5	0
Pain, Percy	0	5	0
Pain, Walter E.	0	5	0
Parson, H. J.	0	2	6
Peck, G.	0	10	6
Sturton, Richard	1	1	0
Yeomans, John	0	5	0
Campbeltown.			
Cairnie, R.	0	5	0
Canterbury.			
Amos, Daniel	0	10	6
Biggleston, E. R.	0	5	0
Bing, Charles	0	5	0
Bing, Edwin	0	10	6
Fowler, W. H.	0	10	6
Harris, F. R.	0	10	6
Cape Town.			
Tebb, Henry	1	1	0
Cardiff.			
Anthony, David	0	10	6
Benjamin, J. B.	0	5	0
Clark, C.	0	5	0
Coleman, Alfred	0	10	6
Coleman, E. J.	0	10	6
Coleman, J. D.	0	5	0
Drane, Robert	1	1	0
Duck and Son	0	5	0
Duck, W. G.	0	5	0
Edwards, E.	0	2	6
Evans, E. M.	0	5	0
Fargher, C.	0	2	6
Farthing, H.	0	2	6
Foster, J. E.	0	2	6
Furnival, William	0	5	0
Gerhold, H. A.	0	2	6
Greaves, John	0	5	0
Hagon, Albert	0	5	0
Harries, D.	0	5	0
Hicks, W. T.	0	5	0
Hopkins, W. R.	0	2	6
Howell, Thomas	0	5	0
Hughes, J.	0	5	0
Jenkins, T. M.	0	2	6
Jones, J. (Barry Dock)	0	7	6
Jones, J. A.	0	5	0
Jones, John T.	0	5	0
Joseph, L.	0	2	6
Kernick and Son	0	10	6
Lewis, James	0	5	0
Lloyd, David	0	5	0

Cardiff—continued.	£	s.	d.
Mumford, Richard	0	5	0
Munday, John	0	10	6
Prosser, H. H.	0	2	6
Prust, Richard	0	5	0
Rees, John	0	5	0
Robb, John	0	5	0
Sanders, W. J.	0	5	0
Stephens, G. E.	0	2	6
Treharne F. G.	0	5	0
Wakeford, —..	0	2	6
Walklate, J. T.	0	5	0
Williams, R. E.	0	5	0
Williams, W. Jesse	0	5	0
Williams, Thomas	0	10	6
Williamson, Mrs...	0	5	0
Yorath, T. V.	0	5	0

Carlisle.

Bell, John	0	5	0
Fisher, Catherine Hodgson	0	5	0
Foster, James	0	5	0
Halhead, J.	0	2	6
Hallaway, John	0	5	0
Nichol, A.	1	1	0
Parker, Edward J.	0	5	0
Parker, William	0	5	0
Pattinson, M. H...	0	5	0
Ridley, T.	0	5	0
Robson, John	0	5	0
Thompson, Andrew	0	10	6
Simpson, P.	0	5	0

Carluke.

Hinksman, John	0	10	0

Carmarthen.

Davies, C. E.	0	5	0
Howell, A	0	5	0
Lloyd, Walter	0	5	0

Carnarvon.

Francis, James	0	2	6
Jones, David..	0	5	0
Jones, John	0	5	0
Lloyd, William	0	5	0
Owen, G. C. R.	0	2	6

Carshalton.

Carter, Francis	0	10	6

Castle Cary.

Moore, Francis S.	0	10	0

Castle Douglas.

Veitch, A.	0	5	0

Chapel Allerton.

Saville, William	0	5	0

Chard.

Churchouse, C. H.	0	5	0

Charlestown-of-Aberlour.

Smith, John	0	2	6

Chatham.

French, Miss E.	0	5	0
Lamb, Thomas C.	0	5	0
Morgan, Alfred W.	0	5	0

Cheddar.

Allen, Samuel	0	5	0

Chelmsford.

Metcalfe, Wilson	0	10	6
Thresh, Dr. J. C.	0	10	6
Tomlinson, James	0	10	6
Warren, F.	0	10	6
Wright, W.	0	10	6

Cheltenham.

Balcomb, John	0	10	6
Barron, William	0	10	6
Beetham and Son..	1	1	0
Butcher, Thomas	1	1	0
Codling, A. J.	0	10	6
Davies, H.	0	2	6
Davies, R. E.	0	2	6
Dolman, Mrs.	0	5	0
Fletcher and Palmer	1	1	0
Fletcher, John	1	1	0
Hands, William	0	5	0
Hill, Arthur	0	5	0

Cheltenham—continued.	£	s.	d.
Hodgkinson, T.	0	2	6
James, J.	0	5	0
Jeffrey, Thomas A.	0	10	6
Johnson, H. M.	0	2	6
Joyner, E. E.	0	2	6
Ladell, R. S...	0	2	6
Morris, D. A.	0	2	6
Mowatt, J. R.	0	5	0
Organ, E.	0	5	0
Palmer, F. T.	0	10	6
Pattison, Thomas	1	1	0
Perry, H. W...	0	2	6
Power, J. H.	0	5	0
Prockter and Forth	1	1	0
Purnell, Mrs...	0	5	0
Robinson, C. E.	0	5	0
Saxby, A. C.	0	5	0
Smith, Nathaniel and Co.	1	11	0
Stewart, James	1	1	0
Thomas, J. A. and J. P.	0	10	6
Walters, John	0	10	6
Wood, Frederick	0	10	6

Chertsey.

Boyce, George	0	5	0

Chester.

Baker, W. H.	0	10	0
Baxter, George	0	10	6
Baxter, G. M.	0	2	6
Bowers, James D.	0	5	0
Davidson, W.	0	5	0
Donald, A.	0	2	6
Hodges, W.	0	5	0
Huke, James W.	0	5	0
Kemp, G.	0	10	0
Logan, F.	0	2	6
Mills, John	0	5	0
Shrubsole, A..	0	2	6
Shrubsole, G. W...	0	5	0
Spencer, J. H.	0	5	0
Williams, W. L.	0	10	6

Chesterfield.

Barfoot, J. R. D.	0	5	0
Booth, George	0	10	6
Elliott, Thomas (Newbold)	0	5	0
Furness, Thomas	0	5	0
Greaves, A. W.	0	5	0
Knighton, T. W.	0	5	0
Lancaster, Wm. G.	0	5	0
Sampson, George	0	5	0
Whitlamsmith, W.	0	5	0
Windle, John T.	0	5	0
Wright, G.	0	5	0

Chester-le-Street.

Greenwell, Richard Henry	0	5	0

Chichester.

Baker and Son	0	10	6
Charge, A. W.	0	5	0
Everard, A. G.	0	2	6

Chippenham.

Coles, John C.	0	10	6
Turpin, A. B.	0	5	0

Chipping Ongar.

Ward, David..	0	10	6

Chipping Sodbury.

Jones, Richard	0	10	6

Chorley.

Hill, William	0	5	0
Oakes, G.	0	5	0

Christchurch (Hants).

Green, John	0	2	6

Chulmleigh.

Joint, Robert James	0	6	0

Cirencester.

Griffiths, Waldron	0	10	6
Kinch, Edward	0	10	6
Paternoster, J.	0	5	0

Clacton-on-Sea.

Mann, William	0	5	0

Claycross.

Lloyd, Robert	0	10	6
Smith, John	0	5	0

Clun.

Darroll, William	1	1	0

Coalville.

Brunt, F.	0	5	0

Cockermouth.

Bowerbank, Joseph	1	1	0
Brown, R. F.	0	2	6
Cooper, F. A.	0	2	6
Robinson, William	0	5	0

Codnor (near Derby).

Farnsworth, Thomas	0	5	0

Colchester.

Barritt and Son	0	10	6
Bates, Thomas W.	0	5	0
Cordley, W. B.	0	5	0
Davies, Rees..	0	5	0
Everitt, W. E.	0	5	0
Jopling, W.	0	5	0
Prosser, Mrs...	0	5	0
Shenstone, J. C.	0	5	0
Smith, W.	0	5	0
Weddell, Arthur	0	5	0

Coldstream.

Elliot, W. M.	0	5	0

Collumpton.

Foster, M. T.	0	2	6

Combe Martin (North Devon).

Shapcott, W. H. P.	0	5	0

Coningsby.

Brown, Leonard H.	0	5	0

Consett.

Milner, T.	0	2	6

Constantinople.

Bateman, J. M.	1	1	0

Cork.

Selkirk, James	0	10	6

Corwen.

Jones, William	0	10	6

Coventry.

Axford, J. W.	0	10	6
Bampton, G. F.	0	2	6
Bird, Frederick	0	2	6
Brown, John	0	5	0
Clarke, William	0	2	6
Frost, G...	0	2	6
Glover, Henry	0	2	6
Hinds, James	0	10	6
Jelly, George William	0	5	0
Loveitt, Mrs...	0	2	6
Mason, D.	0	2	6
Morris, John..	0	2	6
Newton, Alfred H.	0	2	6
Reid, J.	0	2	6
Sellors, Thomas	0	2	6
Wyleys and Co.	1	1	0

Cowbridge.

Thomas, John	0	5	0

Cowes (Isle of Wight).

Beaven, George A.	0	10	6
Fennings, Alfred	1	1	0
ditto (donation)	5	5	0

Cranbrook.

Turner, John..	0	5	0

Crawley.

Leach, John	0	5	0
Weedon, Joseph	0	5	0

Crediton.

Jackson and Sons..	1	1	0

Crewkerne.

Catford, O. W.	0	5	0

	£	s.	d.
Criccieth.			
Bowen, Joseph W.	0	2	6
Cromer.			
Davison, D.	0	5	0
Hoare, W. P.	0	5	0
Cromford (Derbyshire).			
Nicklinson, T.	0	5	0
Croydon.			
Barritt, George	0	10	6
Chapman, J.	0	2	6
Clarke, Josiah	1	1	0
Culverwell, John S.	0	5	0
Davis, F.	0	2	6
Dixon, W. R.	0	5	0
Grimwade, E. H.	0	10	6
Long, Henry	0	10	6
Neal, W.	0	5	0
Nichols, A. F.	0	2	6
Padwick, W. G.	0	5	0
Roberts, D. P.	0	10	6
Sanders, F. T.	0	5	0
Cuckfield (Sussex).			
White, W. E.	0	5	0
Cullen (N.B.).			
Buchanan, John	0	2	6
Seivwright, George	0	10	6
Cumnock.			
Kay, W.	0	2	6
Dalton-in-Furness.			
Preston, William L.	0	5	0
Darlaston.			
Smith, F. A.	0	10	6
Darlington.			
Clare, John	0	10	6
Cranston, John	0	5	0
Nicholson, Richard	0	5	0
Pullin, W. H.	0	10	6
Raw, James H.	0	5	0
Robinson, James	0	5	0
Walton, Frederick G.	0	2	6
Dartford.			
Cann, James	0	5	0
Goff, W. E.	1	1	0
Horrell, A. E.	0	5	0
Dartmouth.			
Hadfield, H. M.	0	5	0
Humphry, H	0	10	6
Rees, Colin A.	0	5	0
Rees, William H.	0	10	0
Darwen.			
Shorrock, R.	0	5	0
Datchet.			
Willcocks, A. S.	0	5	0
Deal.			
Dunn, George S.	0	5	0
Fitt, F. E.	0	5	0
Green, John	0	10	6
Johns, T.	0	5	0
Denton (Lancs.).			
Arrandale, William	0	10	6
Derby.			
Ashley, William	0	5	0
Blunt, Walter B.	0	2	6
Booth, C. W.	0	2	6
Clifton, Frederick	0	5	0
Cope, J. A.	0	10	6
Frost, George	0	10	6
Heath, J. L.	0	2	6
Hefford, Charles	0	2	6
Hoare, C. F.	0	2	6
Hughes, John S.	0	2	6
Machon, Edward	0	5	0
Monkhouse, Henry	0	5	0
Ordish, Thomas	0	2	6
Sherwin, Samuel	0	2	6
Stevenson, Richard W.	0	5	0
Ward, J.	0	5	0
Devizes.			
Edwards, T. R.	0	2	6
Devonport.			
Breeze, George	0	5	0
Codd, Francis	0	5	0
Davey, H. D.	0	2	6
Lamble, John A.	0	2	6
Perkins, S. A.	0	2	6
Rendle, R. H.	0	5	0
Ryall, F. J.	0	5	0
Weary, C. T.	0	5	0
Didsbury.			
Bates, John F.	0	5	0
Diss.			
Cupiss, Mrs. E.	0	10	6
Gostling, T. P.	0	10	6
Whitrod, H. F.	0	5	0
Doncaster.			
Atkinson, Stephen (Arksey)	0	10	6
Connor, Thomas H.	0	10	6
Goldthorpe, A.	0	5	0
Hasselby, T. J.	0	5	0
Howorth, James	0	10	6
Jaques, George	0	10	6
Loxley, C. H.	0	5	0
Parkin, Charles	0	5	0
Stiles, M. H.	0	10	6
Dorchester.			
Durden, H.	0	5	0
Pearce, William L.	0	5	0
Dorking.			
Doubleday, F. W.	0	10	6
Douglas (Isle of Man).			
Aspell, J. S.	0	5	0
Brearey, A. W.	1	1	0
Gore, J. R. A.	0	5	0
Greensill and Son	1	1	0
Halton, W. H.	0	2	6
Radcliffe, J. C.	0	5	0
Richardson, J. W.	0	5	0
Wilson, I.	0	2	6
Young, John	0	5	0
Dover.			
Barnes, William James	0	5	0
Bottle, Alexander	1	1	0
Brown, Joseph Fred.	1	1	0
Clarke, Herbert	0	10	6
Dickeson, Sir Richard	1	1	0
Ewell, Richard M.	0	5	0
Forster, Robert Henry	0	10	6
Hambrook, E. O.	0	5	0
Hambrook, John Barber	0	5	0
Leigh, H. M.	0	2	6
Long, F. J. T.	0	2	6
Peake, Henry	1	1	0
Thompson, Edward	0	10	6
Wyles, William	1	1	0
Downton.			
Dunmore, G. H.	0	10	6
Driffield.			
Bordass, James	0	5	0
Parkinson, Thomas	0	5	0
Droylsden.			
Scanlan, C.	1	1	0
Dublin.			
Bowles, Charles A.	0	10	6
Dufftown (N.B.).			
MacPherson, W.	0	5	0
Dumbarton.			
Babtie, John	0	5	0
Campbell, Colin	0	5	0
Dumfries.			
Allan, William	0	5	0
Johnstone, T. F.	0	2	6
Sutherland, J. W.	0	2	6
Dundee.			
Hardie, James	0	10	6
Hardie, James M.	0	10	6
McMillan, James	0	10	6
Dunfermline.			
Fisher, J. H.	0	5	0
Gilmour, David	0	5	0
Seath, Alexander	0	10	6
Tocher, J.	0	5	0
Dunkeld.			
McDonald, Kenneth	0	10	6
Dunstable.			
Herington, J. H.	0	5	0
Durham.			
Burdon, John	1	1	0
Rollin, John G.	0	10	6
Sarsfield, John	0	2	6
Sarsfield, William	0	10	6
Scawin and Burn	0	10	6
Wise, Joseph N.	0	5	0
Dursley.			
Perodeau, E. G. (Uley)	0	5	0
Ealing.			
Curtis, Fred. G.	0	10	6
Dyson, A.	0	5	0
Hayles Brothers	1	1	0
Holmes, C. J.	0	10	6
Phillips, J. E.	0	10	6
Thomas, Richard	0	10	6
Earlstown.			
Peake, Arthur	0	5	0
Eastbourne.			
Andrews, H. T.	0	10	6
Andrews, J. F.	0	10	6
Browne, Henry R.	1	1	0
Crook, Herbert	1	1	0
Earnshaw, B. K.	0	10	6
Ford, T. M.	0	2	6
Gibbs, Joseph	1	1	0
Gibbs, S.	0	5	0
Hall, Samuel	1	1	0
Price, W.	0	5	0
Ray, C.	0	2	6
Routly, J.	0	5	0
Senior, J.	0	5	0
Tearle, W.	0	5	0
Wilkes, R. H.	0	5	0
East Dereham.			
Peck, Edward	0	10	6
East Grinstead.			
Tully, John	0	2	6
East Molesey.			
Parrott, John	0	10	6
Tweedie, J. J.	0	5	0
Eastleigh (Hants).			
Van, F. W. S.	0	5	0
Eccles.			
Blackburn, A. E. H.	0	5	0
Bomford, A. C.	0	5	0
Bowden, W. (Patricroft)	0	10	6
Howie, W. L.	0	10	6
Oldfield, F.	0	5	0
R. T. H.	0	10	6
Scholes, W. I.	0	5	0
Eccleshall.			
Smith, Edgar R.	0	10	6
Edinburgh.			
Ainslie, Wm. W.	0	5	0
Aitken, James	0	5	0
Arthur, Charles	0	5	0
Baildon, H. C. and Son	1	1	0
Baker, W. C.	0	5	0
Blenkiron, J.	0	2	6
Blyth, J.	0	2	6
Boa, Peter	0	5	0
Brindle, E.	0	2	6
Bruce, Alexander G.	0	5	0
Buchanan, James	1	1	0
Burley, William	0	5	0

Edinburgh—continued.	£	s.	d.
Center, J. A.	0	5	0
Chemists' Assistants and Apprentices' Association	1	1	0
Clark, Andrew	0	5	0
Clark, Dr. William Inglis	0	10	6
Cowie, George	0	5	0
Dewar, F. L.	0	5	0
Dick, Robert	1	1	0
Dott, David B.	0	10	6
Duncan, A.	0	5	0
Duncan, William	0	5	0
Ewing, James L.	0	10	6
Findlay, J.	0	2	6
Fleming, J.	0	2	6
Forret, John A.	0	5	0
Fraser, Alexander	0	5	0
Fraser, J. I.	0	5	0
Gamley, David	0	5	0
Gardner and Ainslie	1	1	0
Gibson, Adam	0	10	6
Gilmour, William	1	1	0
Hendry, R. L.	0	5	0
Henry, C. F.	0	5	0
Heron, James	1	1	0
Hill, John R.	0	5	0
Keith, Sydney	0	5	0
Laurie, J. M.	0	5	0
Lockerbie, James	0	5	0
Lunan, G.	0	5	0
MacAlley, Robert	0	5	0
MacCallum, A. J.	0	5	0
MacDonald, D. F.	0	2	6
Macdonald, John	0	5	0
Macfarlan and Co.	2	2	0
McGlashan, J.	0	5	0
MacLaren, David	0	10	0
Macnair, R. H.	0	2	6
McPherson, Colin A.	0	5	0
MacRae, A.	0	5	0
Middleton, D.	0	2	6
Morison, John	0	10	6
Noble, Alexander	1	1	0
Pinkerton, William	0	10	6
Purves, Samuel	0	5	0
Raimes, Clark and Co.	2	2	0
Ritchie, J.	0	5	0
Robertson, G.	0	5	0
Robertson, James and Co.	1	1	0
Robertson, John	0	5	0
Scobie, James	0	5	0
Scott, James	0	10	6
Smiles, J.	0	10	0
Smith, Thomas	1	1	0
Smith, William	0	5	0
Stephenson, J. B.	1	1	0
Stewart, A. K.	0	5	0
Swan, W.	0	5	0
Symington, Thomas	0	10	6
Thomson, Isaac W.	0	5	0
Wylie, David N.	0	5	0
Young, J. R., jun.	0	5	0

Edmonton (Middlesex).

Ragg, W.	1	1	0
Ragg, W. W.	0	10	0

Egham.

Bartholomew, William	0	10	6

Elgin.

Robertson, William	0	5	0
Thomson, Robert	0	5	0

Eltham (Kent).

Mellin, C. J.	0	5	0
Rawlinson, Mrs. M.	1	1	0

Ely.

Ellis, H. A.	0	2	6
Gulliver, G. E.	0	5	0
Lincoln, William	0	10	0

Enfield.

Gange, George	0	5	6

Englefield Green (Surrey).

Miller, G. F.	0	5	0

Epping.

Rowland, T. W.	0	5	0

Epsom.

Oxley, Frederic	0	5	0
Tottle, Henry John	0	5	0

Erith (Kent).

Howard, G. W.	0	10	6

Evesham.

Dingley, R. L.	0		0
Pumphrey, J. H. (Bengeworth)	0		0

Exeter.

Bartleet, John	0	5	0
Botting, Charles	0	5	0
Bulley, William H.	0	2	6
Gadd, Henry	0	10	6
Ditto (donation)	5	5	0
Harris, H. W.	0	10	6
Lake, John H.	0	10	6
Ditto (donation)	5	5	0
Lemmon, Eric	0	5	0
Milton, Thomas C.	0	10	6
Napier, George L.	0	5	0
Pasmore, George	0	5	0
Stocker, George	0	10	6
Townsend, J.	0	10	6
Wearing, W. H.	0	5	0
Webber, J. W.	0	5	0
Wright, Robert F.	0	5	0

Exmouth.

Toone, A. H.	0	5	0

Eye.

Bishop, Robert	0	10	6
Flowerdew, R.	0	10	6

Eynsham.

Howe, Henry A.	0	5	0

Fakenham.

Searle, Mrs. M.	0	10	0

Falkirk.

Murdoch, David	0	10	6

Falmouth.

Newman, Walter F.	0	5	0
Solomon, W. H.	0	10	6

Fareham.

Batchelor, Alfred E.	0	5	0
Batchelor, Charles	0	5	0
Franklin, Alfred	0	10	6

Faringdon.

Cook, W. R.	0	5	0

Farnham.

Griffith, J.	0	10	6

Felixstowe.

Squirrell, Miss C. O.	1	1	0

Fenton.

Knight, Jesse	0	5	0
Massey, Stephen	0	5	0

Fleckney (Leicestershire).

Deacon, Fanny E.	0	5	0

Flint.

Jones, O. W.	0	5	0

Folkestone.

Bishop, E. J.	1	1	0
Goodliffe, George	0	10	6
Lea, John	0	10	6
Stainer, John	0	10	6

Forfar.

Fowler, G. R.	0	5	0

Formby (Lancs.).

Blood, C.	0	5	0

Fort William.

MacFarlane, P.	0	5	0

Foulsham.

Maddison, Mary	0	5	0

Fowey.

Wellington, J.	0	5	0

Fraserburgh.

Burnett, Robert	0	5	0

Frodsham (Cheshire).

Dunsford, F. W.	0	5	0
Jones, J. M.	0	5	0

Frome.

Hodder, G. W.	0	5	0

Gainsborough.

Forrest, Richard Wm.	0	10	6
Thompson, George	0	10	6

Garstang.

Thomas, J. J.	0	5	0

Gateshead-on-Tyne.

Elliott, Robert	0	10	6
Greenwell, William C.	0	5	0

George Town (Demerara).

Grammer, F.	0	2	6

Glasgow.

Adam, T.	0	2	6
Boyd, A.	0	2	6
Brodie, Robert	0	5	0
Conacher, D.	0	3	0
Crawford, David	0	2	6
Currie, John (Eglinton Street)	0	5	0
Currie, John (Sauchiehall Street)	0	5	0
Currie, W. L.	0	5	0
Dickie, James	0	5	0
Duncan, J.	0	10	0
Dunlop, Thomas	0	5	0
Fenwick, John	0	5	0
Foster, John	0	10	6
Frazer, Daniel	1	1	0
Garry, George	0	2	6
Glasgow Apothecaries' Co.	1	1	0
Glen, Robert	0	5	0
Greig, W.	0	10	6
Harrower, Peter	0	5	0
Jaap, John	0	10	6
Kinninmont, Alexander	1	1	0
Lambie, Hugh	0	5	0
Laurence, John	0	10	6
McMillan, John	1	1	0
Miller, J. W.	0	5	0
Neil, J.	0	5	0
Peacock, J. R.	0	5	0
Rose, Alexander	0	10	6
Thomson, William	0	5	0
Wallace, W.	0	10	6
Whitelaw, James	1	1	0

Gloucester.

Foulkes, W. H.	0	10	6
Franklin, James	0	5	0
Hughes, Evan G.	0	5	0
Jenkins, Henry	0	5	0
Meadows, Henry	0	10	6
Minchin, W.	0	5	0
Sadleir, John	0	10	6
Stafford, William	0	10	6
Trigg, James W.	0	5	0
Ward, Joseph	0	10	6

Gosforth.

Gaitskell, James	0	5	0

Gosport.

Houghton, R. W.	0	5	0
Mumby, Chas. and Co.	1	1	0

Govan.

Skinner, John	0	5	0

Grantham.

Bishop, William	0	2	6
Fisher, F. D.	0	5	0
Hall, Mrs. Arnold	0	10	6
Hunt, Thomas	0	5	0
Welborn, George	0	2	6
Whysall, William	0	10	6
Wilkinson, W.	0	10	6

Grantown.

Duncan, W.	0	4	0

Gravesend.

Clarke, Richard F.	1	1	0
Reid, C. Stuart	0	2	6
Sharman, C. R.	0	5	0
Wiseman, E.	0	2	6

Great Broughton (Cumb.).

Penny, J.	0	10	6

Great Grimsby.	£	s.	d.
Barker, William	0	5	0
Cook, Robert, jun.	0	5	0
Dewing, C.	0	5	0
Mason, William D.	0	2	6
Robinson, Jonathan Scott	0	10	6
White, J. C.	0	2	6
Willey, W.	0	5	0

Guernsey.			
Nickolls, J. B.	0	5	0

Guildford.			
Evans, J. C.	0	2	6
Inman, T. L.	0	5	0
Jeffries, Henry	1	1	0
Long, A. J. T.	0	5	0
Snoxell, S.	0	2	6
Thompson, Thomas	0	5	0
Wheeler, Frederick	0	5	0

Guisborough.			
Fairburn, Robert W.	0	5	0

Haddington.			
Gardiner, D.	0	5	0
Watt, James and J.	0	10	6

Hadleigh.			
Slater, W. M.	0	2	6

Halesworth.			
Gostling, John H.	0	5	0
Johnson, F. E.	0	5	0

Halifax.			
Brook, Robert	0	10	6
Dyer, William	0	5	0
Jessop, Jonathan	0	5	0
Seely, H. W.	0	5	0
Swire, Jabez	0	5	0

Halstead.			
Marlar, John F.	0	2	6

Hambledon.			
Wedge, G. D.	0	2	6

Hampton Wick.			
Miller, C. S.	0	5	0

Hanley.			
Cornwell, T. C.	0	5	0
Furnival, John D.	0	10	6
Insull, E. S.	0	2	6
Jones, E.	0	5	0
Moore, John William	0	5	0
Parr, F. R.	0	2	6
Tirrell, J.	0	5	0
Waldron, J. H.	0	5	0

Hanwell.			
Kirkham, Frank	0	2	6

Harleston.			
Fisher, W. H.	0	5	0
Woods, Charles	0	5	0

Harrogate.			
Davis, Richard H.	0	10	6
Greenwood, Charles	0	10	6
Reynolds, Freshfield	0	10	6
Shaw, B.	0	10	6
Thorp, E.	0	2	6
Weston, G.	0	2	6
Wilson and Son	1	1	0
Wood, A. W.	0	5	0

Harwich.			
Bevan, Charles F.	0	10	6
Harding, Joseph	0	10	6
Worts, Augustine	0	5	0

Harrow.			
Gunn, S. J.	1	1	0
Poll, G. J.	0	5	0

Haslingden.			
Blayney, Joseph J.	0	5	0

Hastings and St. Leonards.			
Beck, Albert N.	0	5	0
Bolton, Thomas	0	5	0
Brooker, Algernon	0	5	0
Brooks, Frederick	0	5	0
Chapman, F.	0	10	6
Crisford, F. J.	0	2	6
Croasdale, J. C.	0	2	6
Curtis, H. E.	0	5	0
Daws, W. K.	0	10	6
Feaver, John	0	10	6
Greenhill, S. O.	0	5	0
Hasselby, E. H.	0	5	0
Jameson, W. E.	1	1	0
Jenner, H. A.	0	5	0
Keyworth, G. A.	0	10	0
Lemmon, G. F.	0	2	6
Maggs, F. W.	0	5	0
Maggs, Samuel B.	0	5	0
Neve, Mary E. B.	0	5	0
Rossiter, Frederick	0	10	6
Smith, A.	0	5	0
Snowdon, Robert	0	5	0
Tharle, C. A.	0	10	6
Tree, F.	0	5	0
Vint, Thomas D.	0	5	0

Haverfordwest.			
Jenkins, Jabez (Lysyfrân)	0	5	0
Saunders, Charles P.	0	5	0
Saunders, David P.	0	10	6

Hawick.			
Craig, John	0	5	0
Kennedy, D.	0	10	0
Maben, Thomas	0	10	6
Turnbull, W. S.	0	5	0

Hay.			
Davies, John Lutwyche	0	5	0

Heaton Chapel.			
Thorp, John	1	1	0

Heaton Norris.			
Dodge, W.	0	5	0

Hebden Bridge.			
Hey, David	0	10	6

Heckington.			
Millhouse, H. H.	0	5	0
Sumners, Michael Cole	0	5	0

Heckmondwike.			
Booth, John	1	1	0
Stead, Walter	0	5	0

Helensburgh.			
Harvie, George	0	5	0
McMurray, J.	0	5	0

Helmsley.			
Allenby, W.	0	5	0

Helston.			
Wakeham, Charles	0	5	0

Hemel Hempstead.			
Ellis, C. J.	0	2	6
Wilkinson, C. E.	0	5	0

Hemsworth (Yorks.).			
Hodgson, G.	0	10	6

Henley-on-Thames.			
Batchelor, C. J. H.	0	5	0

Hereford.			
Guy, E.	0	5	0
Haines, W. E.	0	5	0
Jackson, J. J.	0	10	6
Walker, John	0	10	6
Williams, W. and H. B.	0	10	6

Hertford.			
Durrant, G. R.	0	10	6
Lines, G.	0	10	6

Hexham.			
Gibson, J. P.	1	1	0
Richardson, George	0	5	0
Riddle, W. R.	0	5	0

Heywood.			
Beckett, William	0	10	6

High Wycombe.			
Wilford, J.	0	5	0
Young, H. E.	0	2	6

Highworth (Wilts).			
Ballard, Edwin	0	5	0

Hitchin.			
Kent, T. W. (Arlesey)	0	5	0
Perks and Llewellyn	1	1	0
Ransom and Son	1	1	0

Holyhead.			
Roberts, T. J.	0	5	0

Hong Kong (China).			
Crow, W. E.	1	1	0
Lucas, E. W.	0	10	6
Watson, W. M.	0	5	0

Honley.			
Broadbent, John B.	0	10	6

Horncastle.			
Betts, William	0	5	0

Horsforth.			
Wynn, F.	0	5	0

Horwich (Lancs.).			
Holifield, E. J.	0	5	0
Phillips, S.	0	5	0
Unsworth, Mrs. H.	0	1	0
Varley, W. M.	0	10	6

Houghton-le-Spring.			
Rowell, R. H.	0	5	0

Hounslow.			
Bowering, John	0	5	0
Cull, Joseph	0	10	6

Howden (Yorks.).			
Loam, J. G.	0	5	0

Hucknall Torkard.			
Heath, J.	0	5	0

Huddersfield.			
Dickinson, J. H.	0	5	0
King, William	0	10	6
Needham, T.	0	5	0
Wheatley, Charles	0	10	0

Hull.			
Allison, E. and H.	1	1	0
Bell, Charles B.	1	1	0
Bousfield, W. M.	0	2	6
Burnett, W.	0	2	6
Campbell, Charles	0	5	0
Chapman, E. J.	0	5	0
Chapman, Joseph	0	5	0
Creasser, Matthew	0	5	0
Day, W.	0	2	6
Desforge, J. H.	0	5	0
Dobson, J. B.	0	5	0
Dunlop, John	0	5	0
Dyson, George	0	5	0
Earle, E. H.	1	1	0
Fowler, E.	0	5	0
Gibson, C. P. (Trustees of)	0	10	6
Grindell, John	0	10	6
Hall, Henry R. F.	0	5	0
Hammond, William H.	0	10	0
Hebblethwaite, G. A.	0	2	6
Hickson, R. W.	0	5	0
Hollingsworth, James	0	5	0
Hovles, George	0	5	0
Kellington, M. L.	0	5	0
Kenny, Thomas	0	10	0
Kirton, C. H.	0	10	6
Lambert, F. E.	0	5	0
Linford, John S.	1	1	0
Lofthouse and Saltmer	2	2	0
Markham, A. D.	0	2	6
Metcalfe, A. P.	0	5	0
Millner, J. Y.	0	5	0
Mould, J. S.	0	2	6
Myers, G.	0	10	6
Newton, G. R.	0	2	6
Oldham, James	0	5	0
Raynor, A.	0	5	0

Hull—continued.	£	s.	d.
Richardson, A.	0	2	6
Robinson, T. W.	0	5	0
Ryley, E.	0	2	6
Savege, E.	0	2	6
Shaw, Ward	0	5	0
Sheffield, A. J.	0	7	6
Souter, Jas. S.	0	15	6
Staning, Walter	0	5	0
Stoakes, Benjamin M.	0	10	6
Thirsk, A. T.	0	2	9
Thompson, H. E.	0	2	6
Thyer, J.	0	10	6
Walker, C.	0	2	6
Hunstanton.			
Twiss, Wm.	0	10	6
Huntingdon.			
Baxter, Robert	0	10	6
Cooper, A.	0	2	6
Huntly (N.B.).			
Chalmers, G.	0	2	6
Hurstpierpoint.			
Hudson, Alfred W.	0	2	6
Husbands Bosworth.			
Clerke, W. B.	0	5	0
Hyde.			
Hepworth, J. S.	0	5	0
Oldfield, Henry	0	10	6
Hyères (France).			
Powell, Walter A.	0	5	0
Hythe.			
Lemmon, R. A.	1	1	0
Ilford.			
Beal, E. J.	1	1	0
Ilfracombe.			
Crang, Walter	0	10	6
Wheeler, James	0	5	0
Ilkeston.			
Potts, Charles	1	1	0
Ilkley.			
Worfolk, G. W.	0	10	6
Inverness.			
Allan, Alexander	0	5	0
Fraser, John	0	5	0
Galloway and Son	0	5	0
MacLeod, L.	0	2	6
MacRitchie, D.	0	2	6
Mitchell, H.	0	5	0
Ogston, W.	0	5	0
Ipswich.			
Anness, Samuel R.	0	10	6
Chapman and Pain	1	1	0
Clifton, E. S.	0	5	0
Cornell, William	1	1	0
Cossey, James D.	0	10	6
Crassweller, W. E.	0	5	0
Damant, A. A.	0	5	0
Eyre, H. R.	0	5	0
Grimwade, Ridley and Co.	0	10	6
Marsh, W. H.	0	5	0
Matcham, Edward	0	5	0
Miller, T. T.	0	5	0
Nunn, C. G.	0	5	0
Palmer, F. H.	0	2	6
Wiggin, J. C.	0	10	6
Irvine.			
Dunlop, D.	0	5	0
Gillespie, James	0	2	6
Isleworth.			
Reece, James	0	5	0
Jarrow-on-Tyne.			
Hooper, Richard	0	2	6
Jedburgh.			
Walker, A.	0	5	0

Jersey.	£	s.	d.
Baker, John T.	0	5	0
Cole, George	1	1	0
Ereaut, John	1	1	0
Millais, Mrs.	1	1	0
Miller, Henry	0	5	0
Poingdestre, C. R.	0	10	6
Keighley.			
Riddiough, F.	0	5	0
Kendal.			
Bateson, Thomas	0	10	6
Burton, Matthew	1	1	0
Hind, Thomas W. L.	1	1	0
Rigg, G. F.	0	10	6
Severs, Joseph	0	10	6
Keswick.			
Townley, Thomas W.	0	10	6
Kettering.			
Gray, A. U. (Rothwell)	0	2	6
Thursfield, John F.	0	10	6
Thursfield, J. H.	0	2	6
Kew.			
Edwards, J. E.	0	10	6
Kidsgrove.			
Griffiths, Edwin H.	0	10	6
Kidwelly.			
Jones, L.	0	2	6
Kilmarnock.			
Borland, John	1	1	0
Borland, John, jun.	0	10	6
King's Lynn.			
Atmore, George	0	5	0
Kingston-on-Thames.			
Bond, C. R.	0	10	6
Brewster, William	0	10	6
Clarke, W. E.	0	5	0
Higgs, Alfred	0	5	0
Walmsley, Samuel	0	5	0
Whaley, Edward	0	10	6
Kirkby-in-Furness.			
Postlethwaite, T.	0	2	6
Kirkcaldy.			
Allan, H. W. F.	0	2	6
Key, G. B.	0	5	0
Ness, T.	0	2	6
Peebles, J.	0	10	6
Storrar, David	1	1	0
Knaresborough.			
Lawrence, W. P.	0	5	0
Knutsford.			
Jackson, William	0	5	0
Silvester, Henry T.	0	5	0
Lancaster.			
Arkle, William	0	5	0
Briggs, W.	0	5	0
Troughton, Henry	0	5	0
Vince, James	0	5	0
Wyatt, W.	0	10	0
Landport.			
Gall, Frederic	0	2	6
Perfect, George	0	5	0
Landore (Glam.).			
Dryden, T.	0	5	0
Langholm.			
Beattie, Thomas	0	5	0
Largs (N.B.).			
Barr, Bryce	0	5	0
Launceston.			
Downing, Frederick	0	5	0
Wise, William	0	5	0

Leamington.	£	s.	d.
Barnitt, John	0	10	6
Barrett, Josephus T.	1	1	0
Bloomfield, E.	0	2	6
Davis, Benjamin	0	10	6
Davis, C.	0	2	6
Gardiner, J. A.	0	2	6
Heath, Victor	0	2	6
Heath, W. G.	0	2	6
Hutton, H.	0	10	6
Jones, C. H.	0	2	6
Lamplough, J. W.	0	10	6
Mead, F. G.	0	2	6
Parkes, E. C	0	2	6
Price, J.	0	5	0
Robinson, J. J.	0	5	0
Sansom, Henry	0	2	6
Smith, Samuel A.	1	1	0
Smith, Samuel H.	1	1	0
Stanley, Herbert	0	10	6
Swann, A. E.	0	2	6
Wilson, G. P.	0	5	0
Ledbury.			
Freeman, Ernest	0	10	6
Leeds.			
Bilbrough, A.	1	1	0
Branson, F. W.	0	10	6
Briggs, George	0	10	6
Brown, Edward	0	5	0
Catterall, C. G.	0	10	6
Cole, E. H.	1	1	0
Exley, John	0	5	0
Fawthorp, James	0	5	0
Fox, W. A.	0	2	6
Goodall, Backhouse and Co.	2	2	0
Greasley, M. F.	0	10	6
Hardcastle, J.	0	5	0
Harvey, William (Headingley)	1	1	0
Hirst, Brooke and Hirst	2	2	0
Hirst, David	0	5	0
Holmes, Francis	0	5	0
Horsfield, E.	0	5	0
Jefferson, P.	0	5	0
Jones, C. A.	0	2	6
Ratheram, W.	0	5	0
Reynolds, Richard	1	1	0
Reynolds, Richard F.	0	10	6
Robinson, W.	0	5	0
Smeeton, W. (Executors of)	0	10	6
Smith, R. H.	0	2	6
Taylor, Samuel	1	1	0
Leicester.			
Berridge, Alfred	0	5	0
Broof, R.	0	10	6
Burford, S. F.	0	10	6
Butler, T. E.	0	5	0
Cadoux, S. H.	0	5	0
Carr, William	0	10	6
Clark, John W.	2	2	0
Clark, Walter B.	0	10	6
Cleaver, Samuel	0	5	0
Cox, S. G.	0	10	6
Ellis, George	0	5	0
Esam, Richard	0	10	6
Freeland, A. J. (Kibworth)	0	2	6
Harvey, William R.	1	1	0
Kelly, J. G.	0	5	0
Lloyd, T. H.	1	1	0
Ough, L.	0	5	0
Pickering, Henry	0	5	0
Rowe, W.	0	5	0
Sharp, Edward K.	0	5	0
Wand, Stephen	0	10	6
West, J. L.	1	1	0
Woolley, G. J. B.	0	5	0
Leighton Buzzard.			
Herington, H. E.	0	5	0
Herington, Joseph	1	1	0
Leith.			
Bowman, J.	0	5	0
Coats, J. T.	0	7	6
Crichton, Alexander	0	5	0
Duncan, Flockhart Powell and Co.	0	10	6
Finlayson, Thomas	0	5	0
McDougall, R. I.	0	5	0
Mair, Alexander	0	5	0
Lenton.			
Wilson, Thomas	0	5	0

Lenzie (N.B.).	£	s.	d.
Pettigrew, J. W.	0	4	0
Leominster.			
Ellwood, M. J.	0	10	6
Sandiland, Robert B.	0	5	0
Lerwick.			
Laing, A. L.	0	5	0
Porteous, Arthur A.	0	2	6
Leven.			
Hogg, A.	0	5	0
Lewes.			
Briscoe, Charles (West Firle)	0	5	0
Head, John T.	0	10	6
Leytonstone.			
Bennett, C.	0	2	6
Matthews, J. H.	0	5	0
Lincoln.			
Battle, Son and Maltby	0	10	6
Elmitt, W.	0	5	0
Houfe, R. W.	0	5	0
Tomlinson, Charles K.	0	10	6
Littleborough.			
Hall, Samuel	0	5	0
Little Chishill.			
Jefferson, Thomas	0	10	6
Littlehampton.			
Longman, J. H.	0	2	6
Smart, C. F.	1	1	0
Liverpool.			
Abraham, Alfred Clay	1	1	0
Abraham, Thomas Fell	1	1	0
Adams, Thomas E.	0	10	6
Adams, T. E., jun.	0	5	0
Albright, Henry	0	10	6
Alexander, John	0	10	6
Allan, James H.	1	1	0
Aris, G. H.	0	2	6
Ayrton and Saunders	0	10	6
Bain, John	0	5	0
Barrett, A. A.	0	5	0
Billington, F.	0	5	0
Blabey, J. J. (Woolton)	1	1	0
Blabey, J. R. (Woolton)	0	5	0
Blundell, John	0	10	6
Brown, Edwin	0	5	0
Brown, Joseph	0	2	6
Buck, Richard C.	0	5	0
Burn, J. R.	0	2	6
Burnet, E. M.	0	5	0
Clay, Dod and Co.	1	1	0
Coley, James	0	5	0
Dickins, B.	0	10	6
Drawbridge, Joseph G.	0	10	6
Drawbridge, T. F.	0	2	6
Ellams, George	0	10	0
Elliott, Robert John	0	10	6
Evans, Sons and Co.	5	5	0
Fergusson, W. and J.	0	10	6
Fleming, Mrs. Agnes	0	5	0
Furniss, Thomas	0	5	0
Hackett, Thomas	0	10	0
Hawood, Charles	0	5	0
Hearnshaw, A. D.	0	2	6
Hocken, Joshua	0	10	6
Hodges, E. G.	0	5	0
Hughes, T. I. J.	0	2	6
Jackson, H.	0	10	6
James, John	0	5	0
Johnson, J. H. and S.	2	2	0
Jordan, J. A.	0	5	0
Kirk, W. P.	0	5	0
Leatham, W. H.	0	10	6
Lee, Samuel W.	1	1	0
Lett, Arthur J.	0	5	0
McGuffie and Co.	1	1	0
Mackinlay, F. J.	2	2	0
Morgan, H. B.	0	10	0
Parkinson, Richard	0	10	6
Partridge, T. S.	0	2	6
Parry, R.	0	5	0
Pheysey, Richard (Waterloo)	0	10	6
Richardson, Richard T.	0	10	6
Ridgway, T. E.	0	5	0
Sawden, Alfred	0	10	6

Liverpool—continued.	£	s.	d.
Sleggs, G. M.	0	5	0
Smith, J. J. (Walton)	0	10	6
Smith, R. G.	0	5	0
Symes, Charles	2	2	0
Thomas, Robert	0	10	6
Thompson, John	1	1	0
Thompson and Capper	1	1	0
Tollitt, W.	0	2	6
Troughton, Christopher	0	10	6
Ward, J. S.	0	5	0
Warhurst, Mrs. A.	2	2	0
Williams, William	0	5	0
Wokes, T. S.	0	5	0
Woodcock, J.	0	10	6
Woodhead, H. C.	0	10	6
Wright, William	0	5	0
Wyatt, H.	0	5	0
Wyatt, H., jun.	0	5	0
Llandilo.			
Hughes, T.	1	1	0
Williams, W. J.	0	2	6
Llandudno.			
Burton, Joseph	1	1	0
Sinclair, Mrs. M. A.	0	10	6
Llanelly.			
Evans, Gwilym	1	1	0
Harry, S. R.	0	5	0
James, M. W.	0	5	0
Jones, J. W.	0	5	0
Wade, J.	0	2	6
Llangollen.			
Jones, Humphrey	0	5	0
Llanidloes.			
Jones, Thomas Pryce	0	2	6
Llanibody.			
Walters, J. L.	0	2	6
Loddon.			
Ellis, T. W.	0	10	6
London.			
Allen, Charles B.	3	3	0
Amoore, Lewis P.	0	10	6
Andrew, C. W.	0	2	6
Andrews, Frederick	0	10	6
Andrews, W.	0	2	6
Applegate, Edwin	0	10	6
Arkinstall, William	1	1	0
Ashfield, A.	0	5	0
Ashford, H. S.	0	5	0
Atkinson, James	0	5	0
Atkinson, L.	1	1	0
Attwood, Henry E.	1	1	0
Aukland, W. H.	0	2	6
Austen, C. W.	0	2	6
Austin, Henry Felix	1	1	0
Bacon, Henry J.	0	2	6
Baily, J.	0	10	6
Baines, Wm. H.	0	10	6
Baker, Alfred P.	0	10	6
Ball, —	0	1	0
Ball, The Chemists', per Mr. H. A. Thomas	27	1	6
Banbury, Richard	0	5	0
Barnard, A. P.	0	5	0
Barnes, James Benjamin	1	1	0
Barnes, James Burden	0	5	0
Barret, Edward Louis	1	1	0
Barry, Frederic	0	5	0
Bartlett, G. F. H.	0	5	0
Bartley, George A.	0	10	6
Bascombe, Frederick	0	10	6
Bate, Henry	1	1	0
Bateman, T. H.	1	1	0
Beasley, Frederick	0	5	0
Beddard, John	1	1	0
Bedford, C.	0	10	6
Bell, Matthew W.	1	1	0
Bell, William H.	1	1	0
Bennett, George	0	5	0
Bennett, Thomas	0	5	0
Bessell, J. W.	0	5	0
Best, James	0	10	6
Bevan, William	0	10	0
Bigg, Thomas	1	1	0
Bignall, R.	0	10	6
Bindloss, G. F.	0	10	6
Bingley, Richard	0	10	6

London—continued.	£	s.	d.
Bird, Augustus	2	2	0
Bird, F. C. J.	0	5	0
Bird, G.	1	1	0
Bird, Robert	0	10	6
Birkett, W. J.	0	2	6
Bishop, W. M.	0	2	6
Blake, Charles A.	1	1	0
Bland, John	0	10	6
Blewett, E.	0	2	6
Blyth, Utton	0	5	0
Boothby, H. N.	0	5	0
Botterill, W.	0	5	0
Bourdas, Isaiah	1	1	0
Bourdas, I., jun.	0	10	6
Bowdler, E. H.	0	5	0
Bowen, F. T.	0	5	0
Bowen, John T	0	10	6
Bowen, John W.	1	1	0
Bowles, W. J.	0	10	6
Brand and Co.	1	1	0
Branford, A. J.	0	5	0
Bridges, C. W.	0	10	6
Brodribb, J. B.	0	10	6
Brookes, F.	0	1	0
Brookes, Samuel	0	10	6
Brooks, J.	0	2	6
Broumpton, F. R.	0	2	6
Brown, Alfred James	0	10	6
Brown, Edgar M.	0	2	6
Brown, J.	0	2	6
Bull, E. John	0	5	0
Bullock, J. Lloyd and Co.	2	2	0
Bunker, C. J. G.	0	2	6
Bunker, James	0	2	6
Burden, C. H. B.	0	5	0
Burgoyne, Burbidges, Cyriax and Farries	2	2	0
Burleigh, W. M.	0	5	0
Burn, Henry	0	5	0
Burton, Percy H.	0	5	0
Bush, Arthur	0	5	0
Butt, Edward Northway	10	10	0
Butterworth, John	0	10	6
Cadman, Daniel C.	1	1	0
Cammack, J. F. J.	0	5	0
Campbell, E. K.	0	5	0
Carteighe, Michael	1	1	0
Carter, Thomas	0	2	6
Caseley, Thomas	0	5	0
Casewell, J. P.	0	5	0
Cawdell, George	0	10	6
Chapman, Joseph J.	0	10	6
Charity, William	0	10	6
Chaston, A. E.	0	5	0
Chemist and Druggist (Proprietors of)	5	5	0
Churchill, J. and A.	1	1	0
Churchyard, R. L.	0	5	0
Clapp, Edward F.	0	10	6
Clark, A. T. S.	0	5	0
Clark, J. A.	0	10	6
Clarke, F.	1	1	0
Clarke, W. L.	0	5	0
Clifford, T. A.	0	2	6
Cocker, R. B.	0	2	6
Colchester, William M.	0	5	0
Cole, A. C.	1	1	0
Coleman, J.	0	5	0
Coles, J.	0	10	6
Coles, J. W.	0	10	6
Collett, Chas. B.	0	5	0
Collier, Henry	0	10	6
Constance, Edward	0	10	6
Constance, Herbert E.	0	10	6
Constance, Sidney W.	1	1	0
Cooper, Albert	1	1	0
Cooper, Henry	0	10	6
Cooper, H. H.	1	1	0
Cooper, Wm. Henry	0	10	6
Cooper, William Temple	0	10	6
Corbyn, Stacey and Co.	1	1	0
Cory, H. and Co.	10	10	0
Cory, James T. H.	0	10	6
Cosway, Edwin C.	1	1	0
Cottrill, John W.	0	10	6
Coulson, Thomas	0	2	6
Cox, F. H.	0	2	6
Cracknell, Herbert	1	1	0
Cresswell, Frederick	0	10	6
Crosby, John	0	2	6
Crow, E. L.	0	10	6
Crowden, S. G.	0	10	6
Cryer, Henry	0	5	0
Cugnoni, A. H. D.	0	5	0
Cullen, Harry H.	0	5	0
Curtis and Co.	1	1	0
Dampney, Richard S.	0	10	6

London—continued.	£	s.	d.
Darby and Gosden	2	2	0
Dart, W.	0	2	6
Davenport, Horace	2	2	0
Davenport, J. T.	2	2	0
Davidson, P.	1	1	0
Davies, H.	0	5	0
Davies, Llewelyn	0	2	6
Davies, Robert H.	1	1	0
Davis, H. S. E.	0	10	6
Davy, Yates and Routledge	2	2	0
Dean, S.	0	5	0
De Peare, John Thomas	0	5	0
Dewar, Mrs. Mary Ann	0	10	6
Dinneford and Co.	2	2	0
Dixon, Herbert	0	5	0
Dodd, W. R.	0	10	6
Dolling, A.	0	5	0
Doulton and Co.	1	1	0
Drury, Sydney	0	5	0
Duncan, S. D.	2	2	0
Dymond, T. S.	0	5	0
Dymott, Francis	0	5	0
Dyson, William B.	1	1	0
Eade, George	0	10	6
Eade, James	0	10	6
Edwards, Charles	1	1	0
Edwards, James	0	5	0
Edwards, William Staples	0	5	0
Egg, G. F.	0	10	6
Ellerington, J. P.	0	5	0
Elliott, W.	0	5	0
Ellwood, T. A.	0	5	0
Elvey, Mrs. M. A.	1	1	0
Emsley, J.	0	5	0
Emson, William N.	0	5	0
Epps, James	1	1	0
Evans, Lescher and Webb	1	1	0
Evershed, G. S.	0	5	0
Farmer, C. A.	5	5	0
,, (donation)	10	10	0
Fawssett, T.	0	5	0
Fentiman, C. H.	0	2	6
Fisher, G. R.	0	5	0
Fitch, Robert Owen	0	10	6
Flinders, T.	0	1	0
Foot, F. J.	0	2	6
Fox, C. E.	1	1	0
Fox, W. R.	1	1	0
Fowler, G.	0	5	0
Francis, George Baggett	1	1	0
Francis, G. Bult	1	1	0
Francis, Matthew R.	0	10	6
Francis, W. H.	0	10	6
Freeman, Frank	0	5	0
Frith, E. J.	0	5	0
Froom, William Henry	1	1	0
Frost, John H.	0	5	0
Frost, W. T.	0	10	6
Fryer, C. H.	0	10	6
Fuge, H. D.	0	5	0
Gadd, Robert	0	10	6
Gale, Samuel	1	1	0
Garman, C. E.	0	5	0
Garner, James	0	10	6
Garner, Thomas	0	5	0
Garnham, A. W.	0	5	0
Gaskin, J. H.	0	2	6
Gater, J.	0	5	0
Gerrard, A. W.	1	1	0
Gilbart, S. F.	0	2	6
Glew, F. H.	0	5	0
Goddard, G. E.	0	5	0
Godfrey and Cooke	1	1	0
Godfrey, H. E.	0	5	0
Godolphin, G. F. A.	0	5	0
Goff, Richard	0	5	0
Goldby, F.	0	5	0
Golding, J. F.	1	1	0
Goodall, W. A.	0	5	0
Goodchild, Alfred C.	0	5	0
Goodman, F. W.	0	5	0
Goodwin, John	1	1	0
Gordelier, F. H.	0	10	6
Gorton and Sons	0	10	6
Gould, J.	1	1	0
Gradidge, James H.	0	10	6
Graham, Henry	0	5	0
Granger, Edwin John	1	1	0
Greaves, J. E.	0	10	6
Green, Samuel	0	5	0
Green, W. J.	0	10	6
Greenish, H. G.	0	10	6
Greenish, Thomas	1	1	0
Greenish, T. Edward	0	10	6
Greig, W.	0	2	6
Griffiths, T.	0	2	6
Gristock and Co.	1	1	0
Gudgen, Frederick G.	1	1	0
Gulliver, William	1	1	0
Gulliver, W. F.	0	5	0
Haden, W. E.	0	5	0
Hairsine, H. S.	1	1	0
Hale, G.	1	1	0
Hall, A. W.	0	10	6
Hall, Ralph	1	1	0
Hampson, Robert	1	1	0
Hanbury, Cornelius	1	1	0
Hardy, Samuel C.	1	1	0
Harley, E. T.	1	1	0
Harris, Frank William	0	5	0
Hart, A.	0	5	0
Hart, J. C.	0	5	0
Hart, Thomas	0	5	0
Hartridge, J. H.	0	5	0
Harvey, John William	0	2	6
Harvey, William	0	10	6
Hatfield, George B.	0	10	6
Hatfield, George W.	0	10	6
Haward, G. R.	1	1	0
Hawkins, Thomas	0	10	6
Haycraft, H.	1	1	0
Hearn, John	0	5	0
Heath, F. D.	0	5	0
Heathcoat, T.	0	1	0
Hebbeler, K.	0	10	6
Henty, Henry Martin	0	5	0
Herbert, William	0	5	0
Hern, W. H.	0	5	0
Hewlett, J. C.	1	1	0
Hick, John	0	5	0
Hickey, Evan Lewis	0	10	6
Hickman, William	0	10	6
Hicks, Alexander D.	0	3	8
Higgins, James	0	10	6
Hill, Arthur B.	1	1	0
Hill, Arthur S.	2	2	0
Hill, William	0	5	0
Hillen, John	0	10	6
Hills, Walter	2	2	0
Hodgkinson, George A.	0	10	6
Hodgkinson (Thomas), Prestons and King	2	2	0
Hodgkinson, Treacher and Clarke	2	2	0
Hodsoll, Thomas W. H.	1	1	0
Hogg, E. G.	0	10	6
Hogg, Robert	0	10	6
Hogwood, E.	1	1	0
Holding, J.	0	5	0
Holford, T. Constantine	0	10	6
Holl, Edmund	0	5	0
Holloway, J.	0	2	6
Holmes, A. J.	0	10	6
Holmes, Walter M.	1	1	0
Holroyd, A.	0	2	6
Hopkin and Williams	2	2	0
Hopkin, William King	2	2	0
Horne, John	0	5	0
Horsley, T. W.	0	5	0
Horton, H. W.	0	2	6
Howell, Maurice	0	10	6
Howlett, Samuel	1	1	0
Howse, W. F.	0	5	0
Hucklebridge, P. and W.	1	1	0
Hudson, T. F.	0	5	0
Hughes, Evan	0	10	6
Hugill, John	1	1	0
Hugill, John H.	1	1	0
Humble, J. B.	0	5	0
Humphreys, N. C. and G. R.	0	10	6
Humphreys, Richard	0	10	6
Hunt, Charles	1	1	0
Hunt, H. G.	0	10	6
Huskisson, Henry Owen	1	1	0
Hyne, Harry	0	10	0
Hyslop, John Cahill	1	1	0
Icke, Henry S.	0	10	6
Idris and Co.	2	2	0
Ince, Joseph	1	1	0
Ingram and Royle	1	1	0
Islip, C. C.	0	5	0
Ive, William	1	1	0
,, (donation)	5	5	0
Jacks, D. R.	0	5	0
Jackson, Christopher	0	10	6
Jakson, John and Co.	0	10	6
Jarvis, John S.	0	10	6
James, J.	0	0	6
Jenkins, Henry	1	1	0
Jenkins, Thomas	0	10	6
Jewell, J. E.	0	5	0
Johnson, L.	0	2	6
Johnson and Sons	1	1	0
Johnston, W.	0	2	6
Jones, Henry Stevens	0	5	0
Jones, J.	0	5	0
Jones, John H.	0	10	6
Jones, L.	0	5	0
Jones, M. H.	0	1	0
Jones, T. P.	0	10	6
Jones, W.	0	5	0
Jones, W. A.	0	2	6
Jones, William	0	10	6
Jones, William	0	5	0
Josling, A.	0	2	6
Jozeau, G.	1	1	0
Keer, Isabella S. Clarke	0	10	6
Keer, Thomas H.	0	10	6
Kent, E.	0	10	6
Kent, Thomas Ramsey	0	10	6
Kerr, T.	0	5	0
King, Henry	0	10	0
King, J. H.	0	5	0
Kingan, D.	0	10	6
Kingsford, Frederick	1	1	0
Kirk, Snowden	0	10	6
Kitchin, J.	0	5	0
Knight, G.	0	0	6
Laing, J. S.	1	1	0
Langley, Frank C.	0	5	0
Lapthorn, G.	0	10	6
Laws, John	0	10	6
Layng, R. C.	0	5	0
Leake, Thomas W.	0	10	6
Legg, H. A.	0	10	6
Lescher, Joseph S.	1	1	0
Lewinton, Alexander B.	1	1	0
Lewis, D. J.	0	5	0
Lewis, T.	0	2	6
Lidwell, J. E.	0	10	6
Littlejohn, A.	0	5	0
Llewhelin, Ivor V.	0	2	6
Lloyd, Isaac T.	0	5	0
Lockyer, J. E.	0	2	6
Long, Henry	1	1	0
Long, S. G. H.	0	2	6
Lowe, William E.	2	2	0
Luxmoore, C. M.	0	10	6
Lyon, James	0	10	6
McDiarmid, F.	0	10	6
Macdonald, Alexander	0	10	6
McDougall, James	0	2	6
MacEwan, Peter	0	10	6
MacGeorge, William	0	11	6
MacKaness, C.	0	2	6
McKnight, J.	0	5	0
Maitland, P. C.	0	10	6
Maizey, E.	0	10	6
Marks (Henry) and Sons	1	1	0
Marsh, E. R.	0	10	6
Marsh, W. H.	0	5	0
Marston, John Thomas	0	10	6
Marten, Frederic	0	5	0
Martin, T. C. W.	0	10	6
Martin, W. L.	0	5	0
Martindale, William	1	1	0
Mason, H. H.	0	2	6
Mathews, Henry	1	1	0
Mathews, J. H.	1	1	0
Matterson, J. K.	1	1	0
Matthews, C. W.	1	1	0
Matthews, E. S.	0	10	6
Matthias, J. J.	1	1	0
Maw, Charles	1	1	0
Maw, C. Trentham	1	1	0
Maw, Son and Thompson	2	2	0
Maxwell, P. H.	0	10	6
May, Roberts and Co.	0	5	0
Meggeson and Co.	1	1	0
Michie, Charles C.	0	5	0
Miles, C. J.	0	10	6
Miller, W. P. F.	0	5	0
Minshull, Flora	0	5	0
Minshull, Rose C.	1	1	0
Moore, J.	0	5	0
Moore, L. F.	0	2	6
Morrell Brothers, F. and C.	0	5	0
Morrell, Thomas	0	5	0
Morris, C. G.	0	10	6
Moss, John and Co.	1	1	0
Mundy, Alfred O.	0	10	6
Mutch, John Pratt	0	5	0
Myers, William	0	10	6
Naylor, W. A. H.	0	10	6
Neale, J.	0	5	0
Neame, A. J.	0	5	0
Nettle, W. R. P.	0	5	0
Newton, T. A. C.	1	1	0
Newzam, Henry Samuel	0	10	6

London—continued.	£	s.	d.
Nicholson, Thomas T.	0	5	0
Nind, George	1	11	6
Ninnis, T. M.	0	5	0
Ord, Septimus W.	0	5	0
Page, R. S.	0	5	0
Parker, C.	0	2	6
Parker, F. P.	0	10	6
Parker, Robert Henry	1	1	0
Parker, W. H.	0	10	6
Parkes, G. J. R.	0	5	0
Parkes, J. P.	1	1	0
Parkinson and Son	1	1	0
Parrott, Joseph	0	10	6
Parry, C. D.	0	5	0
Pasco, G. S.	0	2	6
Pasmore, W. F.	0	10	0
Passingham, G. W.	0	10	6
Patey, W. J.	0	7	6
Pattison, George	1	1	0
Pattison, S.	0	5	0
Peacock, George	0	5	0
Peat, Joseph	0	5	0
Peel, Alfred	0	10	6
Pellew, A.	0	10	6
Penrose, A. W.	1	1	0
Peters, D.	0	5	0
Pettinger, Elmer	0	5	0
Pharmacy Club (per Richard Bremridge, Hon. Sec.)	5	5	0
Phillips, A. J.	0	5	0
Phillips, A. W.	0	5	0
Philpott, F. W.	0	5	0
Pickard, William	2	2	0
Pinchen, W. J.	0	10	6
Pinyon, William	0	10	6
Plaister, W. J.	1	1	0
Pond, B. C.	0	5	0
Ponting, F. H.	0	5	0
Portway, A. C.	0	5	0
Portway, J. B.	0	10	6
Potts, Robert A.	1	1	0
Poulson, E.	1	1	0
Pound, H. W.	0	10	6
Powell and Sons	1	1	0
Powell, T. H.	0	10	6
Preston, Richard	0	10	6
Pretty, Charles	0	5	0
Price, J. T.	0	2	6
Price, Robert John	0	5	0
Prichard, Edward	1	1	0
Procter, R.	0	5	0
Puckey, W.	0	10	6
Radermacher, C. J.	0	10	6
Rae, A. D.	1	1	0
Reece, T.	0	10	6
Reed, Charles W.	0	10	6
Rees-Williams, J. J.	0	5	0
Reynolds, R. J.	1	1	0
Richardson, John	0	5	0
Rigden, George	0	5	0
Roach, H. W.	1	1	0
Roach, Pope	1	1	6
Roberts, Mrs. J.	0	1	0
Robertson, George	0	10	0
Robeson, C. B.	0	5	0
Robinson, J.	0	5	0
Robinson, R. A.	0	10	6
Robinson, William P.	0	10	6
Rouse, F. W.	0	10	0
Rowland, E. E.	0	10	6
Rowntree, Thomas	0	10	6
Rundle, C.	0	5	0
Rutter, John	0	10	0
Sadler, William	0	10	6
Sadler, William, jun.	0	10	6
Sainsbury, S.	1	1	0
Salter, F. S.	0	2	6
Salter, W. A.	0	5	0
Sandford, Geo. W.	2	2	0
Sandy, Frederick William	0	10	6
Sanford, H. R.	0	5	0
Sanger and Sons	2	2	0
Sangster, Arthur	1	1	0
Saul, J. E.	1	1	0
Saunders, C.	0	10	6
Saunders, T.	1	1	0
Savory and Moore	3	3	0
Sayers, W. C.	0	10	6
Scoley, Thomas E.	0	10	6
Sedcole, J. W.	0	10	6
Seldon, R.	0	2	6
Sell, W. H.	0	10	6
Sewell, T. A. W.	0	5	0
Sharman, Wm.	0	10	6
Shaw, E. H.	0	2	6
Shaw, J. W.	0	10	6
Shephard, Thomas F.	0	10	6
Shepley, Frederick Thos.	0	5	0
Sherburn, Thomas	0	10	0
Sherwood, N.	0	10	6
Shields, R. H.	0	5	6
Shirley, S. S.	1	1	0
Shone, O. E.	0	5	0
Sibthorp, S. J. K.	0	2	6
Silverlock, Henry	5	5	0
Silvers, Francis T.	0	10	6
Simnett, T.	0	1	0
Slack, Josiah W.	0	10	6
Slator, Henry	0	5	0
Smart, W.	0	10	6
Smith, Fuller	0	10	6
Smith, Harry J.	0	5	0
Smith, James W.	0	7	6
Smith, John Ord	1	1	0
Smith, Percy John	1	1	0
Smith, William	0	10	6
Smith, William	0	10	6
Smith, William Frederick	1	1	0
Smith, William L.	0	10	6
Smithers, F. D.	2	2	0
Snow, G. F.	0	2	6
Sowden, J.	0	2	6
Spurling, W.	0	10	6
Spyer, Newton	0	10	6
Squire and Sons	3	3	0
Stacey, Samuel Lloyd	1	1	0
Stamp, Edward B.	0	10	6
Stansfield, Richard	0	5	0
Stark, A. C.	0	5	0
Starkie, Richard S.	1	1	0
Starling, H. W.	0	2	6
Steer, W. F.	0	1	0
Stenson, Joseph	0	5	0
Stephens, Henry I.	0	5	0
Stickland, W. H.	1	1	0
Stoneham, Philip	0	10	6
Storey, E. H.	1	1	0
Stratton, William	0	2	6
Streater, James H.	0	10	6
Street, A. E.	0	2	6
Strongitharm, W. G.	0	5	0
Strother, C. J.	18	1	0
Style, J. W.	0	10	6
Sugden, W. A.	0	10	6
Summers, James R.	0	10	6
Swain, James	0	5	0
Symons, William H.	1	1	0
Taplin, J. W.	0	10	6
Taplin, William Gilbert	1	1	0
Taubman, Robert	0	10	6
Taylor, Edward	0	2	6
Taylor, George S.	1	1	0
Taylor, Horatio	0	10	6
Taylor, John	0	10	6
Taylor, Peter	0	5	0
Taylor, W. (Woolwich)	0	2	6
Tebbutt, Edwin	1	1	0
Tennent, A.	0	5	0
Thatcher, R.	0	2	6
Thomas, H.	1	1	0
Thomas, Harry A.	1	1	0
Thomas, R.	0	10	0
Thompson, Arthur S.	0	5	0
Thompson, Henry	0	10	6
Thompson, Henry Ayscough	1	1	0
Thompson, John	1	1	0
Thompson, R. W.	0	5	0
Thorn, John James	1	1	0
Thornton, L. B.	0	5	0
Thrower, E. A.	0	2	6
Tijou, Tom	0	2	6
Tingle, Miss Ellen	0	5	0
Tomlinson, Thomas	1	1	0
Tompsett, Leighton S.	0	5	0
Trick, William B.	0	10	6
Troke, Charles	1	1	0
Trotman, Alfred C.	0	10	6
Truman, F. W.	1	10	6
Truman, H. V.	0	10	6
Tudor, W.	0	2	6
Tugwell, Ernest H.	0	10	6
Tugwell, William H.	0	10	6
Turner, Charles E.	0	10	6
Turner, Edward A.	1	1	0
Turner, Thomas	0	5	0
Tustin, Chas. D.	10	10	0
Tyrer, Peter	0	10	6
Vaughan, J.	0	2	6
Vialls, J. B.	1	1	0
Vincent, P.	2	2	0
Walker, Byatt A.	0	5	0
Walker, Charles	0	5	0
Walker, C. J.	0	10	6
Wallbridge, H. A.	0	5	0
Wallis, John T. W.	0	10	6
Wallis, Owen	0	10	6
Walton, F. M.	0	5	6
Want, W. P.	0	5	0
Waring, A. W.	0	5	0
Warren, F. W.	0	10	0
Warren, William	0	10	6
Warrick Brothers	1	1	0
Wastie, Francis	1	1	0
Watson, A. J.	0	10	6
Watson, William	0	10	6
Watts, Edward	0	5	0
Wavell, Edward	1	1	0
Wegg, W. N.	0	5	0
Wells, Thomas	0	5	0
Wells, W.	0	5	0
West, Charles	0	10	6
Weston, Samuel John	1	1	0
Westrup, Joseph B.	0	10	6
Whiffen, Thomas	5	5	0
Whigham, Robert L.	0	5	0
White, Charles	1	1	0
Widgery, John	0	5	0
Wiggins, Henry	0	10	6
Wigginton, Alfred	0	10	6
Wilkinson, Benjamin John	0	10	6
Will, William W.	0	5	0
Williams, Alfred	0	5	0
Williams, Henry	2	2	0
Williams, Hugh	0	5	0
Williams, J.	0	5	0
Williams, J. W.	1	1	0
Williams, T. H.	0	10	6
Williams, T. R.	0	5	0
Williams, Stephen	0	5	0
Williamson, J. C.	0	5	0
Willows, Francis and Butler	3	3	0
Wilson, James	1	1	0
Wilson, John	0	5	0
Wilson, Joseph	0	5	0
Wilson, J. F.	0	2	6
Wilson, Thomas W.	0	10	6
Wing, A. J.	0	5	0
Wink, J. A.	1	1	0
Wisken, Robert	0	5	0
Wodderspoon and Co.	1	1	0
Wood, Jacob	1	1	0
Wood, W.	0	2	6
Woodland, John	1	1	0
Woollings, Frank	0	2	6
Wooster, J. R.	1	1	0
Wootton, Alfred C.	2	2	0
Worsley, A. G.	0	5	0
Wretts, J. R.	1	1	0
Wright, Layman and Umney	2	2	0
Wyatt, Francis J.	0	10	6
Wybrant, A.	0	5	0
Wylde, George	0	10	6
Yates, Robert	1	1	0
Yeatman, F. J.	0	2	6
Young, George	0	5	0

Long Bennington.

Bemrose, John	0	10	6
Drabble, T. L.	0	5	0

Long Eaton.

White, J. T.	0	5	0

Longton.

Hemming, G. T.	0	5	0
Prince, Arthur G.	0	10	0

Looe (Cornwall).

Poad, John	0	2	6

Lossiemouth.

Bremner, James	0	5	0

Lostwithiel.

Cuthbertson, T.	0	5	0

Loughborough.

Baldwin, G. J.	0	2	6
Jones, C.	0	2	6
Scrase, Richard	0	5	0

Loughton.

Harrison, J.	0	5	0

Louth.

Moody, S. W.	0	5	0
Street, W. C.	0	2	6

Lowestoft.	£	s.	d.
Chaston, Anna Maria	0	10	6
Denny, J. H. (donation)	5	5	0
Hornby, Alfred	0	10	6
Moverley, Robert	0	10	6
Scott, J. H.	0	7	6
Ludlow.			
Marston, Alfred	0	5	0
Nickson, James	0	5	0
Smith, F. W.	0	2	6
Woodhouse, George	0	5	0
Luton.			
Chantler, R. P.	0	5	0
Duberly, G. S.	0	5	0
Webb, John H.	0	5	0
Lutterworth.			
Brown, Thomas	0	10	6
Lyme Regis.			
Henley, George	0	5	0
Lymington.			
Allen, Adam U.	0	5	0
Badcock, Henry	0	5	0
Lymm.			
Henshall, James	0	5	0
Lytham.			
Gourlay, H. H.	0	2	6
Macclesfield.			
Cooper, Thomas	0	5	0
Leach, I.	0	2	6
Wright, J.	0	10	6
Macduff.			
McMurtrie, John	0	5	0
Machynlleth.			
Rees, E.	0	5	0
Maidenhead.			
Barry, Thomas S.	0	10	6
Cottingham, Joseph J.	0	5	0
Walton, Ralph	0	10	6
Maidstone.			
Anning, A.	0	5	0
Chesterfield, T. M.	0	5	0
Corfe, Alfred	0	5	0
Rogers, William	0	5	0
Simpson, John W. G.	0	10	6
Stonham, Thomas G.	0	10	6
Maldon (Essex).			
Crick, George E.	0	10	6
Elsey, Charles	0	5	0
Heaver, A. W.	0	5	0
Malton (Yorks).			
Buckle, James	0	5	0
Harrison, William	0	10	6
Laverack, W. H.	0	5	0
Malvern.			
Austin, A.	0	10	6
Coldwell, David B.	0	10	6
Fox, T.	0	5	0
Need, J.	0	10	6
Malvern Wells.			
Clark, Edward J.	0	5	0
Wakefield, Cecil H.	1	1	0
Manchester.			
Adamson, W. S.	0	2	6
Arrandale, J. S.	0	2	6
Atkin, Mrs.	0	5	0
Balmforth, A.	1	1	0
Barford, H. W.	0	5	0
Bates, Frederic W.	0	5	0
Bayliss, T. G.	0	2	6
Beard, J.	1	0	0
Bell, P. C.	0	2	6
Bell, James	0	5	0
Bell, Joseph	0	5	0
Benger, F. Baden	1	1	0
Bentley, J.	0	2	6
Beresford, J.	0	2	6
Bew, John	1	1	0

Manchester—continued.	£	s.	d.
Billington, John	0	2	6
Blain, Alfred L.	0	5	0
Blyton, John	0	10	6
Boor, Frederick	0	10	6
Booth, William G.	0	10	6
Botham, G.	0	2	6
Botham, G. W.	0	2	6
Bower, C.	0	5	0
Bower, H.	0	10	6
Bransby, C. K.	0	2	6
Breadner, C. G.	0	5	0
Brooks, Joseph	1	1	0
Broughton, Thomas	0	2	6
Burman, T.	0	10	6
Burtles, R.	0	2	6
Bushby, Thomas	0	5	0
Butterworth, W. S.	0	2	6
Carter, A. D.	0	2	6
Carter, William	0	10	6
Clayton, G.	0	5	0
Coulding, J. J.	0	2	6
Cowpe, M.	0	2	6
Dale, John	0	5	0
Darling, William	1	1	0
Dawson, Robert D.	0	5	0
Edlin, Dr. H.	0	2	6
Edwards, G.	0	5	0
Fawcitt, T. C.	0	5	0
Gardner, E. J. F.	0	5	0
Gavin, J.	0	5	0
Gavin, Thomas	0	10	6
Gibbons, Thomas G.	1	1	0
Gibbons, Walter	0	10	6
Gibson, Robert	1	1	0
Gourlay, R. G.	0	2	6
Hall, Henry Stacey	0	5	0
Hallawell, J. L.	0	2	6
Hardicker, J.	0	2	6
Harding, E.	0	5	0
Hargreave, S.	0	2	6
Harrop, J. H.	0	5	0
Hart, James	1	1	0
Hastings, W.	0	5	0
Hayes, T.	0	2	6
Hedley, J.	0	2	6
Hilditch, Thomas	0	5	0
Holt, H. C.	0	2	0
Holt, John	0	5	6
Hope, J.	0	5	0
Howarth, Mrs.	0	10	6
Hughes, Evan G.	0	10	6
Hughes, T. W.	0	2	6
Inglis, H.	0	5	0
Jackson, George	1	1	0
Jackson, Thomas	0	10	6
Jeans, Alfred	0	5	0
Jeans, E.	0	5	0
Johnstone, E. S.	0	5	0
Jones, Rev. G. B.	0	5	0
Jones, John J.	0	2	6
Jones, Joseph	0	2	6
Kemp, Harry	0	5	0
Lane, William	0	10	6
Lawrence, J.	0	10	6
Lee, B.	0	10	6
Leech, Robert	0	5	0
Lowry, J.	0	10	6
McCormick, F. H.	0	5	0
Makin, G.	0	5	0
Marsden, Thomas B. (Withington)	0	10	6
Marsden, W.	0	5	0
Massey, J.	0	2	6
Metcalfe, W. E.	0	2	6
Middleton, C.	0	2	6
Moreland, E.	0	5	0
Morris, J. L.	0	5	0
Mundey, H.	0	5	0
Nall, T.	0	2	6
Nuttall, R. H.	1	1	0
Ogden, A.	0	2	6
Oliver, A.	0	2	6
Paine, Standen	1	1	0
Pickup, Robert L.	0	10	6
Pidd, Arthur J.	0	10	6
Pigot, Samuel	0	2	6
Pratt, G. W.	0	5	0
Redhead, J.	0	2	6
Reid, Rev. W.	0	2	6
Riding, J.	0	2	6
Ritchie, T.	0	2	6
Ritson, J.	0	2	6
Rhodes, J.	0	2	6
Roberts, J.	0	2	6
Roberts, W. R.	0	5	0
Royle, Peter	0	2	6
Sanders, E.	0	2	6

Manchester—continued.	£	s.	d.
Sanderson, G. C.	0	12	6
Scaife, Samuel	0	10	6
Siddall, J.	1	1	0
Siddall, J., jun.	0	2	6
Singleton, W.	0	5	0
Smith, A.	0	2	6
Smith, E.	0	5	0
Smylie, J.	0	5	0
Spilsbury, J.	0	5	0
Standring and Co.	1	1	0
Stones, W.	1	1	0
Stratford, A. J.	0	2	6
Sumner, John	0	2	6
Sutcliffe, C. H.	0	5	0
Swinn, Charles	1	1	0
Taylor, J. J.	0	5	0
Teasdale, C.	0	10	6
Terry, Thomas (Withington)	0	5	0
Thompson, H.	0	2	6
Towle, S.	0	5	0
Towles, Rev. R. E.	0	2	6
Tucker, C. H.	0	5	0
Tunaley, T.	0	2	6
Turner, C.	0	10	6
Turner, W. S.	0	10	6
Twemlow, Richard	0	10	6
Vallance, A. C.	0	5	0
Walton, D.	0	2	6
West, Thomas	0	5	0
Westmacott, George H.	0	10	6
Wheeldon, James	0	10	0
Whitaker, T.	0	5	0
Wild, John	0	5	0
Wilkinson, George	0	5	0
Wilkinson, William	0	10	6
Williams, J. B.	0	15	6
Woolley, Sons and Co.	5	5	0
Wright and Barnaby	1	1	0
Wyche, de la, C.	0	2	6
Yates, Ebenezer	0	5	0
Mansfield.			
Adams, Benjamin	1	1	0
March.			
Vawser, Jesse	0	5	0
Margate.			
Harvey, William S.	0	10	6
Pettman, R.	0	10	6
Market Drayton.			
Cooke, William	0	5	0
James, W. M.	0	5	0
King, William George	1	1	0
Market Harborough.			
Adams, H. G.	0	5	0
Bragg, W. B.	0	5	0
Maynard, H. R.	0	10	6
Market Weighton.			
Marshall, J. J.	0	5	0
Marton (New Zealand).			
Wilton, M. H.	1	1	0
Maryport.			
Cockton, John	0	5	0
Masham (Yorks).			
Barker, Mathew M.	1	1	0
Mayfield.			
White, Edward A.	0	5	0
Melbourne (Victoria).			
Woolnough, H. A.	0	10	6
Melton Mowbray.			
Attenburrow, Jas.	0	5	0
Gill, Josiah	0	5	0
Wing, G. N.	0	5	0
Menton (France).			
Gilson, C. B.	0	5	0
Middlesborough.			
Hume, William A.	0	10	0
Taylor, H. H.	0	5	0
Taylor, William R.	0	5	0
Minchinhampton.			
Simpkins, John	0	10	6

Middlewich.	£	s.	d.
Holland, H.	0	5	0
Millom.			
Roberts, John L.	0	2	6
Mirfield (Yorks).			
Crook, Charles	0	5	0
Monmouth.			
Marsh, G. W. F.	0	10	6
Montrose.			
Davidson, A.	0	5	0
Morecambe.			
Birkett, J.	0	5	0
Fell, J. J.	0	5	0
Morpeth.			
Davidson, T. R.	0	5	0
Schofield, F. E.	0	5	0
Morthoe.			
Compton, A.	0	10	6
Motherwell.			
Scott, R. A.	0	2	6
Mussoorie (India).			
Samuel, James B. and Edward	1	1	0
Naples.			
Thomas, J.	0	3	0
Nantwich.			
Manley, Henry (Aston)	0	2	6
Neath.			
Isaac, J. G.	0	5	0
Nelson.			
Collins, M. A.	0	5	0
Newark.			
Bennett, William	0	5	0
Cherrington, G. W.	0	5	0
Cooling, W. J.	0	10	6
Foster, H. P.	0	5	0
March, William	0	5	0
Taylor, J. and Son	0	10	6
New Barnet.			
Williams, W.	0	10	6
Young, Robert Fisher	0	10	0
New Brighton.			
Walker, Joseph	0	5	0
Newbury.			
Davis, Henry J.	0	5	0
Hickman and Metcalf	0	10	0
Pratt, Thomas H.	0	10	6
Newcastle-on-Tyne.			
Arnison, W. S.	0	5	0
Arrowsmith, L.	0	2	6
Bolan, John	0	10	6
Cantrill, W. W.	0	5	0
Coxon, I. B.	0	2	6
Dean, E.	0	2	6
Forster, J. R.	0	5	0
Frater, G.	0	10	6
Ismay and Sons	0	10	6
Marley, William	0	10	6
Martin, J.	0	5	0
Martin, N. H.	1	1	0
Owen, William	0	10	6
Park, F.	0	10	6
Proctor, Son and Clague	1	1	0
Proctor, William	0	5	0
Rheeder, T.	0	5	0
Richardson, Alexander	0	5	0
Richardson, G.	0	10	6
Scott, J.	0	5	0
Selby, T. J.	0	5	0
Smith, G. F.	0	2	6
Spargo, H.	0	10	6
Stuart, Charles E.	0	10	6
Swan, J. W.	1	1	0
Ward, Benjamin	0	5	0
Weddell, G.	0	10	6
Wilkinson and Simpson	1	1	0

Newcastle (Staffs.).	£	s.	d.
Gould, J.	0	5	0
Heathcote, Thomas S.	0	10	6
Oxen, D. H.	0	5	0
Poole and Son	0	10	6
Newhaven (N.B.).			
Anderson, J. G.	0	2	6
Miller, Alexander S.	0	2	6
Newhaven (Sussex).			
Granger, Harold	0	5	0
Newmarket.			
Barrow, Frank A.	1	1	0
Rogers and Co.	0	10	6
Newport (Isle of Wight).			
Millidge, Alfred	0	5	0
Shepperd, William J.	0	5	0
Newport (Mon.).			
Atkins, A. E.	0	5	0
Evans, David	0	5	0
Garrett, T. P.	0	5	0
Lewis, T.	0	2	6
Paine, Charles	0	10	6
Phillips, James W.	0	5	0
Seys, James A.	0	5	0
Smith, Albert	0	5	0
Williams, A. G.	0	5	0
Williams, Rev. Moses	0	5	0
Young, John	0	10	6
Newport Pagnell.			
Taylor, F. W.	0	5	0
Newton Abbot.			
Stiling, John E.	0	10	6
Wright, W.	0	5	0
Newtown (Mont.).			
Morgan, Richard	0	10	6
New York (U.S.A.).			
Seabury, G. J. (donation)	21	0	0
Nice (France).			
Ross, C.	0	5	0
Norbiton.			
Greenwood, J.	0	10	0
Northampton.			
Ashford, Evan Charles	0	5	0
Barry, James	1	1	0
Bingley, John	0	10	6
Clower, John	0	5	0
Kirby, Frederick	0	10	6
Mayger, William D.	0	10	6
Negus, Samuel	0	10	0
Negus, J. H.	0	5	0
Sindall, J. W. (Executors of)	0	5	0
Ward, O. T.	0	5	0
Northfleet.			
Lucas, Joseph M. M.	0	5	0
North Walsham.			
Bailey, George Wm.	0	5	0
Northwich.			
Clough, John	0	10	0
Deakin, J. W.	0	5	0
Humphreys, Griffith	0	5	0
Lee, William	0	5	0
Norwich.			
Betts, George	0	10	6
Caley, Albert J.	1	1	0
Corder, Edward	0	10	6
Corder, Octavius	1	1	0
Cossey, John	0	5	0
Dawson, W. T.	0	5	0
De Carle, H. E.	0	5	0
Eldridge, J. H.	0	10	0
Fuller, T. B.	0	10	6
Gardiner, W.	0	5	0
Hayhoe, W.	0	5	0
King, H. A.	0	5	0
Mallett, H. P.	0	5	0
Mason, Philip H.	0	10	6
Nuttall, Edwin	0	10	6
Pitts, W. C.	0	5	0
Robinson, James	0	5	0

Norwich—continued.	£	s.	d.
Smith, Joseph de Carl, jun.	0	10	6
Squirrell, M. P.	1	1	0
Sutton, Francis	0	10	6
Taylor, H. E.	0	5	0
Thompson, H.	0	5	0
Watson, J. E. H.	0	10	6
Norwood.			
Atkinson, J. G. (Upper)	1	1	0
Birch, H. C. (Upper)	1	1	0
Golds, L. G. (Upper)	0	10	6
Izod and Son (Upper)	1	1	0
Palmer, F. (Upper)	0	10	6
Prime, T. R. (Upper)	0	10	6
Ramsay, W. (Upper)	0	10	6
Rees, H. (South)	1	1	0
Stacy, F. (Upper)	0	5	0
Wallis, G. (South)	0	5	0
White, C. E. (South)	0	5	0
Nottingham.			
Beilby, A. E.	0	5	0
Clarkson, R. B.	0	2	6
Dadley, Elijah	0	10	6
Flowerdew, W. C.	0	2	6
Ingle, G.	0	5	0
Lumby, Fred	0	5	0
Manfull, H. J.	0	5	0
Middleton, A.	0	5	0
Newball and Mason	1	1	0
Parker, W. H.	0	10	6
Pearson, Edward	1	1	0
Rayson, J. T.	0	5	0
Robinson, Joseph	0	2	6
Smithurst, John	0	5	0
Taylor, Thomas C.	0	10	6
Watkinson, Thos.	1	1	0
Nuneaton.			
Iliffe, George	0	5	0
Lester, Henry	0	5	0
Oban (N.B.).			
Robertson, A.	0	2	6
Odiham.			
Woodman, George	0	5	0
Oldbury.			
Homes, Joseph P.	0	5	0
Old Charlton.			
Wigg, L. N.	0	5	0
Oldham.			
Andrew, J. H.	0	5	0
Bagshaw, Henry B.	0	10	6
Bagshaw, William	0	10	6
Bates, Henry	0	10	6
Bates, Hiram	0	5	0
Berry, Thomas	0	5	0
Braddock, George	1	1	0
Brelsford, James	0	10	6
Geddes, William	0	5	0
Glover, J. S.	0	2	6
Goodall, F.	0	10	6
Hargraves, H. L.	0	10	6
Haslop, William	0	5	0
Hurst, James	0	5	0
Lees, James	0	2	6
Lord, Robert B.	0	5	0
Platt, Mrs. S.	0	2	6
Rhodes, Mrs. A.	0	5	0
Tomlinson, A. G.	0	5	0
Wilson, Alexander G.	0	5	0
Oswaldtwistle.			
Wilson, I.	1	1	0
Oswestry.			
Evans, John	0	5	0
Roberts, William Carey	0	2	6
Smale, Mary E.	0	5	0
Smale, Richard B.	0	5	0
Vaughan, David	0	5	0
Otley (Yorks).			
Hamond, J.	0	5	0
Lockwood, T.	0	5	0
Pratt, Richard M.	0	10	6
Oundle.			
Roper, H. E.	0	5	0

Oxford.	£	s.	d.
Bloxham, W. E.	0	5	0
Burbank, T. J. A. R.	0	2	6
Clayton, C.	0	2	6
Court, G. F.	0	5	0
Druce, George C.	0	10	6
Gilkes, W. H.	0	5	0
Hill, James H.	0	5	0
How, R. E.	0	5	0
Jenkins, Alexander	0	5	0
Prior, George T.	0	10	6
Squire, James	0	5	0
Thurland, Henry	0	10	6
Paignton.			
Riches, F. F.	0	5	0
Riches, T.	0	5	0
Sherriff, George	0	5	0
Paisley.			
MacCowan, R. T.	0	5	0
Partick (N.B.).			
McNicol, John	0	5	0
Rait, Robert C.	0	10	0
Pau (France).			
Jarvis, John	1	1	0
Paulton (Somerset).			
Bush, Thomas	0	5	0
Pembroke Dock.			
Bowling, J. H.	0	2	6
Laen, Mrs. S.	0	5	0
Pendleton.			
Jeans, Thomas R.	0	5	0
Robinson, B.	0	5	0
Smith, J. L.	0	3	6
Penzance.			
Buckett, A. H.	0	5	0
Shakerley, Benjamin	0	5	0
Symons, N. H.	0	5	0
Perth.			
Donald, David	0	10	6
Peterborough.			
Bodger, J. W.	0	5	0
Booth, Samuel	0	2	6
Bright, Richard H. D.	0	2	6
Calcutt, T. J.	0	2	6
Carlton, Arthur	0	10	6
Fox, A. E.	0	5	0
Heanley and Saunders	0	10	6
Knight, W. T.	0	10	6
Noble, H. E.	0	2	6
Pearson, John H.	0	2	6
Sturton and Sons	0	10	6
Turner, R. P.	0	2	6
Whitwell, Ewen	0	5	0
Petersfield.			
Nichols, Frederic B.	0	5	0
Petworth.			
Edgar, F. G.	0	5	0
Whitcombe, C.	0	5	0
Plymouth.			
Allen, Joseph	0	10	6
Bailey, John H.	0	5	0
Balkwill, A. P.	2	2	0
Barge, John	0	5	0
Cocks, James	0	5	0
Goodwin, Medmer	0	10	6
Hearder, H. P.	0	10	6
Hender, W. C.	0	5	0
Hetherington, A. H.	0	5	0
Hill, R. C. (donation)	5	5	0
Hunt, F. W.	0	10	6
Luke, R. S.	0	5	0
Maitland, F.	0	5	0
Martin, J.	0	5	0
Maurice, James	2	2	0
Park, Charles J.	0	10	6
Roper, R. F.	0	5	0
Sloggett, Thomas C.	0	5	0
Trew, H. E.	0	2	6
Turney, J. D.	0	5	0
Turney, Samuel B.	0	5	0
Woods, William	1	1	0
Woods, W. H.	0	5	0

Pocklington.	£	s.	d.
Boyden, John A. C.	0	2	6
Pontefract.			
Bratley, William	0	5	0
Pontlottyn.			
Roberts, W.	0	5	0
Pontypool.			
Ford, Edward B.	0	10	6
Pontypridd.			
Cule, Taliesin	1	1	0
Jones, J. P.	0	10	6
Prothero, G. R.	0	2	6
Poole.			
Pomeroy, F. T.	0	5	0
Port Elizabeth (Cape Colony).			
Willet, John A.	0	10	6
Porth.			
Davies, Thomas	0	10	6
Evans, Mrs. Annie	0	5	0
Porthcawl.			
Thomas, J. J.	0	5	0
Portland.			
Childs, Joseph L.	0	5	0
Porto Alegre (Brazil).			
Hallawell, J.	1	1	0
Portobello.			
Bowman, E.	0	2	6
Nesbit, John	1	1	0
Portsmouth.			
Bailey, H. H.	0	2	6
Brewis, T.	0	5	0
Ventham, A. W.	0	2	6
Portsoy.			
Clark, James	0	5	0
Poulton-le-Fylde (Lancs.).			
Blade, E.	0	5	0
Preston.			
Arkle, C. A.	0	2	6
Barnes, T.	0	2	6
Camm, A.	0	2	6
Duckett, J. J.	0	2	6
Grimshaw, T.	0	2	6
Hargreaves, M.	0	2	6
Lewty, A. E. R.	0	2	6
Parker, Thomas	0	5	0
Patterson, T.	0	2	6
Pemberton, William	0	2	6
Sharples, George	0	5	0
Stuart, W.	0	5	0
Walker, J. E.	0	2	6
Waterworth, A.	0	5	0
Waterworth, E.	0	2	6
Watkinson, W. J.	0	2	6
Prestwich.			
Mercer, A.	0	5	0
Ramsgate.			
Argue, James	0	5	0
Baily, E.	0	5	0
Franks, Alfred	0	5	0
Morton, Henry	0	2	6
Pavey, H. J.	0	5	0
Saunders, Charles J. H.	0	2	6
Thomas, H.	1	1	0
Wells, A. J.	0	10	6
Rangoon (India).			
Sutherland, A.	0	2	6
Reading.			
Aplin, A. E.	0	4	6
Biddles, W. B.	0	5	0
Bradley, Charles	0	10	6
Brunsden, E.	0	2	6
Butler, B. H.	0	5	0
Cardwell, E.	0	10	6
Coles, J. S.	0	5	0
Craft, James	0	5	0

Reading—continued.	£	s.	d.
Cross, John	0	5	0
Dowling, R.	0	5	0
Gibson, J. E.	0	2	6
Hayward, S.	0	2	6
Hill, J.	0	5	0
Knowles, J. H.	0	5	0
Mays, F. W.	0	2	6
Parkes, W. E.	0	5	0
Powell, J. A.	0	5	0
Rowell, John C.	0	5	0
Smith, A. B.	0	10	0
Tunbridge, Frederick	0	10	0
Young, J. M. (Theale)	0	5	0
Wright, J. N.	0	10	0
Redditch.			
Moule, William	0	5	0
Mousley, W.	0	5	0
Redhill.			
Monk, F. A.	0	5	0
Ralling, Ernest L.	0	10	6
Sillitoe, F. S.	1	1	0
Reepham.			
Cripps, Johnson	0	10	6
Reigate.			
Sargant, J.	0	10	6
Stammwitz, Louisa	0	10	6
Retford.			
Westbrook, Dr. C.	1	1	0
Rhyl.			
Lawrence, George R.	1	1	0
Williams, A. H.	0	5	0
Richmond (Surrey).			
Bletsoe, F. F.	0	10	6
Bletsoe, John	0	10	6
Melvin, G.	0	2	6
Mumbray, R. G.	0	10	6
Thacker, William	1	1	0
Ripon.			
Parkin, J. B.	0	10	6
Thornley, F.	0	5	0
Rochdale.			
Bamford, J. W.	0	5	0
Hadfield, James	0	5	0
Highley, William	0	5	0
Kerr, William	0	2	6
Mason, Arthur	0	5	0
Partington, William	0	2	6
Taylor, Edward	0	5	0
Thomas, E.	0	2	6
Whittaker, J. W.	0	2	0
Rochester.			
Brown, Hugh S. F.	0	2	6
Cowan, Frank	0	5	0
Rock Ferry.			
Dutton, H. O.	1	1	0
Lewis, N. J.	0	2	6
Romford.			
Lasham, John W.	0	10	6
Romsey.			
Oram, F.	0	2	6
Ross.			
Matthews, T. A.	0	5	0
Rothbury.			
Farrage, Robert	0	10	6
Rotherfield.			
Field, William	0	5	0
Rotherham.			
Bradshaw, C. H.	1	1	0
Rothesay.			
Duncan, William	0	5	0
Rothwell.			
Elstob, J.	0	5	0

Royston.	£	s.	d.
Webb, W. J. (Melbourn)	0	5	0

Ruthin.			
Magin, Arthur E.	0	2	6
Rouw, T. J.	0	5	0

Ryde (Isle of Wight).			
Bulmer, B.	0	5	0
Dixon, Henry	0	10	6
Flower, T. C.	0	5	0
Gibbs, William	0	10	6
Pollard, Henry H.	0	10	6
Smith, Tenison	0	10	6

Rye (Sussex).			
Horrell, W. H. D.	0	5	0
Waters, William A.	0	10	6

Saffron Walden.			
Hutchin, W. F. W.	0	5	0

St. Albans.			
Allenby, Henry	0	2	6
Ekins, Arthur E.	0	10	6

St. Andrews.			
Bruce, A. K.	0	10	6
Cleghorn, Dr.	1	0	0
Govan, Alexander	0	10	6
Kirk, John J.	0	2	6

St. Austell.			
Bice, James	0	5	0

St. Bees.			
Broomfield, R. W.	0	5	0

St. Clears.			
Johns, John	0	2	6

St. Davids.			
David, Albert	0	2	6

St. Day.			
Corfield, Charles	0	10	6

St. Helens.			
Harrison, James	0	5	0
Sherlock, Thomas	0	5	0

St. Just.			
Wearing, John	0	2	6

St. Leonards. See Hastings.

St. Neots.			
Dukes, H. J.	0	2	6
Wise, James	0	5	0

Salford (Lancs.).			
Bullock, A. H.	0	2	6
Bullock, H.	0	2	6
Denton, J.	0	5	0
Gardner, E.	0	2	6
Johnson, W. H.	0	10	6
Jones, J.	0	5	0
Reddish, A. F.	0	2	6
Waugh, J.	0	5	0
Whitfield, C.	0	5	0
Whittaker, E.	0	10	6

Salisbury.			
Atkins, Samuel Ralph	1	1	0
Atkins, William R.	0	10	6
Field, E.	0	5	0
Hardy, R. E.	0	10	6
Hook, R. G.	0	5	0
Horne, J.	0	5	0
Kerly, W.	0	2	6
King, L. W.	0	5	0
Liddle, —	0	5	0
Newton, F. H.	0	5	0
Newton, J. W.	0	10	6
Orchard, E. J.	0	10	6
Pickford, A. F.	0	5	0
Rowe, J.	0	5	0

Saltburn-by-the-Sea.			
Taylor, William	0	10	6

Saltcoats.			
Walker, J.	0	5	0

Sandbach.			
Gee G. H	0	2	6

San Remo (Italy).	£	s.	d.
Squire, Frank R.	1	1	0

Sandgate.			
Jenner, William M.	0	5	0
Kennett, E.	0	2	6

Sandown (Isle of Wight).			
Brown, G.	0	5	0
Cocksedge, H. B.	1	1	0

Sandwich.			
Baker, Frank	0	10	6
Dixon, William (Ash)	0	5	0
Woodruff, A. E. (Eastry)	0	5	0

Scarborough.			
Chapman, Henry	0	10	6
Clare and Hunt	1	1	0
Cuttle, Arthur E.	0	2	6
Hill, R. M.	0	2	6
Hughes, John E.	0	10	6
Jones, Alfred	0	5	0
Roberts, R.	0	2	6
Simms, R. J.	0	2	6
Smith, John F.	0	5	0
Webster, J. H.	0	2	6
Whitfield, G.	0	5	0
Whitfield, John	1	1	0

Seacombe.			
Hinkley, E.	0	2	6
Holt, Richard W.	0	5	0
Sleggs, G. R.	0	5	0

Seaham Harbour.			
Storey, W.	0	5	0

Seaton.			
Skinner, A. J. P.	0	5	0
Skinner, G. J.	0	5	0

Sedgeley (Staffs.).			
Thompson, J. W.	0	10	6

Selkirk.			
Dunn, Thomas	0	5	0

Settle.			
Shepherd, J. W.	0	10	6

Sevenoaks.			
Pain, E.	0	10	6

Shanklin (Isle of Wight).			
Brown, Andrew Henry	0	10	0
Deeks, W. T.	0	2	6

Sheepshed.			
Moore, Thomas	0	5	0

Sheerness.			
Hills, William J.	0	2	6
Prosser, David	1	1	0

Sheffield.			
Archer, A.	0	2	6
Basker, J. P.	0	2	6
Bennett, R.	0	5	0
Bradwall, J. H.	0	5	0
Carr, George	0	5	0
Carr, P.	0	5	0
Clayton, William	0	10	6
Cubley, G. A.	0	10	6
Dobb, J. T.	0	10	6
Eardley, J. F.	0	5	0
Ellinor, George	0	10	6
Eyre, S.	0	5	0
Fox, A. R.	0	10	6
Furness, Joseph M.	0	5	0
Greaves, R. B.	0	5	0
Haigh, W.	0	5	0
Hewitt, J. P.	0	5	0
Ibbitt, H. E.	0	2	6
Jepson, Xeno	0	2	6
Lowe, S. P.	0	5	0
Marshall, J.	0	5	0
Miller, John T.	0	5	0
Miner, M. T.	0	5	0
Morrison, C. O.	0	5	0
Newsholme, G. T. Wilkinson	1	1	0
Preston, Job	0	10	6
Prevett, J.	0	2	6
Priestley, Henry	0	10	6
Salisbury, John M.	0	10	6
Stevenson, W.	0	5	0
Swift, A. H.	0	2	6

Sheffield—continued.	£	s.	d.
Turner, J.	0	5	0
Turner, J. W. J.	0	5	0
Ward, William	0	10	6
Watson, H. G.	0	5	0
Watson, Robert W.	0	10	6
Watts, J.	0	5	0
Wiles, Edwin	0	5	0

Shepton Mallet.			
Fudgé, Charles William	0	5	0

Sherringham (Norfolk).			
Burrell, W. H.	0	2	6

Shields, North.			
Burn, Thomas	0	2	6
Gibson, James	0	10	6

Shields, South.			
Bottomley, L. W.	0	5	0
Forrest, Robert	0	10	6
Mays, A.	0	5	0
Noble, John	0	5	0
Riddle, J.	0	5	0
Riddle, J. P.	0	5	0
Walker, James	0	5	0
Walker, J. B.	0	5	0
Williamson, B.	0	10	6

Shildon.			
Veitch, T. D.	0	10	6

Shipdham.			
Skoulding, G.	0	5	0

Shrewsbury.			
Adams, William	1	1	0
Blunt, T. P.	1	1	0
Cross, A. R.	0	5	0
Cross, William G.	3	3	0
Gouldbourn, William	0	10	6
Perkins, Christopher	0	5	0
Pyefinch, John	0	5	0
Salter, Benjamin	1	1	0
Salter, Joseph B.	1	1	0

Sidcup.			
Bonnett, F.	0	2	6

Sidmouth.			
Chessall, Rowland	0	5	0

Silloth.			
Smith, H. J.	0	5	0

Silverdale.			
Wilson, Edward	0	5	0

Sittingbourne.			
Cocking, T. S.	0	5	0
Gordelier, William G.	1	1	0
Stedman, W. (Teynham)	0	2	6

Skelton.			
Ellis, A.	0	5	0

Sleaford.			
Harrison, T. E.	0	5	0
Spyvee, W.	0	5	0

Slough.			
Elliman, Sons and Co.	1	1	0
Griffith, Richard	0	10	6

Smallthorne.			
Fletcher, Thomas	0	10	6

Snaith.			
Bean, John	0	10	6

Solihull.			
Bate, A. M.	0	2	6

Southall (Middlesex).			
Diggens, E. D.	0	5	0

Southampton.			
Alderslade, W.	0	5	0
Bates, William	0	5	0
Bishop, Samuel	0	5	0
Borchert, Heinrich T. G.	1	1	0
Chemists Assistants and Apprentices' Association	5	0	0
Chipperfield, R.	0	10	6
Dawson, Oliver R.	0	10	6
Fletcher, I. B. (Totton)	0	5	0
Johnson, W. E.	0	5	0

Southampton—continued.	£	s.	d.
Madge, James C.	0	10	6
Mumford, Alfred	0	10	6
Randall, William B.	1	1	0
Rubie, J. T.	0	5	0
Spearing, James	0	10	6
Southend.			
Dawson, George R.	0	5	0
South Molton.			
Swingburn, Richard H.	0	10	6
Southport.			
Adams, C. M.	0	10	6
Ashton, William	0	10	6
Ball, Henry	0	5	0
Cave, J. R.	0	5	0
Crook, G.	0	5	0
Elliott, Stephen J.	0	2	6
Foggitt, J. B.	0	5	0
Gill, Hugh	0	5	0
Gillett, J. (Executors of)	0	5	0
Hamer, J. A.	0	5	0
Hay, David	0	5	0
Laing, J. W. A.	0	2	6
Mainwaring, R.	0	10	6
Merchant and Co.	0	5	0
Neame, H. A.	0	2	6
Righton, James	0	10	6
Roberts, H.	0	5	0
Round, Frederick	1	1	0
Smith, F.	0	4	0
Surr, Edward	0	10	6
Sykes, J.	0	5	0
Whitworth, James	0	10	6
Wilding, G. J.	0	10	6
Winter, William	0	10	6
Wood, G. E.	0	10	6
Young, E. F.	0	2	6
Southsea.			
Childs, James L.	0	10	6
Cruse and Co.	1	1	0
Deacon, F. G.	0	5	0
Ford, H. S.	0	5	0
Sangster, John G.	0	5	0
Trist, R.	0	5	0
South Stockton.			
Ronchetti, T. A.	0	5	0
Southwell.			
Downing, J. H.	0	10	6
Southwold.			
Critten, Robert P.	0	2	6
Spalding.			
Bell, E. W.	0	5	0
Bloodworth, T.	0	5	0
Donington, R.	0	5	0
Steeper, Samuel	0	5	0
Spennymoor.			
Burdon, Thomas A.	0	5	0
Farthing, G. T.	0	5	0
Spilsby.			
Rainey, J. J.	0	5	0
Stafford.			
Averill, Henry Alcock	0	10	6
Averill, John	0	10	6
Stamford.			
Dickinson, Frederick	0	10	6
March, Frederick	0	5	0
Stanford-le-Hope.			
Cushion, S.	0	5	0
Stevenage.			
Fresson, Lewis Francis	0	10	6
Stockport.			
Arnfield, J. C.	0	5	0
Johnson, Thomas J.	0	5	0
Kay Brothers	2	2	0
Orton, W. B.	0	5	0
Plant, F. G. L. (Romiley)	0	5	0
Stockton-on-Tees.			
Bainbridge, Robert R.	0	2	6

Stoke-on-Trent.	£	s.	d.
Adams, Frank	0	10	6
Adams, William H.	0	10	6
Guest, George C.	0	2	6
Harris, A. N.	0	5	0
Smith, Arthur H.	0	10	6
Wilson, Clement Fisher	0	10	6
Stone (Staffs).			
Slater, Thomas	0	10	6
Slater, Thomas, jun.	0	5	0
Stonehouse (Devon).			
Netten, Henry J. T.	0	5	0
Stony Stratford.			
Cox, Julia Jane	0	10	6
Robinson, William H.	0	10	6
Stourbridge.			
Biggs, F. W.	0	5	0
Burgess, William	0	5	0
Loverock, Henry	0	5	0
Selleck, W. R.	0	5	0
Simpkins, G. S.	0	5	0
Smith, S. (Wordesley)	0	5	0
Yeates, A.	0	5	0
Stowmarket.			
Gostling, George J.	1	1	0
Simpson, Robert G.	0	5	0
Wilson, Thomas	0	5	0
Stradbroke.			
Foulsham, Harry B.	0	5	0
Stratford.			
Pursey, G. F.	0	2	6
Stratton.			
Pickard, Henry	0	5	0
Streatham.			
Bascombe, W.	0	5	0
Shacklock, J. H.	0	10	6
Strood.			
Picnot, Charles	1	1	0
Stroud.			
Coley, Samuel J.	0	10	6
Pearce, J. A.	0	10	6
Sudbury (Suffolk).			
Brown, J. H.	0	2	6
Sunbury-on-Thames.			
Price, J.	0	5	0
Sunderland.			
Askew, J. R.	0	2	6
Aslin, John	0	5	0
Aslin, William	0	2	6
Bowman, S.	0	5	0
Fairman, George P.	0	10	6
Harrison, John	0	10	6
Harrison, W. B.	0	5	0
Hodgson, C.	0	5	0
Hodgson, R.	0	5	0
Leadbitter, W. W.	0	2	6
Mitchinson, John	0	5	0
Ranken, Charles	0	5	0
Sayer, J. R.	0	5	0
Scott, W.	0	5	0
Thompson, L.	0	10	6
Todd, M. J.	0	2	6
Walton, T.	0	5	0
Surbiton.			
Acfield, William	0	5	0
Lowe, Charles	0	10	6
Sutton (Cheshire).			
Dangerfield, W. H.	0	5	0
Sutton-in-Ashfield.			
Briggs, G. W.	0	5	0
Swaffham.			
Bell, Frederick R.	0	10	6
Christopherson, Fred	0	5	0
Finch, Jacob	0	10	0
Swansea.			
Bevan, E.	0	5	0
Bonnett, F.	0	5	0
Davies, J. M.	0	5	0
Davies, John (31, High Street)	0	5	0
Davies, John (75, Oxford Street)	0	5	0

Swansea—continued.	£	s.	d.
Davies, John (Walters Road)	0	10	6
Davies, William	0	5	0
Evans, D. L.	0	2	6
Evans, J. W. M.	0	2	6
Grose, Nicholas M.	1	1	0
Hughes, James	0	5	0
Jones, Moses	0	10	6
Jones, T.	0	5	0
Keall, F. P.	0	10	6
Lloyd, John W.	0	5	0
Lowther, H. R.	0	5	0
Rees, Daniel	0	5	0
Richards, J.	0	5	0
Roberts, J. K.	0	5	0
Thomas, Evan	0	5	0
Trick, M.	0	5	0
Williams, H. E.	0	10	6
Williams, J. T.	0	10	6
Yorath, C.	0	5	0
Swindon.			
Green, John	0	5	0
Sydenham (Upper).			
Babb, J.	0	5	0
Taunton.			
Copestake, H. H.	0	5	0
Hambly, Charles J.	0	5	0
Short, G. W.	0	2	6
Tavistock.			
Doble, H. T.	0	5	0
Gill, William	0	2	6
Seccombe, C. W. (Whitchurch)	0	2	6
Teignmouth.			
Cocking, Frederick J.	0	5	0
Evans, Joseph J. O.	0	5	0
Maunder, William	0	5	0
Silk, E.	0	2	6
Tenbury.			
Slade, John	0	10	6
Tenby.			
Davies, Moses P.	0	5	0
James, George	0	5	0
Tewkesbury.			
Wilkes, D. T. (Bredon)	0	2	6
Thame.			
Tame, Thomas	0	2	6
Thirsk.			
Ayre, George	0	5	0
Ayre, Henry	0	2	6
Thornhill (N.B.).			
Fingland, James	0	5	0
Thrapston.			
Pars, R. C.	0	10	6
Ticehurst.			
Corke, Edward	0	10	6
Titchfield.			
Smith, W. O.	0	10	6
Tiverton.			
Havill, P. W.	0	2	6
Rossiter, Thomas E.	0	5	0
Tritton, C. E.	0	5	0
Todmorden.			
Maddock, H.	0	5	0
Topsham.			
Ellis, Frederick	0	2	6
Torquay.			
Adams, J. H.	0	5	0
Bathe, William	0	5	0
Bridgman, William Louis	0	5	0
Cocks, John W.	0	5	0
Davies, J.	0	5	0
Guyer, James B.	0	10	6
Holloway, E. A.	0	5	0
Knight, Benjamin	0	5	0
Moon, G. W.	0	5	0
Newlyn, J.	0	5	0
Noak, W. F.	0	2	6
Kendall, J. M.	0	5	0
Shapley, Charles	0	10	6
Sloman, Richard	0	10	6

Torquay—continued.	£	s.	d.
Taylor, John	0	10	6
Temple, C. H.	0	5	0
Tomlin, I. P.	0	5	0
Waymouth, T. S.	0	5	0
West, I.	0	2	6
Totnes.			
Cooke, E. H.	0	2	6
Morse, C. H. Stafford	0	5	0
Tottenham.			
Bently, W. J.	0	10	6
Eastman, J. E.	0	10	6
MacCrindle, T.	1	1	0
Miller, C. B.	0	5	0
Tanner, A. E.	1	1	0
Tredegar.			
Phillips, Charles L.	0	5	0
Truro.			
Anstey, J. U.	0	5	0
Bucher, W. H.	0	5	0
Feaver, Samuel	0	10	6
James, Hamilton	0	5	0
Percy, Thomas B.	0	10	0
Tunbridge.			
Millidge, Thomas E.	0	10	6
Wardley, S. F.	0	10	6
Tunbridge Wells.			
Arnold, Spencer	0	10	6
Batting, Thomas G.	0	10	6
Cheverton, George	1	1	0
Dunkley and Rogers	1	1	0
Howard, Richard	0	10	6
Sells, Robert J.	0	10	6
Thompson, G. A.	0	5	0
Whitrow, Benjamin	1	1	0
Williams, James	0	10	6
Tunstall.			
Viggars, G. D.	0	5	0
Tutbury.			
Green, Isaac	0	5	0
Twickenham.			
Alexander, William	0	5	0
Bishop, Thomas	1	1	0
Peake, Henry F.	0	5	0
Shelley, Henry	0	10	6
Taylor, J. J.	0	5	0
Uckfield.			
Farr, E. H.	0	10	6
Ulverston.			
Willan, Robert	0	10	6
Uppingham.			
Guy, F. V.	0	2	6
Upton-on-Severn.			
Gibbs, John	0	10	6
Urmston.			
Duncalfe, Richard	0	5	0
Uttoxeter.			
Woodward, H.	1	1	0
Woolrich, Charles B.	0	10	6
Ventnor (Isle of Wight).			
Littlefield, J. W.	1	1	0
Nicholls, A. L.	0	5	0
Smith, C. A.	1	1	0
Weston, Charles	1	1	0
Wadebridge.			
Philp, J.	0	5	0
Wakefield.			
Cardwell, James	0	5	0
Chaplin, J. H.	0	5	0
Chaplin, John Lambert	0	10	6
Duffin, Thomas	0	10	6
Green, A.	0	5	0
Hick, M. B.	0	5	0
Job, C. F.	0	5	0
Pollard, William	0	10	6
Saville, George	0	10	6
Smith, G. E.	0	10	6
Thornton, E.	0	5	6
Wice, J. H.	0	10	0

Wallingford.	£	s.	d.
Ashmall, George	0	5	0
Payne, Sidney	1	1	0
Upton, Eustace J.	0	10	6
Wallington.			
Wood, Edward	0	10	6
Walmer.			
Wood, Henry	0	5	0
Walsall.			
Barnes, G. A.	0	5	0
Bayley, C.	0	10	6
Elliott, E. M.	0	2	6
Elliott, George	0	10	0
Grove and Son	0	5	0
Morris, J. O.	0	5	0
Whitehead, J. H.	0	2	6
Walsham-le-Willows.			
Harrington, Arthur	0	5	0
Waltham Abbey.			
Griffiths, J. M.	0	10	6
Marshall, A.	1	1	0
Walthamstow.			
Dunstan, J. F.	0	2	6
Walton-on-Thames.			
Power, William	0	10	6
Wantage.			
Candy, J. W. G.	0	5	0
Robins, H.	0	2	6
Ware.			
Medcalf, Benjamin	0	10	6
Medcalf, Benjamin Pearce	0	10	6
Wareham.			
Harman, E. S.	0	5	0
Marshallsay, R. J.	0	5	0
Randall, Thomas	0	5	0
Warminster.			
Toone, J. V.	0	10	6
Warrington.			
Young, John R.	0	10	6
Warwick.			
Mellor, J. G.	0	10	6
Watchet.			
Daymond, Samuel	0	2	6
Watford.			
Chater, Edward M.	1	1	0
Chater, Matthew Taylor	1	1	0
Cottle, Alfred James	0	5	0
Maries, H. D.	0	5	0
Parrott, W. S.	0	10	6
Wath-upon-Dearne.			
Hick, Allan	0	10	6
Watton.			
Pechey, T. P.	0	5	0
Vincent, Lacey A.	0	10	6
Weaverham.			
Manifold, John I.	0	5	0
Wednesbury.			
Gittoes, Samuel J.	0	10	6
Wellingborough.			
Smith, John T.	0	2	6
Sykes, Harry	0	5	0
Wellington (New Zealand).			
Ridd, A. H. (Pahiatua)	0	2	6
Wellington (Somerset).			
Gregory, Walter	0	5	0
Windeatt, G. J.	0	5	0
Wells (Norfolk).			
Rump, Robert R.	0	10	6
Wells (Somerset).			
Manning, Richard James	0	10	6
Slater, Jonathan	0	5	0

Welshpool.	£	s.	d.
Griffiths, Thomas	0	5	0
Welton.			
Myers, George Henry	0	5	0
Westbury.			
Paine, Charles	0	2	6
West Cornforth (Co. Durham).			
Hunter, H.	0	2	6
Westgate-on-Sea.			
Bessant, Frederick R.	0	10	6
West Malling.			
Stedman, Richard B.	0	5	0
Weston-super-Mare.			
Cooper, John	0	5	0
Duckett, F. W. (Blackford)	0	10	6
Hall, E.	0	5	0
Parkes, Harry C.	0	10	6
Pinch, J. E.	0	5	0
Pumphrey, Arthur	0	5	0
Watson, J. W.	0	5	0
Weybridge.			
Griffin, Thomas	0	10	6
Kennett, J. N.	0	10	6
Weymouth.			
Gregory, W.	0	5	0
Groves, Thomas B.	0	10	6
Smith, E. M.	0	10	0
Stedman, S. S.	0	5	0
Street, Herbert	0	5	0
Whitby.			
Corner, Thomas B.	0	10	6
Frank, John	1	1	0
Stevenson, John	0	10	6
Whitchurch (Hants).			
Greatorex, E. J.	0	10	6
Whitehaven.			
Wilson and Kitchin	1	1	0
Whitley (Yorks).			
Whitehead, G.	0	5	0
Whitstable.			
Arrowsmith, G. W. T.	0	5	0
Whittlesea.			
Callaway, L.	0	10	6
Wick (N.B.).			
Miller, Kenneth	0	5	0
Wigan.			
Dawson, F. R.	0	5	0
Johnson, T.	0	10	0
Kellett, Richard E.	0	5	0
Phillips, Jonathan	0	5	0
Wimbledon.			
Blissett, F. H.	0	2	6
Butler, E. D. Barry	0	10	6
Dancey, R.	0	2	6
Day, T. S.	0	10	6
Pooley, John D. S.	0	10	6
Spencer, W. G.	0	5	0
Winchester.			
Barratt, F. J.	0	5	0
Hunt, R. (donation)	5	5	0
Knight, George E. Moses	0	5	0
Powell, Edward F.	0	10	6
Winchfield.			
Machin, W. G.	0	5	0
Windsor.			
Collins, Henry G.	0	5	0
Duckworth, A.	0	5	0
Grisbrook, Edward	0	5	0
Harmer, J. D.	0	5	0
Russell, Charles J. L.	0	10	6
Wood, Robert	0	5	0
Wingate.			
Cross, John T.	0	10	0

	£	s.	d.
Wingham.			
Palmer, Henry B.	0	5	0
Winshill.			
Green, W.	0	2	6
Winslow.			
Parrett, Edward	0	5	0
Wisbeach.			
Hill, Major	0	2	6
Witham.			
Green, Robert P.	0	10	6
Wokingham.			
Pearman, H.	0	2	6
Spencer, Thomas	0	10	6
Wolverhampton.			
Banks, C. H.	0	5	0
Beardmore, A. E.	0	10	6
Burnett, C. C.	0	5	0
Cannell, William	0	10	6
Caswell, J. A.	0	2	6
Coleman, E.	0	10	0
Culwick, H. E.	0	5	0
Gascoyne, E.	0	2	6
Gibson, F. J.	0	10	6
Goodsell, P. G.	0	5	0
Hamp, John	0	5	0
Hill, W. H.	0	2	6
Pratt, J.	0	5	0
Reade, Bros. and Co.	0	10	6
Stanway, Edward Thomas	0	10	6
Weaver, Alfred C.	0	10	6
Willcock, F. A.	0	2	6
Wolverton.			
Barton, W.	0	5	0
Woodbridge.			
Betts and Son	0	5	0
Woolston (Hants).			
Pell, John	0	5	0
Worcester.			
Blunt, L.	0	2	6
Briggs, A. E.	0	2	6
Dodge, E.	0	2	6
Ferneley, Charles	0	10	6
George, Henry	0	10	6
Hall, Frederick J.	0	5	0
Hinks, John	0	10	6
Hopkins, E. R.	0	2	6
Horniblow, W. T.	0	5	0
Judson, T. B.	0	2	6
Kitson, E. J.	0	10	6
Lunn, T.	0	5	0
Maxey, W. H.	0	10	6
Neve, F. C. (Hallow)	0	10	6
Price, W. W.	0	2	6
Rogers, E. H.	0	2	6
Silk, Thomas	0	5	0
Steward, John A.	0	10	6
Storm, E. B.	0	5	0
Twinberrow, J.	0	10	6
Turner, C. W.	0	5	0
Virgo, Charles	1	1	0
Workington.			
Mason, Joseph R.	0	5	0
Worksop.			
Baxter, George	0	5	0
Jones, George W.	0	5	0
Pask, T. E.	0	10	0
Worthing.			
Aston, W.	0	5	0
Berry, H. J.	0	5	0
Burt, James	0	5	0
Cortis, A. B.	0	10	6
Frost, William	0	10	0
Gulliver, W. I.	0	10	6
Wyke.			
Drake, William	0	5	0
Yarmouth.			
Arthur, John	0	5	0
Clows, John E.	0	10	6
Lane, F. J.	0	5	0
Mornement, H. J.	0	5	0
Poll, W. S.	0	2	6
Pratt, Edward J.	0	10	6
Williams, C. E.	0	2	6
Yaxley.			
Farr, Joseph	0	10	6
Yeadon.			
Blatchley, Thomas	0	10	6
Kenion, W.	0	2	6
Yeovil.			
Gatward, O.	0	10	6
Wright, A.	0	10	6
York.			
Batty, Thomas	0	10	6
Coates, Henry	0	5	0
Grierson, G. A.	0	5	0
Lupton, J. A.	0	2	6
Parker, Thomas	0	10	6
Saville, John	1	1	0
Sowray, J.	0	5	0
Wisker, R. H.	0	2	
Zeehan (Tasmania).			
Davies, E. C. J.	0	10	0

ANONYMOUS DONATIONS AND SUBSCRIPTIONS.

	Don. £	Don. s.	Don. d.	Subs. £	Subs. s.	Subs. d.
S. J. B.				2	2	0
A Friend				0	2	6
S. F.	5	5	0			
E. S. V.				0	2	6
H. R.				1	1	3
A Friend				0	5	0
M. D.				0	2	6

LEGACIES.

	£	s.	d.
Brady, Henry Bowman	500	0	0
Davison, Ralph	100	0	0
Willats, Richard	100	0	0
Wagstaff, John Henry	25	0	0

CONTRIBUTIONS TO OUR KNOWLEDGE OF THE ACONITE ALKALOIDS.

PART II.—ON THE ALKALOIDS OF TRUE ACONITUM NAPELLUS.*

BY PROFESSOR DUNSTAN AND MR. JOHN C. UMNEY.

[*From the Research Laboratory of the Pharmaceutical Society.*]

The authors have examined the alkaloidal constituents contained in the roots of the true *Aconitum Napellus*. The plants were grown by Mr. E. M. Holmes at the instance of the British Pharmaceutical Conference. The process used for the extraction of the alkaloids was such as to preclude the possibility of the occurrence of hydrolysis or other decomposition of the alkaloids. It consisted in percolating the roots, dried at a low temperature and finely powdered, with cold rectified fusel oil (b.p. 100°–132°) and extracting the alkaloids from the solution by agitation with water acidified with one per cent. of sulphuric acid. Resin was removed by extracting the acid solution with chloroform and the liquid was then made just alkaline with dilute ammonia and extracted with ether, which removed a considerable quantity of alkaloid but left in solution a further and smaller quantity which was subsequently dissolved out by agitation with chloroform.

The *alkaloid soluble in ether* was obtained as a gum-like mass incapable of crystallization. By conversion into hydrobromide it was separated into a crystallizable and uncrystallizable salt.

The crystalline hydrobromide was identified as the salt of aconitine, the crystalline and highly toxic alkaloid already described by one of the authors and Dr. W. H. Ince. The rotatory power of the pure hydrobromide in aqueous solution was ascertained to be $[\alpha]_D$—29·65, a result which agrees well with that recorded in the paper above referred to. As some doubt exists with reference to the solubility of aconitine in water, it was carefully determined with this pure specimen. The mean of two determinations was 1 gramme in 4431 grammes of water at 22°. Jürgens had previously recorded the far greater solubility of 1 in 745 at the same temperature.

The non-crystalline hydrobromide furnished an alkaloid resembling a gum in appearance. It dissolved in ether and alcohol, but only sparingly in water. The aqueous solution was alkaline to litmus and was very bitter, but it did not give rise to the tingling sensation so characteristic of aconitine. The base could not be crystallized, neither could the hydrochloride, sulphate and nitrate prepared from it. The aurochloride is also amorphous. Owing to the circumstance that a crystalline compound of this base could not be obtained, it was difficult to gain conclusive evidence of its homogeneity.

The properties recorded above show that it is not aconine or the base called by Wright and Luff picra-aconitine, which readily afforded crystalline salts. These characteristic properties belong to an alkaloid of which a full account will be given in a later paper, considerable progress having already been made in the most difficult task of isolating it in a pure state. We propose to assign to it the name of *napelline*, which was first given to the alkaloid now known as pseudaconitine, and afterwards by Hübschmann to a substance which the work of Wright and Luff showed to be a mixture chiefly composed of aconine. The napelline obtained as described above is probably associated with another amorphous base, about which we have at present little information to give, beyond the fact that neither it nor its salts appear to crystallize.

The *alkaloid soluble in chloroform* was proved to be identical with *aconine*, the amorphous base which results from the hydrolysis of aconitine. On combustion it afforded numbers corresponding with those deduced from the formula $C_{26}H_{41}NO_{11}$. Its molecular weight determined by Raoult's method also corresponded with this formula.

The roots of the true *Aconitum Napellus* certainly contain three alkaloids, one of which is crystalline, viz., aconitine, two being amorphous, viz., napelline and aconine. Indications have been obtained of the presence of a fourth alkaloid which is amorphous and closely resembles napelline.

The authors found that the juice expressed from the roots contained a large proportion of amorphous bases but very little aconitine, the greater part of which remains in the root and may be extracted, together with the remainder of the amorphous alkaloids, by exhausting with amyl alcohol. The total quantity of amorphous bases amounted to more than twice that of aconitine.

The physiological action of all these alkaloids is being investigated. The results so far obtained point to the conclusion that crystalline aconitine is by far the most toxic of the alkaloids contained in *Aconitum Napellus*.

* The substance of a paper communicated to the Chemical Society, on March 3, 1892.

CONTRIBUTIONS TO OUR KNOWLEDGE OF THE ACONITE ALKALOIDS.

PART III.—ON THE FORMATION AND PROPERTIES OF ACONINE AND ITS CONVERSION INTO ACONITINE.*

BY PROFESSOR DUNSTAN AND DR. F. W. PASSMORE.

[*From the Research Laboratory of the Pharmaceutical Society.*]

Owing to the uncertainty which exists with reference to the products of the hydrolysis of aconitine the authors have investigated the subject, starting with a pure alkaloid. Wright and Luff have stated that when aconitine undergoes hydrolysis the sole products are aconine and benzoic acid. More recently Dragendorff and Jürgens have asserted that the hydrolysis occurs in two stages. In the first stage there are formed benzoic acid and an alkaloid identical with the picraconitine once isolated by Wright and Luff from the roots of supposed *Aconitum Napellus*. In the second stage the picraconitine is hydrolysed into benzoic acid, methyl alcohol and aconine, which is the final product of the change.

The authors have carefully studied the process of hydrolysis by heating pure aconitine with water in closed tubes at 150°, but have been unable to obtain at any stage either picraconitine or methyl alcohol. The alkaloid extracted from the solution by ether was a mixture of aconine with unaltered aconitine. With pure aconitine the reaction oc-

* The substance of a paper communicated to the Chemical Society on March 3, 1892.

curs precisely in accordance with the equation $C_{33}H_{45}NO_{12}+H_2O=C_{26}H_{41}NO_{11}+C_7H_6O_2$.

Having accumulated in these experiments a few grains of aconine, the authors proceeded to examine its properties when in a pure state. Up to the present time neither it nor its salts has been obtained in a crystalline state. The base, even when quite pure, cannot apparently be crystallized; all attempts to induce crystallization having failed. The authors have, however, succeded in crystallizing several of the salts, viz., the hydrochloride, hydrobromide, sulphate and nitrate. All these salts are very soluble in water; the hydrochloride being the least soluble is the easiest to crystallize. This salt is best purified by crystallization from a mixture of alcohol and ether. When dried at 100° it melts at 175°·5 (corr.). The crystals deposited from alcohol have the composition $C_{26}H_{41}NO_{11},HCl,2H_2O$. When dried at 100°, they still retain $1H_2O$, which is, however, lost at 120°. The aqueous solution is lævo-rotatory $[\alpha]_D$—7°·71. The base was obtained from the pure hydrochloride by decomposition with a solution of silver sulphate, and decomposition of the aconine sulphate, with exactly sufficient baryta water. The solution on evaporation furnished a hygroscopic, brittle gum, which refused to crystallize. It melts at 132° (corr.). Aconine is very soluble in water, and the aqueous solution is alkaline. When dry it is insoluble in ether and almost insoluble in chloroform. On analysis it afforded numbers agreeing with the formula $C_{26}H_{41}NO_{11}$, which is that suggested by Dunstan and Ince as a result of their study of pure aconitine. Aconine is a powerful reducing agent precipitating the metals from solutions of gold and silver salts. It also reduces Fehling's solution. By the reaction of auric chloride with a solution of aconine hydrochloride, an amorphous aurochloride is obtained which is considerably more soluble in water than the corresponding aconitine salt. The physiological action of pure aconine is being investigated. Its aqueous solution is slightly bitter, and gives rise to a burning sensation in the mouth, but does not produce the tingling which is characteristic of aconitine. In respect of its action on polarized light, aconine exhibits the same peculiarity as aconitine. Its salts are lævo-rotatory, whilst a solution of the free base is dextro-rotatory $[\alpha]_D + 23°$. When heated with alkalis aconine slowly resinifies.

The study of the hydrolysis of aconitine has led to the conclusion that aconitine is monobenzoyl aconine ($C_{26}H_{40}(C_6H_5CO)NO_{11}$). In order to substantiate this inference from the analytical results and prove that aconine really stands in this simple relation to aconitine, experiments were made with a view of reversing the hydrolysis and reconverting aconine into aconitine. The action of benzoic anhydride on aconine at different temperatures led to no result, not a trace of aconitine or anhydro-aconitine being formed. Since aconine is a comparatively strong base it seemed likely that it might be competent to decompose ethyl benzoate with formation of aconitine, or anhydro-aconitine if the temperature of reaction were high, according to the equations (1) $C_{26}H_{41}NO_{11}+C_6H_5CO\cdot OC_2H_5=C_{26}H_{40}(C_6H_5CO)NO_{11}+C_2H_5OH$. (2) $C_{33}H_{45}NO_{12}=H_2O+C_{33}H_{43}NO_{11}$. Aconine was dissolved in alcohol, the alcoholic solution mixed with rather more than the calculated quantity of the alkyl salt and the mixture heated in a closed tube for three hours at 130°. After removal of the unaltered ethyl benzoate, etc., a base soluble in ether was isolated, and this furnished a crystalline hydrobromide which corresponded with the salt of anhydro-aconitine. The aurochloride melted at 141°, and is thus proved to be anhydro-aconitine aurochloride. The alkaloid produced the physiological action characteristic of anhydro aconitine ($C_{33}H_{43}NO_{11}$), and was identical with that obtained by the dehydration of aconitine. Since the anhydro-compound combines with water to form aconitine this result constitutes a partial synthesis of the natural alkaloid, and proves it to be monobenzoyl aconine.

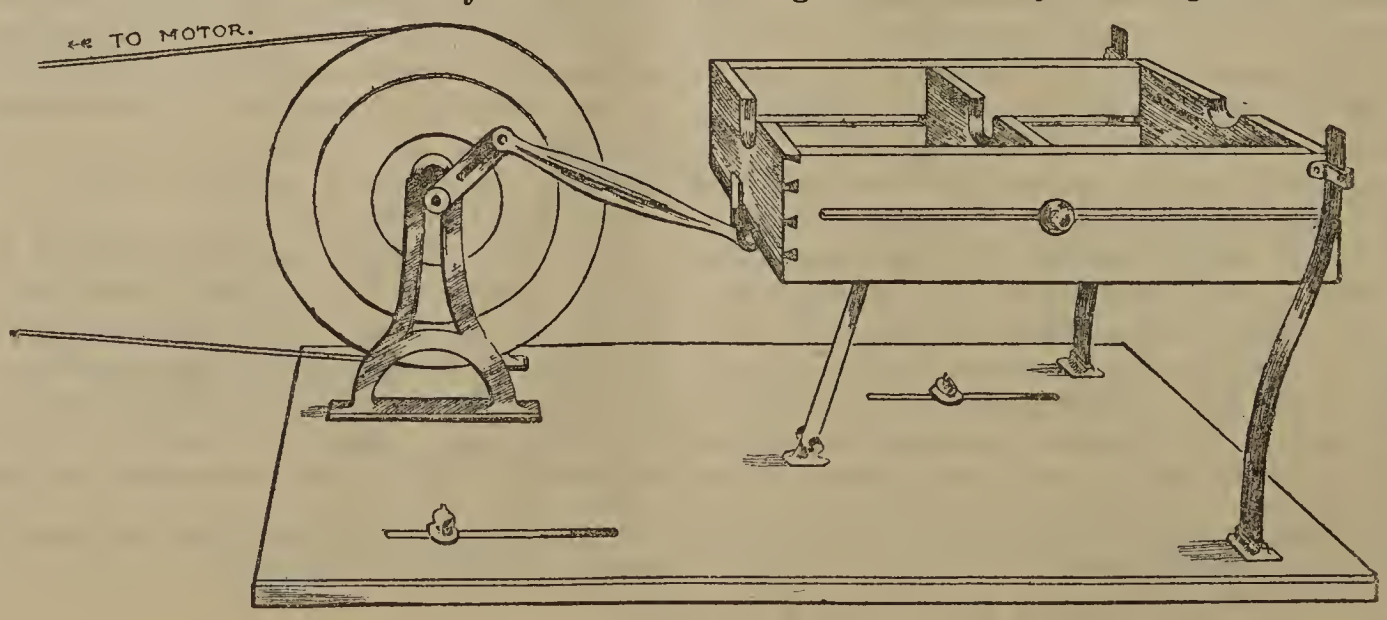
The examination of the action of various reagents on aconine has, so far, not led to any important results. Nitrous acid fails to attack it. The principal product of its oxidation by alkaline permanganate is oxalic acid. Attempts to isolate an addition compound with methyl iodide were not successful. By the action of methyl iodide on aconitine, a crystalline *aconitine methyl iodide* ($C_{33}H_{45}NO_{12},CH_3I$) was obtained which melts at 219° (corr.). The *aconitine methyl hydroxide* ($C_{33}H_{45}NO_{12}CH_3OH$) prepared from this compound is an amorphous base whose salts do not appear to crystallize. A further study will be made of this compound and its physiological action will be investigated.

ON A SIMPLE LABORATORY SHAKER.

BY PROFESSOR DUNSTAN AND MR. T. S. DYMOND.

[*From the Research Laboratory of the Pharmaceutical Society.*]

In most laboratories, especially where research in organic chemistry is being carried on, the need



for some mechanical arrangement for shaking is constantly felt. The extraction of solids with various liquids, the desiccation of organic liquids with a solid drying agent, the chemical action of a liquid on a substance not freely soluble in it, are a few out of many instances where time and trouble may be saved and greater efficiency secured by the employment of a mechanical contrivance for shaking. In the Research Laboratory of the Pharmaceutical Society, such a machine, which works almost noiselessly, is now in constant use. Having found that the arrangements for the purpose which are usually sold by apparatus makers were unsuited to all our requirements, we devised a simple shaking machine which in a form perfected by more than a year's experience we now wish to bring under the notice of the Society. A very few words of explanation are necessary, since the principle and mode of working of the shaker are readily apparent from the drawing.

It consists of a wooden truck into which can be firmly fixed, by means of a sliding partition, a bottle or other vessel of any size up to that of a Winchester quart. This truck is supported underneath near the front by a rod which is capable of moving backwards and forwards on a pivot. At the back the truck is supported by two flexible steel laths, one end of each being clamped to either side of the truck, the other end being firmly fitted in the base-board of the machine. The necessary to-and-fro motion is communicated to the truck in the usual manner by means of a crank connected with a revolving wheel and attached to the truck by an iron or wooden rod. This rod can be connected with the crank at different distances from the axle, so that the extent of the excursions made by the truck may be varied. A cord from a water or other small motor passes over the wheel, which is grooved at three distances from the centre, so that the rate of motion may be regulated. In order to avoid the necessity of altering the length of the cord which passes from the motor to the wheel, the base-board of the apparatus is provided with slots and thumbscrews, by means of which it may be securely fixed to the bench at different distances from the motor.

The shaker may be obtained from Messrs. Baird and Tatlock, Cross Street, Hatton Garden, E.C.

THE HISTORY OF THE OFFICIAL ALKALOIDS.*

BY J. RUTHERFORD HILL.

In introducing the subject, the author gave a sketch of the development of chemical knowledge of the class of bodies known as alkaloids, beginning with the discovery of morphine by Sertürner, in 1804. He then referred to the memorable prediction made by Liebig in his research on alcohol and ether, when by substituting amidogen NH_2, for hydroxyl HO, in oxalic acid $(C_2O_2)<^{OH}_{OH}$ he produced the neutral body oxamide $(C_2O_2)<^{NH_2}_{NH_2}$ and was led to make the following statement:—"If in the oxides of methyl CH_3O, and ethyl C_2H_5O, the oxides of two basic radicles, we were able to substitute one equivalent of amidogen for oxygen, there cannot be the slightest doubt that we should obtain compounds perfectly similar in their behaviour to ammonia. Expressed in a formula, a compound $C_2H_5NH_2$ must have basic properties." He then pointed out how this speculation was confirmed in the discovery of ethylamine $N\{^{H}_{H}_{C_2H_5}$ by Wurtz in 1845, and completed by the discovery of diethylamine $N\{^{H}_{C_2H_5}_{C_2H_5}$ and triethylamine, $N\{^{C_2H_5}_{C_2H_5}_{C_2H_5}$ by Hofmann in 1850. Reference was then made to the statement of Kopp in 1848 as to the possibility of artificially producing morphine, quinine and strychnine, and the slow progress that had been made in this direction, though the search had accidentally led to the important discovery of aniline dyes by Perkin.

The discovery by Ramsay and Dobbie in 1878, that the cinchona alkaloids yield tricarbopyridenic acid by oxidation with potassium permanganate, just as pyridine does, which led them to suggest a close relationship between these alkaloids and pyridine, and the research of Koëning in 1880, which led him to the conclusion that "pyridine may be the nucleus around which all the alkaloids ought to be grouped like the aromatic bodies around benzene," were also referred to. Thus marsh gas or methane CH_4 is the nucleus of the fatty series, benzine C_6H_6 is the nucleus of the aromatic series, and pyridine C_5H_5N is the nucleus of the alkaloidal series of organic compounds.

The methods adopted for the extraction of alkaloids were described and the precautions necessary to avoid alteration of the active principle by dehydration, saponification, or polymerization pointed out. The various solvents, precipitants and general and specific tests for alkaloids, as well as the methods of determining the molecular weight and their empirical and rational chemical formulæ were also briefly described.

The author then sketched the history of each of the official alkaloids, which he had arranged in a chronological series, beginning with morphine, discovered by Sertürner in 1804, and concluding with pilocarpine, discovered by Gerrard in 1875. The paper concluded with a reference to recent allegations to the effect that the known alkaloids do not exist in the plant, but are produced by the process of extraction; that they vary under the influence of age, cultivation, and varying conditions of climate, soil and situation; and that changes may also take place in the drug by keeping after coming into the market. These points were illustrated by reference to the recent researches of Schmidt and Schütte on the alkaloids of the Solanaceæ, and the interesting discovery of Einhorn as to the relationship between atropine and cocaine was also pointed out.

* Read at a meeting of the Glasgow Chemists and Druggists' Assistants' Association.

THE ACCURACY OF CHEMICAL THERMOMETERS.*

BY J. F. LIVERSEEGE, F.I.C.

Some time ago I had reason to doubt the accuracy of some thermometers I was using, and, at the first opportunity, I compared them with a thermometer having a Kew certificate.

The freezing point was first determined by putting the thermometers in a test tube lined with ice and reading them as soon as the temperature was constant. The ice was readily obtained by adding ammonium nitrate to cold water (5° C.) in a small beaker and stirring with the test tube. To obtain temperatures from 5° to 45° C. hot and cold water in suitable proportions were thoroughly mixed in a beaker and stirred with the standard thermometer and two others attached by elastic bands to a piece of wood. The readings were taken by means of a lens about every 5° C. For temperatures above 45° C. the thermometers

* Read at a meeting of the Midland Counties Chemists' Association.

were put in a bucket of water and gradually heated to boiling by a gas stove with constant stirring by a wooden paddle. Each thermometer was in turn compared with the standard, the whole of the mercurial thread being under water, if possible. For the higher temperatures a number of readings was necessary to obtain concordant results.

1. Centigrade thermometer with paper scale—17° to 100°. The error in this thermometer did not exceed 0·2° up to 62°. From 65° to 95° it was 0·3° too high, and at 98° the error was 0·5°.

2. Centigrade thermometer with etched scale—23° to 360°. The zero of this old thermometer had risen 1·5°. From 0° to 29° the error varies from 1·3° to 1·6° and from 35° to 98° between 0·8° and 1·1°.

3. Thermometer plummet of a Westphal specific gravity balance 50° to 80° F. The readings were too high, the error being 0·8° at 50°, 1·0° at 60° and 0·6° at 80°.

4. Fahrenheit thermometer with "milk-glass" scale 30° to 212°. In this thermometer the error falls fairly regularly from 3·0° at 60° to 2·5° at 209°, the extremes being 3·3° at 150° and 2·2° at 190°.

5. Centigrade thermometer with scale etched in half degrees 0° to 44°. The zero of this old thermometer had risen 0·3°. From 0° to 20° the error varies 0·3° to 0·5° too high; from the latter point the error gradually falls till at 41° it is 0·1° too low.

6. Fahrenheit thermometer with "milk-glass" scale, 24° to 120°. All the readings of this thermometer are too low, the error increasing regularly from 0·2° at 57° to 1·8° at 120°.

7. Fahrenheit thermometer with etched scale, 50° to 70°. The error decreases from 0·9° at 57° to 0·7° at 67°.

8 and 9. Centigrade thermometers with etched scale, 0° to 32°. All the readings of these short range thermometers are too high, the error of 8 rising from 0·5° at 14° to 0·7° at 31°; 9 has an error of 0·4°.

10. Fahrenheit thermometer, with "milk glass" scale 32° to 212°. The error in this thermometer increases by steps from 0·3° too low at 42° to 2·9° too high at 187°, and then falls to 2·0° at 210°.

11. Centigrade and Fahrenheit thermometer with etched scales—7° to 200° C., and 20° to 400° F. The errors of the readings of the Centigrade scale vary somewhat erratically from 0·3° too low at 3° to 0·3° too high at 98°; at 38° the error rises to 0·5°. These errors were obtained by comparison with the standard thermometer. Next, by means of a lens, the degrees were observed at which there were coincidences between the two scales, and Centigrade readings were calculated to Fahrenheit degrees. This showed that the readings of the two scales differed from 0·2° to 1·2° F.; for instance, 213° F. is opposite 100° C. Finally, by combining the error of the Centigrade scale with the difference between the scales, the error of the Fahrenheit scale was found to vary between 0·1° and 0·3° too low, but to be 1·0° at 201°.

In conclusion, it may be noted that accuracy is not in proportion to the cost of the thermometers; for the one with a paper scale (No. 1) is, one point excepted, practically correct; those with "milk glass" scales (Nos. 4, 6 and 10) are decidedly incorrect, giving many errors of 2° to 3° F.; while those with etched scales vary. No. 11 is, and No. 2 was, fairly accurate for thermometers with ranges of 207° C. and 383° C.; but Nos. 7, 8 and 9, having only short ranges, ought not to have errors of 0·5°; while No. 5 is quite too erratic for a thermometer graduated in half degrees.

I think these figures show that unless a thermometer has been compared with a standard thermometer, its indications must not be trusted too much, as they may be correct, or may have a decided error.

UNNA'S MEDICATED SKIN VARNISHES.

Skin varnish is the term applied by Unna to preparations used in dermatological practice for forming a thin covering on the skin. The principal bases for these preparations are the following:—

Bassorin Varnish.—The pure bassorin basis is obtained, according to Elliot, by filtering tragacanth mucilage (15:100) in a filter heated by steam, evaporating and mixing with glycerine. A similar basis may be prepared by stirring five parts powdered salep with 95 parts cold water until a smooth mucilage is obtained, then heating for half-an-hour on the steam bath. The salep basis contains less bassorin but more starch.

Casein Varnish.—The casein obtained by coagulating skim-milk with rennet at a temperature of 35° to 40° is washed and dried until it forms a yellowish-white sandy powder soluble in alkaline solutions. In preparing the casein varnish this casein is dissolved by means of borax. For 20 parts casein 2·5 parts of borax and 77·5 parts water furnish a rapidly drying uniform covering material. The alkaline characters of the borax are marked by the casein. Admixtures of heavy pulverulent substances readily settle out of this basis and it is requisite to distribute them by shaking. A varnish of casein and glycerine is prepared by dissolving the casein in 3 or 3·5 parts of ammonia, adding a quantity of glycerine equal in weight to the casein, and heating to drive off the ammonia. The resulting mass mixed with twice its weight of boiling water give an excellent permanent emulsion.

Amber Varnish is made by dissolving a mixture of amber and turpentine in alcohol. It must not be used as a vehicle for the application of zinc oxide.

Castor Oil and Shellac Varnish.—With 1 part shellac, ⅕ part castor oil, and 3 parts alcohol, a varnish is obtained which forms a good flexible covering easily removed by alcohol.

Canada Balsam and Collodion Varnish.—16 parts collodion with 1 part Canada balsam gives a material suitable for the application of pyrogallol, and it can be easily removed by alcohol.

Castor Oil and Collodion Varnish.—8 parts collodion and 1 part castor oil.

Lead Ricinoleate Varnish.—1 part lead oxide heated with 1·5 part castor oil to saponification and mixed with 2 parts absolute alcohol, gives a good skin varnish.

Chrysarobin Amber Varnish.—1 part chrysarobin and 20 parts of amber dissolved in turpentine.

Pyrogallol Shellac Varnish.—1 part pyrogallol, 1 part castor oil, 5 parts shellac and 15 parts absolute alcohol.

Salicylic Acid, Canada Balsam, and Collodion Varnish.—1 part Canada balsam, 10 parts collodion and 3 parts salicylic acid.

Zinc Oxide, Castor Oil, and Collodion Varnish.—2 parts zinc oxide, 2 parts castor oil and 16 parts collodion.

Zinc and Lead Ricinoleate Varnish.—5 parts lead ricinoleate, 8 parts zinc oxide, 8 parts absolute alcohol, and lastly 1 part each of collodion and ether.

Icthyol Borax Casein Varnish.—5 parts sodium icthyolate and 15 parts borax casein varnish.

Sulphur Glycerin Casein Varnish.—5 parts sulphur and 15 parts glycerine and casein varnish.

Zinc Oxide Salepbassorin Varnish.—2 parts zinc oxide and 18 parts salepbassorin varnish.

Zinc Icthyol Tragacanth Bassorin Varnish.—1 part sodium icthyolate, 2 parts zinc oxide, and 17 parts tragacanth bassorin varnish.—*Therapeut. Monatsch.*

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, MARCH 5, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE COUNCIL MEETING.

AT the meeting last Wednesday there was a full attendance, and letters were read from Mrs. PASSMORE, thanking the Council for the resolution passed at the last meeting; from Mr. HUMPHREY, thanking the Council for his appointment as Sub-Editor; and from Mr. BUTT, thanking the Council for his appointment as an auditor of the Society.

Thirteen persons were elected pharmaceutical chemist members of the Society and two chemist and druggist members. Twenty-seven persons were elected associates of the Society and twenty-eight persons were elected students.

On the reading of the report of the Finance Committee the PRESIDENT drew attention to the receipt of the annual payment for copies of the Register supplied to the Government, and to the considerable amount received from the Society's Solicitor on account of penalties and costs awarded in prosecutions for breaches of the Pharmacy Act. From the Pharmaceutical Society of Ireland payment had been received for the Journals supplied to its members, in connection with which the Registrar, Mr. FERRALL, had informed the SECRETARY that a resolution had been passed by the Council of the Irish Society acknowledging the generous terms on which the Journal had been supplied. The PRESIDENT also mentioned that among the receipts on account of the Benevolent Fund £110 5*s.* had been paid to the donation account, and that a further amount had been invested, leaving a balance in hand of £19 15*s.* 6*d.*

On the recommendation of the Benevolent Fund Committee, four grants of ten pounds each and one of twelve pounds were ordered to be paid. The SECRETARY reported the death of an annuitant at the age of 71. As the result of the consideration of the question as to increasing the amount of annuities, the report contained a recommendation that after the first of October next, annuitants above 65 years of age should receive fifty pounds a year, and those under that age forty pounds a year. In moving the adoption of the report and recommendations the VICE-PRESIDENT invited the assistance of any members who have votes for the British Orphan Asylum in support of a child of Mrs. COOKE and of a child of Mrs. WILKINSON. In regard to the amount of annuities Mr. BOTTLE expressed his gratification that the Committee had unanimously agreed to increase them, and he thanked the PRESIDENT, as well as Mr. WATT, for the support they had given to the suggestion. So far as its adoption might involve additional expenditure he felt confident that there would be no difficulty in obtaining the money requisite. Mr. ATKINS, in seconding the motion, admitted having been converted from his previous belief that it would have been wiser to distribute the charity over a larger area, and that the long discussion of the subject by the Committee had convinced him of the soundness of the recommendation. The TREASURER also gave it his hearty support, as a step that is justified, though it has some element of adventure. He thought it would furnish to many the opportunity they had sought for becoming subscribers or donors to the Benevolent Fund, and that the response would be amply sufficient to satisfy all requirements. In the long discussion which ensued the speakers mostly approved of the recommendation in the main, and it was only in regard to matters of detail that there was any difference of opinion. Thus Mr. EVANS suggested that it might be desirable to have three different classes of annuitants, receiving from £30 to £45 or £50 a year; and that after the candidates had been elected it should be left to the Committee to decide upon the amounts of the annuities awarded. To some extent Mr. HARRISON expressed sympathy with the views of Mr. EVANS, though he thought he had overlooked the fact that the selection of candidates is at present made by the Committee. To divide those selected candidates into two groups Mr. ALLEN thought would be likely to expose the Committee to suspicion of favouritism to the advantage of those who had been subscribers to the Fund. Mr. RICHARDSON recognized the good intentions of those who desired to alter the mode of election and leave it, to a great extent, in the hands of the Committee; but he thought the practical objection to that plan was to be found in the disinclination of subscribers to lose their power of influencing elections, and the consequent loss of interest in the Fund.

The suggestion that the subject should be referred back to the Committee for further consideration of these matters of detail was objected to by the PRESIDENT on the ground that a distinct principle was involved in the recommendation which ought to be decided upon by the Council, and because the points raised in the discussion were entirely outside the recommendation. He pointed out that the difference in amount according to age had been decided upon long ago, when the Council

embarked upon the policy of trusting to annual subscriptions for the payment of a large portion of the annuities. The Committee had acted upon those lines, though rather in favour of a uniform £50 annuity, which he was himself in favour of. As he pointed out the real question considered by the Committee was one of finance. By the liberality of the supporters of the Fund during the past three years a thousand pounds had been invested at 3 per cent., instead of being spent in the relief of necessity. He thought, therefore, a further three hundred pounds might safely be looked for in the future. Though the Committee would probably be the most competent body to elect candidates, the adoption of that plan would not be approved by the subscribers. The great business of the Committee being to provide for present distress on the principle that each generation should take care of its own poor, it might be considered that a subscriber who gives five shillings every year does more good than by helping to accumulate funds. He believed all that Mr. EVANS desired would be obtained by a careful scrutiny of the merits of candidates. After some further discussion, an amendment to refer back the report was put and lost, and the motion for the adoption of the report was put and carried.

On the recommendation of the Library, etc., Committee, a grant of twenty pounds was made to the Chester Chemists' Association for the purpose of obtaining materia medica specimens. The sub-Committee which had discussed with the Executive of the British Pharmaceutical Conference the project of holding conjoint meetings of the Conference and the Society, reported that further consideration of this matter did not appear likely to lead to any advantageous result. The PRESIDENT reported that the portrait of JACOB BELL, by Sir EDWIN LANDSEER, and the portrait of the late THOMAS HYDE HILLS, by Sir J. E. MILLAIS, have been received from the executors of Mr. HILLS, and are now hung on the walls of the Council room. On the recommendation of the Committee it was decided that the copy of the portrait of JACOB BELL, which has hitherto been in the Council room, should be placed in the Society's House in Edinburgh.

Mr. DAVID RUSSELL JACKS was appointed Divisional Secretary for South St. Pancras, and Mr. ALFRED WILLIAMS was appointed Divisional Secretary for the Northern division of Islington, in the place of the late Mr. BROAD.

A very gratifying communication was received from the Chicago College of Pharmacy, in reference to the death of the late H. B. BRADY, expressing in the form of a resolution the high appreciation of his character and attainments, and the deep sense of the loss sustained by pharmacy and science which the officers and members of the College entertain.

For particulars of the other matters dealt with by the Council, we must refer to the report, as the space occupied by it prevents further mention of them this week.

The very stormy and unpleasant weather on Tuesday evening did not prevent a good assembly at the Junior Pharmacy Ball, when some three hundred lovers of dancing, including the President of the Pharmaceutical Society and Mrs. Carteighe, were present, in defiance of the sleet and wind. At the supper the chair was taken by the President of the Pharmaceutical Society, who, in congratulating the Committee on the success of the Ball, remarked that the burden of the work fell upon the Honorary Secretary, and that great credit was due to Mr. Arliss Robinson for the way in which the arrangements had been managed by him. The Benevolent Fund will also share in the successful result of his exertions, for we understand that in addition to the fifteen guineas recently received as a contribution from the surplus of a previous ball, it is expected the proceeds of this year's Ball will furnish a very creditable balance to be handed over to the Benevolent Fund.

* * *

The last of the series of Professor Armstrong's lectures on "Fermentation" will be delivered on Wednesday next, the 9th March. The chair will be taken at 8.30 p.m. precisely.

* * *

A meeting will be held at 17, Bloomsbury Square, on Wednesday next, at 11.30 a.m., for the purpose of making preliminary arrangements for the Annual Dinner of the members of the Pharmaceutical Society and their friends. The chair will be taken by the President, and gentlemen interested in this annual gathering are invited to attend this meeting.

* * *

A number of letters on the subject of liquor strychniæ have been received, but owing to the length of the reports of official proceedings we are compelled to defer their publication until next week. This is also the case in regard to several other communications.

* * *

The Annual Dinner of the Chemists' Assistants' Association was held at the Holborn Restaurant, on Thursday evening. There were present about 230 members, patrons, and friends. Mr. S. R. Atkins occupied the chair, and among the company were to be noted Mr. Ernest Hart, Dr. W. M. Ord, Messrs. Bremridge, Ince, Mason, Greenish, Martindale, and others well known in pharmaceutical circles. After the customary loyal toast, that of the "Medical Profession" was proposed by Mr. A. H. Mason and replied to by Mr. Ernest Hart, his remarks being supplemented by Dr. W. M. Ord. The toast of the "Chemists' Assistants' Association," by the Chairman, was responded to by Mr. W. Lloyd Williams, the President. Mr. J. C. Umney proposed the toast of "The Pharmaceutical Society," Mr. Martindale replying, and the concluding toast of "The Chairman and Visitors," by Mr. W. A. Morris, was replied to by the Chairman. The proceedings were interspersed with music and song, and a very enjoyable evening was spent by all.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, March 2.

Present—

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Messrs. Abraham, Allen, Atkins, Cross, Evans, Gostling, Greenish, Hampson, Harrison, Hills, Leigh, Martindale, Newsholme, Richardson, Schacht, Southall, Storrar, Warren and Watt.

The minutes of the previous meeting were read and confirmed.

The PRESIDENT reported the receipt of a letter from Mrs. Passmore, thanking the Council for the very kind terms in which her late husband had been referred to, and for its generosity in continuing Mr. Passmore's salary for the remainder of the current year.

Also from Mr. John Humphrey, thanking the Council for his appointment as Sub-Editor.

Also from Mr. Edward Butt, thanking the Council for the honour conferred upon him in appointing him one of the Auditors of the Society.

DIPLOMAS.

The undermentioned, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Button, Arthur Edward.
Carter, Thomas.
Cocker, Horace Edward.
Cooling, Francis Charles.
Davidge, Henry Norris.
Emmons, Charles.
Gillies, William.
Goodwin, Francis Arthur.
Hale, Giles.
Hudson, John Edward.
King, Edgar James.
Lawrenson, George.
Postlethwaite, Thomas.
Randall, Bruford Henry.
Whitehouse, John William.

ELECTIONS.

MEMBERS.

The following, who have passed the Major examination, having tendered their subscriptions for the current year were elected "Members" of the Society.

Button, Arthur Edward.....Lincoln.
Carter, Thomas .....Chester.
Cooling, Francis Charles .....Bath.
Davidge, Henry Norris .....Langport.
Ecclestone, George Thomas ...Soham.
Emmons, Charles .....Hastings.
Goodwin, Francis Arthur .....London.
Hale, Giles .....London.
Hudson, John Edward .....Pendleton.
Lawrenson, George.....Radcliffe.
Postlethwaite, Thomas .....Kirkby-in-Furness.
Whitehouse, John William ...Scarborough.
Wilson, Arthur .....Grimsby.

Chemists and Druggists.

The following registered Chemists and Druggists who were in business on their own account before August 1, 1868, having tendered their subscriptions for the current year, were elected "Members" of the Society:—

Nelson, Joseph Jacob.....Edinburgh.
Ritchie, Thomas .....Manchester.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscription for the current year, were elected "Associates in Business" of the Society:—

Minor.

Buckley, Walter .....Castle Eden.
Cleeland, Henry .....Brighton.
Davies, John Fred ....Hay.
Henson, William John .....Norwood.
Hughes, John Smith .....Derby.
Taylor, William Carey .....Blackpool.

Modified.

Clarkson, Thomas .....London.

ASSOCIATES.

The following, having passed the Minor examination, and tendered (or paid as Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Aitcheson, John Tait .....Berwick-on-Tweed.
Andrews, John Henry .....Winchester.
Andrews, Walter.....Winchester.
Brooke, Benjamin .....Scarborough.
Bryce, James ....Lauriston.
Carpenter, Joseph Edmund ...Welford.
Duckering, Richard .....East Barkwith.
Emlyn, James Seymour.....London.
Foulkes, Edward James .....Whitchurch.
Fox, Matthew Henry .....Northwich.
Godber, James.....Alfreton.
Griffiths, Charles John .....Shanklin.
Harvey, William Wilton .. ...Derby.
Jowett, Hooper Albert D. .....Lancaster.
Robertson, Alexander .....Elgin.
Rose, James Dudfield, jun. ....Jarrow-on-Tyne.
Shaw, George Arthur.....Stockport.
Whittock, Willian Henry .....Warminster.
Whitton, Andrew Crichton ...Dundee.
Williams, Arthur John Berry..Wolverhampton.

STUDENTS.

The following, having passed the First examination, and tendered their subscriptions for the current year, were elected "Students" of the Society:—

Allen, George William .....Ongar.
Ashwin, Alice Maud .....Stratford-on-Avon.
Black, John Oswald .....St. Andrews.
Clemitson, Joseph William ...Bishop Auckland.
Crouch, William Samuel .....Epsom.
Davies, David Jonathan.....New Quay.
Dent, John Wallace ....Swaffham.
Dixon, Rowland .....Sheffield.
Hayward, Charles Edward ...Trowbridge.
Hickin, William Edward .....Birmingham.
Horsey, Frederick Samuel.....Woodbridge.
Howard, Arthur .....Ely.
Inglis, Frank .....Delph.
Inglis, James .....Biggar.
Morris, Harry Barker.....Bilston.
Norfolk, John William .....Beverley.
Pearce, William Forward .....Brixham.
Pearson, Benjamin.....Grange.
Richardson, Walter B. .. ..Brixton.
Rogers, Albert.....Weston-super-Mare.
Rolfe, William Charles .....Swaffham.
Scott, William Atha .....West Hartlepool.
Spearing, Arthur John .....Weston-super-Mare.
Staward, Richard .....Berwick-on-Tweed.
Thorp, Ernest .....Southport.
Tonge, Charles Bursall ... .Gravesend.
Walker, John Dalling.....Peebles.
Walker, John Robert.....Cockermouth.

Several persons were restored to their former status in the Society upon payment of a restoration fee and the current year's subscription and fine.

Report of the Finance Committee.

The report of this Committee having been read,

The President (as Chairman of the Committee) moved the adoption of the report and recommendations. There was nothing very special to call attention to with regard to the receipts, the annual payment from the Government for the Registers had been received, and a considerable amount for penalties and costs had been forwarded by the Solicitor. There was also a payment by the Pharmaceutical Society of Ireland for the supply of the Journal to its members, and in connection with that he might say that he had before him a letter from Mr. Ferrall, who asked the Secretary to inform the President and Council that at a meeting of the Council of the Irish Pharmaceutical Society it was resolved that thanks be given to the Council of the Pharmaceutical Society of Great Britain for the generous terms on which they had supplied the Journal to members of that Society.

Mr. Schacht asked what those terms were.

The President said the payment was £20 a year, for which a copy of the *Pharmaceutical Journal* had been sent to each member of the Irish Society. That arrangement was terminated at the end of last year, the reasons for which he need not go into at length, but the constitution of the Society had been enlarged, and a number of associated druggists were now connected with the Society, and they preferred having a trade journal instead of the *Pharmaceutical Journal*. Still they had thanked the Council for having assisted them at a time when they were not so prosperous, and he might say that when the arrangement was first made, this Council offered to supply the Journal on any terms which the Irish Society could afford, the idea being not to benefit the Pharmaceutical Society or the one on the other side of the Channel, but to aid in the general welfare and advancement of pharmacy in Ireland. On the Benevolent Fund the receipts were fairly good, including the ground rents. On the donation account there had been received £110 5*s*., out of which £100 stock had been purchased, leaving £19 15*s*. 6*d*. in hand. The payments were of the usual character.

The report and recommendations of the Committee were unanimously adopted.

Report of the Benevolent Fund Committee.

The report of this Committee included a recommendation of the following grants:—

£10 to a former member (aged 62). A previous grant of £10 was made in April, 1887. (London).

£10 to the widow (aged 42) of a former pharmaceutical chemist member and donor to the Fund. Has five children between 8 and 14, and seeks to get the youngest elected to the British Orphan Asylum. (Norwich).

£12 to the widow (aged 54) of a registered chemist and druggist, who died in 1886. She has carried on a dressmaking business, but had to give it up in 1890. (Pembrokeshire).

£10 to the widow (aged 42) of a registered chemist and druggist, who was a dispenser in an infirmary and died in January last, leaving five children under 13 unprovided for. (Stratford).

£10 to a registered chemist and druggist (aged 74), one of the unsuccessful applicants for an annuity at the last election. (Ramsgate).

Two applications had been deferred for further inquiries.

The Secretary reported the death, on February 7, of John Cooke, an annuitant, at the age of 71.

The Committee had considered the question of increasing the amount of the annuities granted, and recommended that after October 1 next, annuitants above 65 years of age shall receive £50 a year, and those under that age £40 a year.

The Vice-President, in moving the adoption of the report and recommendations, said there was nothing in connection with the grants which he need refer to, except to invite the assistance of any members who had votes for the British Orphan Asylum, in favour of Corbett Kendle Cooke, the orphan of a pharmaceutical chemist member and a supporter of the Benevolent Fund. He had also received a letter from Mrs. Wilkinson, the widow of a chemist and druggist, who did not ask any aid from the Fund, but requested votes in favour of her child, Henry John Wilkinson, at the next election to the Infant Orphan Asylum at Wanstead. This lady had provided for herself so far as she was able by taking a situation; but the child was a heavy drag upon her, and if it could be provided for, it would be a great boon. It was exceedingly gratifying to him to find that the Committee had unanimously agreed to increase the amount of the annuities; in the case of those under 65 by £10, and in the case of those over that age by £15. They were much indebted to the President for the support he gave to the suggestion, and Mr. Watt having strongly backed it up, the Committee had agreed to it unanimously. This would involve an additional expense of over £600 a year, but he felt confidence that there would be no difficulty in raising the money.

Mr. Abraham asked if the Committee was quite convinced of the desirability of making the distinction in the amount according to age. He could quite conceive of cases in which younger men might have a stronger claim.

Mr. Atkins seconded the motion. At previous meetings he expressed his conviction that it would be wiser to distribute the charity over a larger area rather than to increase the amount of the annuities, but after listening carefully to the prolonged debate in the Committee he had come to the conclusion that the recommendation of the Committee was a sound one. If he thought, as he once did, that there was a large reserve of untouched necessity behind, he should still adhere to his original conviction, but he thought that by the generous action of the Council and Society those arrears had been largely overtaken, and the question now arose whether increased comfort could be given to the annuitants. He believed the Committee was justified in the step now proposed, and therefore he assented to it, believing that it would not diminish the amount granted in what might be called casual grants. He knew that some differed from him on that point, but he had seen such splendid results from grants of this kind which he had been privileged to administer, that he should extremely regret if they were in any way endangered.

Mr. Hampson gave his hearty support to the recommendation of the Committee. It was certainly an important step, and one which he believed was justified, though it had in it an element of adventure. It could only be done in reliance on the present subscribers continuing their support, and in the hope that those who had not yet subscribed would seize this opportunity of putting their names down as donors and subscribers. It seemed to him it was an opportunity which many had sought, and that it would be readily taken advantage of. He quite agreed with Mr. Atkins as to the importance of the casual grants, which must not on any account be discontinued. Frequently the Committee was not able to give as much as it desired, and yet it would be a great hardship if that part of the work were curtailed, for he had often seen the beneficial results of it, and how permanent the effects were. It was often very useful in

the case of illness, or in supplying a little furniture, a sewing machine, or some other means by which the persons in distress might earn their own livelihood. This part of the work, therefore, must not be crippled, but he felt sure that if an appeal were made to all members of the trade, to the chemists and druggists who participated in the benefits of this Fund, as well as the members—because for years there had been no distinction made between those who subscribed to the Fund and those who had not—that the response would be such as to quite justify the step taken. This scheme had an ingredient of inequality which did not quite satisfy him, and which was no doubt a vulnerable point, but he was not prepared to say that it should be altered.

Mr. EVANS hoped that no remark he might make would do any injury to the Fund, for he believed it was the grandest institution in connection with the Society; but he did not quite agree with this scheme. He did not like tying down the hands of the Committee in this way with regard to age. There were men now in receipt of £30 as annuitants, who might possibly do very well with the £30, even if they were over 65, but according to this scheme they would receive £50, whether it was necessary or not. There were plenty of men in business in this country at the present moment who did not have a net income of £2 a week. It was an extraordinary statement to make, but he was quite convinced of its truth, and possibly even those men might be giving their mite to this Fund. £1 a week was not too much if the funds were forthcoming, but if that scale were adopted the tendency would be, if this went on to any great extent, that there would be canvassing and exchange and purchase of votes from different centres, in order to obtain these annuities. The Committee knew much better than the members how to distribute the funds, for it was very often a matter of chance how the votes were given. He thought the Committee, with the assistance of the Secretary, would be in a much better position to say who should have £45 a year, £30, or £50, according to the necessities of the case.

The PRESIDENT said he understood Mr. Evans to suggest that there should be two classes, class A and class B, and the Committee should recommend according to the facts before it which class the applicant should be placed in.

Mr. EVANS said his suggestion was that the Committee should decide the class after the election. It had been suggested that the Committee should elect altogether, but he would leave the election as it was, and then let the Committee go into the matter, inquire into the merits of the case, and say this man should be put in class A, while here is a man who will do very well in class B. He objected to the classification by age, because one man might be 67 without wife or child, who could do very well with £30, and another man at 50 might be paralyzed and require attendance and extra expense of various kinds, and he would be shut out.

Mr. HAMPSON said he had intended to take that opportunity of referring again to the further reform which he hoped would be accepted at some future time, and which would be quite as important as those now suggested, namely, with regard to the system of elections. The last time he brought this before the Council, some members seemed to think that he wished to place the entire power in the hands of the Committee, but that was not his idea. He thought there should be a hybrid Committee consisting of certain persons selected by the subscribers who should act with the Committee, so as to save the trouble of all this counting of votes, and the misery that necessarily attended the present mode of election.

Mr. CROSS said it was impossible not to sympathize with much that Mr. Evans had said, but he felt it was an insult to offer their annuitants less than £1 a week if it could be afforded, considering the position which many of these men had occupied, and some of them at least should have a higher annuity than £35 a year. Still he did feel that there ought to be some difference made between those who had been provident enough to subscribe to the Fund and those who had neglected it all their lives. It had always been a catholic Fund, but the majority had never subscribed a single sixpence to it, yet by accident they might get an annuity of £50 a year, which would be a stroke of good luck they did not deserve. He knew the reply which would be given and which was, to some extent, justified, that this was charity and not insurance, but charity ought to benefit those who gave as well as those who received, and surely it was a benefit to the chemists of this country that they should be encouraged to give, and if the Committee made some stipulation that those who had subscribed should be entitled to a larger annuity than those who had not it would be, in his opinion, a more just arrangement. There was no great hurry, and as it was quite clear that the scheme might be capable of amendment, he thought it would not suffer if it were deferred for another month. The more consideration that was given to a subject of this kind the better. Therefore, much as he disliked interfering with the work of the Committee he did not think the Committee would object to having it referred back again for reconsideration. Any regulation which would tend to increase the subscriptions would benefit not only the Fund but those who subscribed also.

Mr. HARRISON said he supported the proposition of the Committee in the main, but at the same time there was something in the view put forward by Mr. Evans that the extent of the necessity of the applicant rather than age should be the measure of the help to be given. It was quite possible a person might have arrived at a certain age and become entitled to the larger grant when the necessities of the case scarcely required it. But Mr. Evans appeared to overlook the fact that all the candidates were selected by the Committee beforehand, and he thought the Committee might be asked to divide the list into two groups, being guided by the necessities rather than age, putting in one list those it thought entitled to the larger grant, and in the second those who would receive the smaller. He should prefer that scheme to the one indicated by Mr. Cross. It would be a great mistake to make any distinction between those who had subscribed to the Fund and those who had not. He regretted that all did not subscribe, but it was not the best way to induce them to do so to show that the Fund was administered out of a large heart, and that the question was not what a man had been, but what he was at the time of the application. If the Fund were administered in that spirit he believed there would be a large accession of subscribers, and to this end they should all make an effort. He would not go into figures as to whether the Fund would bear this increased strain or not, because he took it largely on the recommendation of the Committee. They had heard that it had the support of the President, which might, perhaps, make some inclined to be cautious, but at the same time it had the hearty support of a cool-headed Scotchman, Mr. Watt. He therefore felt perfectly safe in supporting the proposal, but he was not sure that it might not go back with advantage. Some time would elapse between now and October, and two or three suggestions which had been made, as, for instance, whether the division should be one of age or one of necessity, might very well be further considered. In any case he was glad to think with Mr. Atkins that no large residuum of necessity was left undealt with, and it was therefore

justifiable to increase the amount of help given rather than spread it over a larger area.

Mr. EVANS remarked that if the Committee divided the applicants into two classes before the votes were given, it would be possible for two or three men, whom the Committee thought most desirable, and placed in Class A, to be left out altogether, there being too many for that particular class; and would thus lose not only the £50, but the £30.

The PRESIDENT said that was a matter of detail. There would probably be so many in Class A and so many in Class B.

Mr. SCHACHT said these were matters of detail which, if the suggestion were acted on that the Committed be requested to reconsider the matter, might very well be thrashed out. He rose rather for the purpose of asking what was the kind of justification the Committee felt for the belief they entertained, that a further expenditure of something like £700 might be undertaken. He noticed that last year they expended about £2000; in annuities £1595, and in temporary assistance about £500. To raise £700 more than an average amount of £2000 was rather a large sum, and though the Committee might be perfectly justified in its expectations he should like further information as to the basis on which they acted. If this further amount were not forthcoming someone must suffer. Either the annuitants must diminish in number or the amount distributed in temporary assistance must disappear. He did not consider £50 a year too large a sum to give to those who really deserved assistance, but he should like a little more information as to the position of the Fund.

Mr. HILLS said, not being a member of the Committee, he could not answer this question, but he had great confidence in the Committee. It was quite evident that if the Committee had the wisdom of Solomon there would be hardly two annuitants receiving exactly the same amount, because no two cases of need were exactly alike. Different arrangements had been suggested. The only distinction at present was that of age. He could not see why a person over fifty-five should necessarily have more than one under that age; in some cases it would be right and in others just the reverse. Other distinctions had been suggested, such as that of sex; it was quite possible that a widow required less than a married couple, and there was also the question raised by Mr. Cross, with which he had a great deal of sympathy, as to distinguishing between subscribers and non-subscribers. But taking it all round he should be more inclined to make it the same figure for everyone; this would relieve the Committee of a great deal of difficulty, and probably on the whole as much justice would be done as under the proposed arrangement. He would suggest, if the matter went back to the Committee, that the annuity at present should be raised to £40 all round; they might then have sixty annuitants instead of fifty, and surely the best way of increasing the interest taken in the Fund was to enlarge the number of those who were benefited by it. He sympathized largely with Mr. Hampson's views as to the manner of election, but that point did not arise now. If the Committee could see its way to abolish the barbarous method of election, by which candidates who were often in the greatest need were put to the unnecessary expense and trouble of canvassing, he should be very glad.

Mr. ALLEN said he was rather surprised at the view put forward by Mr. Cross. It would be simply impossible to divide those who had subscribed from those who had not. For twenty-five years they had appealed to the generosity not only of members but to those outside the Society, on the basis of the Fund being administered entirely independent of such considerations. That had been italicized in the Calendar, and had always formed the strongest ground of appeal. Many people had subscribed largely to the Fund, who were not chemists and druggists within the meaning of the Act, and could not therefore derive any benefit from it, and to alter the system which had been acted on for so long seemed to him not only unwise but impossible. This led him to oppose Mr. Evans's suggestion, because if there were two classes, A and B, it might happen that a considerable number of those who had been subscribers would get put in the higher class, and then there would be an outcry of favouritism. He rather agreed with Mr. Hills that there should be only one class of annuity. No one was placed on the approved list unless the Committee were thoroughly satisfied as to his claim, and the fact that some were placed thereon at a comparatively early age showed that age was not the only guide.

Mr. MARTINDALE supported Mr. Hills' suggestion. A uniform sum would be most satisfactory all round, and probably £40 would meet the necessity of the case at present. The age test was not a good one, because though in many cases it might reach the requirements with a fair amount of justice, in others it would not; but then private charity came in. He had some doubt whether if the annuity were raised to £50 all at once, it might not have the tendency to lead more persons to depend upon it, and thus discourage thrift and self-reliance. With regard to the system of voting, he did not think it should be interfered with; because the very fact of canvassing created a greater amount of interest in the Fund than any other means which could be suggested. The Government was now thinking of giving aid to working men of a certain age, and that Society should endeavour to aim at something considerably beyond that, though it could not grant such large annuities as those given by the medical and other professional charities. He did not think the amount should be less than £50.

Mr. RICHARDSON said he did not think the members of the Committee would feel at all snubbed if the matter were referred back for further consideration, and the effect of this discussion being made public would be to arouse interest amongst the members and the trade at large. He hoped that many would not only take an interest and give advice, but also assist with their subscriptions. He sympathized considerably with Mr. Evans's view. There were charities in his own neighbourhood where a considerable amount of discretion was left to the Committee, grants being made varying from £50 to £100, and he thought it would perhaps be better if the Committee had some discretion placed in its hands. The question of whether the annuity should be £40 or £50 would depend very much on the amount of subscriptions received, for though this matter was continually being discussed, the Fund did not get the amount of support which was anticipated. He hoped this discussion would elicit opinions from the country which would guide the Committee in its final decision, and thought it would be better if that were adjourned until after the annual meeting in May, and that if necessary the new scheme might come into operation at the beginning of next year. In some large towns the subscriptions were very meagre; for instance, he noticed that from Salford, near Manchester, which was an enormous place, the amount received was miserably small, and the question was whether the time had not arrived when in many of these large towns divisional secretaries should not be appointed who would look after not only the interest of the Society but especially subscriptions to the Fund. He believed there was more generosity among chemists if they were only waited upon than was supposed. He was strongly of opinion that it would be a great mistake to alter the mode of election. It was very kind of those gentlemen who wished it to be in the hands of the Committee, and the present was called a barbarous

method, but taking people as they were they would not like to lose their patronage, and if that were taken away the Fund would suffer.

Mr. NEWSHOLME supported the suggestion of Mr. Hills that this matter should go back to the Committee. He thought it would be well to have one class only, but did not agree that the amount should be fixed at £40. After talking about £50 and £60, to come down to £40 was hardly worth doing at all.

Mr. GOSTLING said he was very unwilling to interfere with the recommendation of any Committee, but still thought the question should receive full consideration. He was much inclined to favour one uniform amount, but should like to increase it to £45 instead of £40. It was a charitable fund, and he should be sorry to see it made an insurance fund. They had received thousands of pounds in the form of donations, on the understanding that the Fund was available for every chemist and druggist, and they as members of the Council, as trustees, ought to adhere to that condition. He thought there was every reason to hope that the income would be larger than it ever had been previously, otherwise it would not be safe to adopt this recommendation. The chemist and druggist, as a rule, enjoyed a comparatively happy and easy income—he did not say it was a large one—far from it, but he cut his garment according to his cloth and lived in comparative ease. It was not the amount of income that determined a man's happiness, but the peaceful condition of his mind; and it would be rather hard on anyone who had been in such a position to have to come down to £35 a year. He should be glad to see it £45 all round, or £45 to one class and £50 to another.

Mr. WARREN said the privilege of belonging to the Fund was so easy of attainment to any chemist, however poor, that he sympathized to a great extent with the remarks of Mr. Cross that those who subscribed should be entitled to the higher annuity, if anyone had it. He could not understand how any chemist in the present day, knowing how the Fund was administered, did not between the age of 20 and 30 put by some half-crowns yearly towards it. The great thing was to get people in the habit of giving while they were young. He had commenced with half-a-crown as a student, and he thought it ought to be looked upon as a natural step when the examination was passed that everyone should subscribe at least that half-crown for the good of his fellows. If that were impressed upon young men at the time, he believed it would have a good effect, and if they commenced in that way, they would be likely to continue.

Mr. STORRAR as a member of the Committee had no objection to the question being remitted for further consideration. It was very pleasant to find an unanimous opinion that the amount of the annuity should be increased. Mr. Schacht had asked a question as to the means of providing the additional amount required, but if he looked at the Benevolent Fund Balance Sheets, he would see that for the last few years they had been improving. The proposed increase would require £600 or £700, and increasing the annuities to £40 would cost nearly £300 per annum extra, but without decreasing the casual grants, the Committee could see its way to at least going to the £40, and he thought the members of the Society and the trade might safely be trusted to provide the amount required to raise it to £50 if the Council thought fit. He sympathized with Mr. Hills' view, that it would be better, if there were any necessity for it, to increase the number of the annuitants rather than the amount of the annuity, but they were told on good authority that every approved candidate had been elected for several years back, and if that were the case he thought it was time tto raise the amount. If the matter were reconsidered he Committee could go over the whole of the ground once again. As to the mode of election he sympathized with Mr. Hampson, believing there could be no worse system than the present; but at the same time it might be politic to continue it. It must be remembered that an annuitant in the country could live on £40 quite as well as a man in town could on £50, therefore he thought the subscribers should be asked to vote for the candidates and leave the power in the hands of the Committee to say which candidates elected should receive the £50 or the £40.

Mr. EVANS said he would suggest that the matter be referred back to the Committee to consider the proposition that annuitants should be divided into two classes, one half to receive £50 per annum, and the other £30, and it should be in the discretion of the Benevolent Fund Committee as to which class each annuitant should be placed in when elected.

Mr. HILLS asked if it was suggested that there should be an annual revision. Suppose an annuitant took a wife, or removed from town into the country or *vice versâ*, were all these matters to be taken into consideration by the Committee.

Mr. EVANS said if an annuitant got married the annuity ought to be forfeited.

Mr. HARRISON thought it would be much better for it to go back to the Committee with power to make any amendment in the scheme it liked.

The PRESIDENT said he objected altogether to that. There was an important principle involved in this report, which ought to be decided by the Council itself. The Committee had been asked to consider the desirability of increasing the amount of the annuities, not any question of classification, and therefore that had not been referred to. It was entirely outside the recommendation. The difference in amount, according to age, was determined upon years ago at a time when the Council had the boldness and enterprise to trust to the annual subscribers to make up the amount required for the additional annuities. It embarked then on a policy, which had proved thoroughly successful, of trusting to the stability of the subscriptions, having only enough income from interest on capital to pay for half the annuities. Whether it was wise to make the division he was not prepared to say, but that was a very small matter. There were only eight persons in the lower class, and next year there would be only six, and he believed the feeling of the Committee was in favour of making the annuity a uniform £50 rather than having two classes. That he believed was the proper thing to do, but the Committee had simply acted on the present lines. If a person were deserving of an annuity, he could not see why there should be any division at all, either on the ground of age or sex; and if there was to be one class only all should have £50. As a rule the applicants were aged. The real question considered by the Committee was one of finance; and, as Mr. Storrar had pointed out, the subscribers and donors had been fairly liberal during the last few years, and a certain amount had been invested. During the past three years, instead of having spent £1000 on the relief of necessity it had been invested at 3 per cent. The Committee thought that with the tendency of the Fund to improve and with the popularity this increase would invoke, it might safely look to get in another £300 a year, commencing from October next.

Mr. RICHARDSON asked if the amount not spent in one year could not be carried forward.

The PRESIDENT said that legacies, donations and subscriptions not used during the year had to be invested. Assuming the subscriptions kept up to their present amount, another £300 would meet the case with the present number of annuitants. He did not think the Committee would seriously object to abolishing the distinction of age. On many points he agreed with Mr. Evans that the Committee

was probably the most competent body to determine the relative eligibility of candidates, but he was asking to take a certain portion of the privilege of subscribers out of their hands and put it into those of the Committee, and he was sure that would not be agreed to by the subscribers. The best policy was to administer it in the most catholic way; not to put anybody on the list unless he or she were deserving, and then to give everybody £50 a year, and let the subscribers elect. If it were left to the Committee to determine whether the person elected should have £30, £40 or £50 a year, the effect would be that pressure would be put upon the Committee by the friends of candidates, which would be absolutely irresistible; in fact, the plan would be utterly impracticable. He hoped the Council would not refer this report back. The only logical course was to abolish the distinction of age altogether, but the Committee had had nothing to do with that. That reform could be carried out at any future time. He felt certain that the more the Society was able to give the more successful the subscription list would become. Under the rules, legacies and donations had to be invested, and he should propose to ask their friends, who now gave donations which the Council was bound to invest to give subscriptions. It was no part of the business of the Committee to get donations to a fund to provide for posterity, but simply to provide for the distress of the present, though he did not say it was not desirable to have a certain amount of capital to fall back upon. Still every generation ought to take care of its own poor, and for the purpose of the fund a subscriber who gave 5*s.* every year did more good than if he gave a £10 donation.

Mr. EVANS said it was a good thing their forefathers did not think so.

The PRESIDENT said there was much to be said on the other side. Their forefathers had produced a number of abuses which it had taken numberless Acts of Parliament to remedy, and there was often the greatest difficulty to know how to deal with large accumulated funds given for particular purposes. He was not sure that their successors would not have to go to Parliament to know what to do with the vast property which was now being accumulated in freehold ground rents. Mr. Evans' proposition was an illogical one, but it involved a departure in principle which the Committee had not dealt with, and it would certainly be a very dangerous, if not impossible task for the Committee to undertake to apportion the relative merits of candidates, and determine that one should have £10 more than another. The subscribers would resent it, and he believed all Mr. Evans desired would be obtained by a careful scrutiny of the merits of the candidates. What a father could do with his children or a sole trustee could do with a trust, was not a thing which the Council or a Committee could undertake with safety. He hoped the matter would be decided at once, and that all the members of the Council would take up this matter with courage and determination. He felt sure that the two past Presidents now looking down upon them from the walls—Jacob Bell and Thomas Hyde Hills—would be very pleased if they could know what the Council was doing.

Mr. EVANS then suggested that the question should be adjourned for a month, in order to elicit the opinion of outside members of the Society.

Mr. GOSTLING: As the number under sixty-five years of age was so small, he thought it would be as well to give every one £50.

Mr. SCHACHT said as he understood now from the altered condition of the Fund the Committee thought it would be safe to dispense to all their annuitants £50 a year. He should therefore give the motion his unqualified support.

Mr. RICHARDSON said he was very glad to find the Committee was putting by money, which he was not aware of, but he hoped it would not prevent additional subscriptions from coming in, because there was quite sufficient poverty in their ranks to warrant having more annuitants.

The PRESIDENT again expressed the hope that the matter would not be adjourned.

Mr. HILLS thought it was quite evident there was something more to be said, especially with regard to the distinction of age.

The PRESIDENT said he was quite ready to accept an amendment that all annuitants should have the same sum.

Mr. HILLS said on the face of it, it was absurd that a person of 64 should get £40, and a person at 66 should get £50.

Mr. SOUTHALL hoped the question would be left for another month, as he thought it would be a great advantage to the Committee and to the constituencies that it should be further discussed. They often heard from their constituents that they had no opinion to express on matters put before them, but this was a matter on which they probably would express opinions.

The PRESIDENT said in reply to Mr. Hills' question whether he should prefer fifty annuitants at £50 to sixty at £40, he should say he would prefer sixty at £50, and that was what he hoped to see.

Mr. HILLS said that was not the question.

The PRESIDENT said the Committee believed the number of annuitants need not be diminished by the increase in the amount.

Mr. EVANS moved that the decision be adjourned to the next meeting of the Council. The object of everybody was to create as much interest as possible in the Fund, and members reading this discussion would naturally be interested, and many would take the trouble to express their views upon it. If there was such a strong case why should there be so much disinclination to adjourn it.

Mr. HAMPSON said although a member of the Committee he would second the amendment. He could not understand the attitude of the President, who seemed inclined to force this matter through with unnecessary haste. He did not see that any inconvenience would arise by the delay of a month.

Mr. SCHACHT said it was only a question of form, but there was a rule that every motion should have notice given of it, and it seemed a little out of order to introduce an alteration in the administration of this Fund in a fundamental particular without notice being given.

Mr. RICHARDSON again expressed his opinion that a gentleman who had spent his life in toil, when he fell into reduced circumstances ought to have a larger sum than the miserable amount now given.

Mr. MARTINDALE did not want the Fund to suffer in any way, but did not see what harm would be done by postponing the matter.

The PRESIDENT said he only wanted the Council to approve the recommendation of the Committee that an increased amount should be given. If desired the Committee could afterwards consider whether there should in future be only one class, but that was quite outside the present recommendation.

Mr. ALLEN asked if the Council could not go a step further and agree to do away with two classes in future; they had spent a good deal of time in discussing it, and might as well settle it at once.

Mr. EVANS said the majority could always do what it liked, he appealed to the majority to defer the decision, feeling sure that further discussion outside would only benefit the Fund.

The PRESIDENT thought it would do much more good to the Fund to decide at once on increasing the amount of annuities. If it were deferred for a year some sort of expression of opinion might be obtained

from the members, but how many could be expected to come in during the next month. He must again protest against an adjournment.

Mr. WATT said he had not intended to speak on this question, but he had endorsed every word the President had said, and it was a great satisfaction to him that the Committee, after the fullest discussion, unanimously came to this resolution. He was surprised at members of the Committee endeavouring to delay the matter; if it were adjourned it would be impossible to make every one of one mind. Differences of opinion had been expressed, but he thought the objections had been answered. The question of age had not been fully considered by the Committee at all. Now was the time when the subscriptions were coming in to decide the matter, and to wait for any indefinite expression of opinion was utterly impracticable. The Council was quite competent to deal with the matter without any aid from outside. The first person he spoke to on the subject told him he would double his subscription, and no doubt many more would do the same when the approaching change was made known.

Mr. ATKINS did not see how the matter would be advanced by sending it back to the Committee, unless the whole Council attended. He should be delighted to reconsider it any number of times, but there were such points of difficulty raised that he could not see his way through them. He supported the recommendation of the Committee because it went to work tentatively, and he was not sure that the scheme for making the annuity uniform would bear examination. There was something to be said on the other side; that a younger man ought still to have some power of helping himself, and if the younger age were levelled up to the maximum it might tend to discourage thrift. He supported the Committee's recommendation because it was definite and yet tentative; there was no finality about it. Mr. Evans or Mr. Hills might bring forward their suggestions afterwards.

Mr. EVANS said it was new to him that the Committee had power to modify the report which had been adopted by the Council.

Mr. ATKINS said this might be adopted and further suggestions brought forward on a future occasion.

Mr. SCHACHT said if the report were carried the division of age was continued, but it would be competent to raise the question at the next meeting of abolishing that difference.

Mr. HILLS said he should prefer to abolish that age qualification and he would increase the annuities as well. He suggested £40 because that was tentative, and later on it might be raised to £45 or £50, if found practicable. As the President was so strong in opposition to this going back to the Committee, he should throw all the responsibility on the Committee, and would say no more about it, though he thought it was deciding the matter rather hastily.

The PRESIDENT said there was no regulation as to the number of annuitants, as Mr. Hills seemed to suppose; but each year in October the Council decided whether it would elect any more and how many; it was not a question of vacancies.

Mr. STORRAR said the Committee's proposal was a definite one, of an annuity of £50 above the age of 65 and £40 below; and he should suggest that the Council adopted the report so far as it recommended that the annuities be increased, but remit it back to consider the question of age. He could see no harm in letting it stand over for a month. The Council was unanimous that the amount should be increased.

The PRESIDENT said if Mr. Evans wished it he would put his motion for adjournment, but he hoped it might not be necessary, as it would be losing a great opportunity for good during the ensuing month. Many points came up in Committee which could not be gone into fully in Council, but he felt certain he should persuade all members of the Council in Committee, of the desirability of increasing the amount of annuities to a handsome sum, which really as a matter of convenience was urgent and politic, and that it would suffer by a month's delay.

The amendment that the portion of the report referring to the increase of annuities be referred back was then put and lost.

Mr. HARRISON said he did not vote for that amendment, because he did not care for it to go back in that indefinite form without the Council giving any opinion on the main principle of the recommendation. The Committee last month was requested to consider the report whether the amount paid to annuitants should be increased, but it did not consider other questions because it was not asked to do so. Now it seemed to him very desirable when making an alteration in such a matter that it should be done once for all, and not from time to time, and he would prefer to move as an amendment that the Council agree with the Committee that the amounts paid to annuitants should be increased, and request the Committee now to consider the expediency of abolishing the classes of annuitants, or if that be found inexpedient, to determine whether the distinction should be made to depend on the extent of the necessities of the applicant or the age.

Mr. CROSS seconded the amendment.

The VICE-PRESIDENT asked if this was an amendment.

The PRESIDENT said it seemed to him to be bringing in new matter, of which notice must be given, as it altered the principle of the distribution. The Committee was asked to consider the question of amount, and that was the only question it had dealt with.

Mr. HARRISON said he would submit to the President's ruling and give notice of motion for next month.

The motion for the adoption of the report and recommendations of the Committee was then put and carried.

REPORT OF THE LIBRARY, MUSEUM, SCHOOL AND HOUSE COMMITTEE.

Library.

The report of the Librarian had been received, including the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
January	Day . .	528	29	0	20
	Evening .	144	15	1	7

Circulation of books.	Total.	Town.	Country.	Carriage paid.
January . . .	184	110	74	18*s.* 5*d.*

Donations to the Library had been announced (see pp. 660–61), and the Committee had directed that a letter of thanks be sent to each of the donors.

The Committee recommended the purchase of the undermentioned works:—

For the Library in London—

Cooley, Cyclopædia of Practical Receipts, 7th ed., 1892, 2 copies.
Wagner, Manual of Chemical Technology, 1892.
Tschirch, Indische Heil- und Nutzpflanzen, 1892.
Husemann, Handbuch der Arzneimittellehre, 1892.
Bocquillon-Limousin, Formulaire des médicaments nouveaux, 1892.
Streatfield, Practical Work in Organic Chemistry.

For the Library in Edinburgh—

Cooley, Practical Receipts, 7th ed., 1892.
United States Dispensatory, latest ed.
Richter, Organic Chemistry.
Dymock, Pharmacographia Indica.
Streatfield, Practical Organic Chemistry.
Kew Bulletin, vols. 1–5.

The Committee had recommended that an additional

book-case be erected in the west library (old council room).

Museum.

The Curator's report had been received, and included the following particulars:—

	Attendance.	Total.	Highest.	Lowest.	Average.
January	Morning	553	37	1	21
	Evening	63	9	1	2

Donations to the Museum had been announced (see page 661), and the Committee had directed that a letter of thanks be sent to each of the donors.

The staff of the Society's School had attended and reported on the respective classes under their charge.

The application from the Chester Chemists' Association was considered, and the Committee had recommended that a grant of £20 be made for the purpose of obtaining materia medica specimens.

The Sub-Committee which had met the Executive of the British Pharmaceutical Conference and discussed of holding in conjunction with that body meetings in the country, had reported that nothing appeared likely to be gained by further consideration of the matter.

The PRESIDENT had reported the receipt from the executors of the late Thomas Hyde Hills of the two portraits mentioned in his will, viz., one of Jacob Bell, by Sir Edwin Landseer, and the other of himself —the testator—by Sir J. E. Millais.

The Committee had recommended that the copy of the portrait of Jacob Bell be placed in the Society's House in Edinburgh.

The PRESIDENT, in moving the adoption of the report, said the first portion simply gave the usual detailed account with reference to the Library and Museum. The next paragraph was with reference to the question how far it was wise or expedient, or under what conditions it was practicable to hold meetings of the Pharmaceutical Society in the provinces in conjunction with the British Pharmaceutical Conference. The subject had been referred to the Committee, and the first thing done was to hold a conference with the Executive of the British Pharmaceutical Conference. Recently a committee of that executive met a sub-committee of the Library Committee, and the result of that meeting was quite clear to those present, namely, that in the present condition of things, having regard to the want of instructions from the members of the Conference on the one hand and on the other the delicacy which the Executive felt in dealing with it, no advantage could arise from continuing the discussion with the Committee of the Conference. That, of course, left the Council free now or hereafter to take any course of action which might seem expedient. The Chester Chemists' Association had applied for a grant for materia medica specimens, and a sum had been voted for that purpose. The last two paragraphs of the report referred to the two portraits now on the wall of the Council room. A vote of thanks had already been sent officially for these gifts, to the executors of Mr. Thomas Hyde Hills; and he need only say that those portraits were priceless, whether from the art point of view or from the point of view of pharmacy. Inasmuch as Mr. Hills some years ago gave a copy of Jacob Bell's portrait to the Society, by another artist, it was now recommended that that copy should be placed in the Society's house at Edinburgh, where Jacob Bell was exceedingly well known.

Mr. HAMPSON, in seconding the motion, said he was sorry the consultation with the representatives of the British Pharmaceutical Conference had not resulted in any plan of carrying out the desires of the Society. There was, of course, no desire that those meetings in the provinces should be in any way antagonistic to the Conference; but rather that in some way they should be amalgamated, and thus bring about some arrangement which would in no way interfere with the success of the work already accomplished by the Conference. But it was quite clear there was no hope of anything in the nature of an amalgamation, and that the two bodies must for the present act independently. Perhaps the time might come when the subject might be re-opened. With regard to the two portraits, that of Mr. Hills was a wonderful likeness and recalled his presence in the old Council Chamber. In that portrait he saw not only the early steps of a grand picture but a wonderful living likeness of a man; and it was a remarkable result of three hours' work. Not only the form, but the manner, posture and well-known attitude of Thomas Hyde Hills was portrayed, and the Council was extremely fortunate in having it. The other portrait bore rather a melancholy aspect. It was taken, he believed, five days before Mr. Jacob Bell passed away, and when he was almost in a moribund state. Still it was extremely valuable, if anything the more valuable of the two, as it represented the founder of the Society.

Mr. SCHACHT said he feared the President took the correct view in saying that no advantage would accrue from a continuation of the approach to the Executive of the British Pharmaceutical Conference, but he did not think it was therefore impossible that at some future time the Conference and the Society might come together in this work. The Executive of the Conference laboured under the difficulty that it had no means of approaching its constituency, so to speak, before meeting the Committee, or of collecting the opinions of those whom it represented, and therefore it felt bound to proceed on the lines of its antecedents and not of its own motion to take any very special action in the way of a new departure. Still, as a member of both Associations, he could not help saying that he thought it was quite possible at some future time to resume the consideration of the possibility of moving together for the purposes of both. The two portraits referred to were lifelike representations of the individuals whose memory they perpetuated, and he rejoiced to see a real reflection of them in the mind of the respective artists. It was one thing to get a photograph and another thing to get an impression which one man conveyed to another mind.

Mr. ATKINS said it was quite evident to the Committee that it was quite hopeless at present to pursue any further investigation in conjunction with the Executive of the Conference; but he trusted that Mr. Schacht would not be discouraged in the initiative he had taken from his own point of view, with regard to the Society becoming better known in the provinces by visits which might be afterwards determined upon on either a large or smaller scale. He did not see why the one thing should be made to depend on the other in the slightest degree. The importance of the Society becoming in one sense peripatetic remained to be argued, and he thought Mr. Schacht had made out a very strong *primâ facie* case, the best proof being the altered state of opinion in certain parts of the country since the President visited them some time ago and made statements on the policy of the Society. At present the lines on which the Conference moved precluded it doing the particular kind of thing which he desired to see done, because so long as it moved along the same orbit with the British Association it could not touch that large number of smaller towns which were unable as yet to receive the British Association. But there still remained a great deal of ground to be covered in making known the principles and policy of the Society in the country generally. He entirely agreed with what had been said by Mr. Hampson with regard to the portraits. He had not the honour of knowing Jacob Bell very intimately, he

often wished he had; but he did know Thomas Hyde Hills, and had received manifold expressions of kindness from him which he should never forget.

The report was then unanimously agreed to.

The Annual Report.

It was resolved that the preparation of the annual report be referred to the Library, Museum and Laboratory Committee.

The Annual Meeting.

It was also decided that the annual meeting be held on Wednesday, May 18.

Divisional Secretaries.

The President moved that Mr. David Russell Jacks, of Gower Street, be appointed Divisional Secretary for South St. Pancras. A conference had recently been held of the London Divisional Secretaries, in conjunction with the Library and House Committee, when a general discussion with regard to pharmacy laws and trade matters took place, and much useful information was elicited. He was able to assure those gentlemen that the Council heartily appreciated their personal efforts, for whether a man were Local Secretary, Divisional Secretary, President, Vice-President or Member of the Council, his power for good was directly proportional to the amount of personal effort he put forth. He had also to propose that Mr. Alfred Williams, 195, Seven Sisters Road, be appointed Divisional Secretary for the northern division of Islington, in the room of Mr. Broad, deceased.

Both appointments were unanimously agreed to.

Report of the Ground Rents Committee.

The report of this Committee recommended the purchase of certain ground rents at Gunnersbury.

The President, in moving the adoption of the report, said two or three suitable purchases had been lost through not being able to come to terms with the vendors; in this case the property seemed very suitable, and though the sum required was not so large as the amount ready for investment, other houses were being erected in the immediate neighbourhood, which would be probably available in the course of twelve months. The bargain was not yet completed, but was only awaiting the assent of the vendor to certain conditions, which the Committee had thought it necessary to impose. The interest returned would be a fraction under 4 per cent.

The report and recommendation were unanimously adopted.

The Late Henry B. Brady.

The President said he had before him the following very gratifying address, which had been received from the Chicago College of Pharmacy.

To the Officers and Members of the Chicago College of Pharmacy.

Your Committee appointed to draft suitable resolutions expressive of the feeling of this body upon learning of the death of Henry Bowman Brady, would most respectfully submit the following:—

"That in the death of this distinguished savant, pharmacy and the pharmaceutical profession the world over loses one of its valued members. Not only pharmacy, in which he received his early training and to whose literature he made his first scientific contributions, but also the greater and broader field of natural history, in which he spent years of laborious research, and which accorded him the distinction of the foremost authority in his special branch of learning."

The Chicago College of Pharmacy feels his loss all the more keenly from the fact that through his philanthropic spirit and his interest in extending pharmaceutical education it was materially aided by the pharmacists of Great Britain in its re-establishment when through the great conflagration of 1871 it had lost its all.

It is therefore meet that the Chicago College of Pharmacy should place upon record its appreciation of his disinterested friendship. Therefore be it Resolved: "That in the death of Henry Bowman Brady we have lost a loved, honoured, and respected friend, society an ornament, and the pharmaceutical profession one of its brightest members, whose honoured career has illumined its history."

Resolved: "That we extend to his bereaved family and friends all the condolence and sympathy that hearts can feel or words express. Trusting that He who ruleth over all will comfort and console them in their great affliction and be very near to them through all their days in the years to come."

Resolved: "That these resolutions be transmitted to the family of our deceased friend, and a copy to the Pharmaceutical Society of Great Britain and to the British Pharmaceutical Conference, and that a page of our records be inscribed to his memory."

Respectfully submitted,

(Signed) { Albert E. Ebert. / Wm. K. Forsyth. / C. S. N. Hallberg. } Committee.

He would suggest that it be entered on the minutes.

Mr. Schacht thought a document of this kind might be framed and hung on the walls.

The President said he quite agreed with the suggestion, and would move that the House Committee be requested to have the address properly framed and hung on the walls of the Society. He would also send a suitable reply to the Chicago College.

The motion was agreed to.

Report of the General Purposes Committee.

The report of this Committee included the usual letter from the Solicitor, stating the progress of cases placed in his hands.

One defendant had paid two penalties and nominal costs; judgment had been given in one case in favour of the Society, and two defendants had paid instalments.

Six cases of alleged infringement were considered, and in each case the Registrar was authorized to take proceedings under the direction of the President.

The above report was, as usual, read and considered in committee.

On resuming, the report and recommendations were unanimously adopted.

Report of Examinations.

ENGLAND AND WALES.

February, 1892.

	Candidates. Examined.	Passed.	Failed.
Major	27	15	12
Minor	57	24	33
	— 84	—39	—45

First Examination.

Eight Certificates were received in lieu of this examination.

SCHOOL OF PHARMACY EXAMINATION QUESTIONS.

PRIZE EXAMINATION.

Pharmacy and Practical Pharmacy.

Mr. Ince.

BRONZE MEDAL.

Session, 1891-92.—*Winter Course. Friday, February* 26.—*Time allowed*—2 *p.m. to* 5 *p.m.*

The following are the questions that were set for this examination:—

1. Describe official Sugars and explain their use in pharmacy other than in the preparation of Syrupi.
2. Write a dispensing note on methods employed in the suspension of insoluble substances.
3. Classify the preparations of mercury, indicating strength and dose.
4. Make Syrupi Papaveris, Rhei and Sennæ.
5. Translate into technical uncontracted Latin, the sentences given.

EVENING MEETING IN EDINBURGH.

Wednesday, February 24, 1892.

MR. J. LAIDLAW EWING IN THE CHAIR.

The fourth Evening Meeting in Edinburgh of the present session was held in the Society's house, 36, York Place, on Wednesday, February 24, at 8.30.

The minutes of last meeting having been read and approved, a letter was read from Mr. D. B. Dott, stating that, owing to the serious illness of his father, he could not attend the meeting. Apologies were also received from Mr. J. B. Stephenson and Mr. J. Nesbit, Portobello.

In the absence of Mr. Dott the following communications were read by the Assistant-Secretary:—

NOTE ON CALAMINE.

BY D. B. DOTT, F.I.C., F.R.S.E.

The name calamine appears to have been applied to two different minerals, the native carbonate and the native silicate of zinc. In medicine, however, only one calamine has ever been recognized; that being the native carbonate, purified by roasting and levigation. This is the prepared calamine of the British Pharmacopœia. The native carbonate occasionally contains other metals; iron, manganese, calcium, magnesium, lead and copper having been found associated with the zinc. Christison, in his 'Dispensatory,' mentions that sulphate of baryta is used as an adulterant of calamine. The object of this note is to call attention to the fact that much of what is called calamine, consists largely of sulphate of barium, and in some cases contains no zinc at all. In short, the so-called calamine is evidently a manufactured article, having no resemblance to the real substance, and incapable of passing even the lax test of the Pharmacopœia. Six samples from various respectable sources were examined qualitatively, and four quantitatively. A portion of the sample was treated with hot hydrochloric acid; potassium chlorate being added to aid the solution and to peroxidize the iron. The washed insoluble residue was fused with a mixture of sodium and potassium carbonates, the mass treated with water and so separated into an insoluble portion and a solution. This insoluble portion dissolved almost completely in dilute hydrochloric acid; the solution giving a greenish colour to the flame and an abundant insoluble precipitate with sulphuric acid, indicating barium. The alkaline filtrate from the fused mass was rendered acid with hydrochloric acid, and evaporated to complete dryness in order to render insoluble the silica if any were present, but only in one case was there anything more than traces of silica. The alkaline solution gave strong evidence of sulphuric acid, showing that the barium had existed as sulphate. Returning to the original hydrochloric acid solution, it was found that hydrosulphuric acid produced no precipitate in any case. The solution was rendered alkaline with ammonia and excess of ammonium sulphide added. This precipitate was completely dissolved by dilute hydrochloric acid, peroxidized by potassium chlorate, nearly neutralized by sodium carbonate, and heated to boiling with excess of sodium acetate. By this means the iron and alumina are completely precipitated. The filtrate was tested for manganese by warming with bromine with negative results. In some cases sulphide of ammonium produced a precipitate of zinc sulphide in this filtrate. The filtrate from the iron group was tested for calcium, magnesium, etc., in the usual way. In some cases calcium was indicated, magnesium never. In no instance was barium indicated at this stage, showing that it had been added as sulphate in all cases, and not as carbonate. From the results of the qualitative examination it was evident that a simpler scheme would suffice for the quantitative analysis. A weighed portion of the sample was digested in hot hydrochloric acid, a little potassium chlorate being added, the solution diluted slightly and filtered. The residue was washed with boiling water, dried and ignited, and reckoned as barium sulphate. The filtrate was then mixed with large excess of ammonia, the precipitate thereby produced being ignited, and reckoned as ferric oxide, alumina, etc. To the filtrate sulphide of ammonium was added, the dried precipitate being cautiously ignited with nitrate of ammonium, was then strongly ignited for half-an-hour to convert the sulphate entirely into oxide. I have found this method to work fairly well, and it saves the trouble of igniting in hydrogen, when one has not the apparatus ready. To the filtrate from the zinc precipitate, carbonate of ammonium was added to precipitate the lime, the precipitate being collected after some hours, and strongly ignited to convert into oxide.

The following is a summary of the results obtained:

	No. 1.	No. 2.	No. 3.	No. 4.
Barium Sulphate	92·10	50·34	40·14	29·17
Calcium carbonate	4·79	17·89	52·72	nil.
Ferric oxide, etc.	3·32	1·56	1·33	4·49
Zinc basic carbonate	nil.	28·84*	5·74	66·90
	100·21	98·63	99·93	100·56

Two other samples were examined only qualitatively and very closely resembled No. 1. The critic will at once observe that the totals do not make exactly 100. This is easily accounted for. It would be impossible for instance to say whether the zinc exists as basic carbonate, as basic carbonate containing an excess of normal carbonate, or as basic carbonate containing oxide, without an elaborate analysis which would be a foolish waste of time. The results are amply sufficient for their purpose, which is to show that the article which is generally supplied as calamine has no right whatsoever to that designation.

The CHAIRMAN said his attention had been recently directed to this substance by Mr. Donald McEwan, an ex-President of the Assistants' Association. The presence of sulphate of baryta in commercial calamine had engaged the attention of pharmacists about forty years ago, and the samples then reported upon seem to have corresponded pretty much to those referred to in this note. From a paper by Mr. Davies, of Harrogate, read at a meeting of the British Pharmaceutical Conference in 1866 it appeared that a great improvement had taken place at that time.

Mr. DAVIES expressed the hope that when next commercial samples were examined they would all be found to be pure. Since that time calamine had, to a large extent, gone out of use, but it seemed to have come back again and had been re-introduced to the Pharmacopœia. The results obtained by Mr. Dott seemed to indicate that they were still very far from the satisfactory state of things to which Davies looked forward. With regard to the effect of sulphate of

* Oxide in this case.

baryta on the skin he could hardly venture an opinion, but perhaps Dr. Stockman could enlighten them on that point.

Dr. STOCKMAN said he had once analysed a sample of calamine, and while testing for zinc found that it consisted, to a very large extent, of silica in a state of fine powder. With regard to the use of calamine in medicine he knew of no special reason why it should be employed. It had been said that it was much cheaper than the pure carbonate of zinc, but that could hardly be a sufficient reason. It would be much better to use the pure article than an indefinite mixture. With regard to the action on the skin of sulphate of barium he did not think it would be hurtful if it was in very fine powder. As a dusting powder almost any very fine powder was suitable. But if calamine was to be used as an ointment they would desire to have a less insoluble substance, the theory being that the zinc would be acted on by the fatty acids and partly dissolved. If calamine was to be used at all it certainly ought to be got as pure as possible.

Mr. BOA said he had a general impression that commercial calamines were highly sophisticated. The only advantage the native carbonate of zinc had over the pure article seemed to be the fine flesh tint which it gave in lotions such as those of Dr. Startin. This tint could not, apparently, be got by the use of carmine or similar colours. Beyond that he did not think calamine possessed any advantage, and the pure carbonate was best and should be preferred.

Mr. D. McEWAN said he had brought to him by a friend some samples of calamine which attracted attention by their variation in weight. This point reminded him of a paper by Mr. Bennet, read at a meeting of the Assistants' Association a few years ago, and on examination it was found that the heavy variety consisted of sulphate of barium coloured with ferric oxide. The only reason for the use of calamine seemed to be the fine flesh tint it gave, and that could easily be got if desired by adding a little ferric oxide to the official zinc carbonate. He thought the addition of calamine to the Pharmacopœia was quite unnecessary, and it would be an advantage to have pharmacists more adequately represented on the Pharmacopœia committee, so that such errors might be avoided.

Mr. ARTHUR said he had had a considerable experience in the use of calamine and had observed its variation in density. He had handed to Mr. Hill three samples which showed this quite distinctly. One of these samples had a fine flesh tint and effervesced briskly with hydrochloric acid; but it was easy to see that it was not natural, but a mixture. The other two samples effervesced only slightly with hydrochloric acid, and a rough examination failed to indicate either zinc or barium. Christison admits that the genuine calamine may not effervesce with acids if prepared by roasting and elutriation, as recommended in the Pharmacopœia. He (Mr. Arthur) could see no reason why zinc oxide should not answer all purposes for which calamine is employed. It was largely employed as a diluent of calomel for dusting syphilitic and other ulcers, and for this purpose the oxide would answer equally well,

Mr. HILL said Mr. Dott had not apparently met with a sample of what was known as silicious calamine, such as Mr. Bennet found one of his samples to be. It was quite possible that some of these commercial calamines might be sent into the market quite honestly, as they were found together in the same geological formation, and might be accidentally mixed in the operation of mining. But some of them, and specially those having a fine flesh tint, were manifestly factitious; and consisted of barium sulphate, rubbed up with ferric oxide. By shaking a little of the sample off a spatula into a bunsen flame, a green colour, indicating barium, was produced; and by firmly drawing a steel spatula across the powder on a white sheet of paper, the red streaks of ferric oxide could easily be seen. It would seem that in spite of the attention already called to this subject, the substances found in commerce were just as bad as ever. There seemed no good reason for the use of calamine, beyond the fact that it gave a pleasant colour. Genuine calamine, as a rule, had not the fine pink tint, but was rather of a greyish-brown colour. He had placed on the table a sample of native calamine in mass, which had been analysed and found to be of good quality, and it would be seen that it would never yield the fine pink tinted powder so much desired. He had also put on the table a specimen of genuine calamine powder, presented to the Museum many years ago by J. Bell and Co., London, and it also was of a dull greyish-brown colour. It was for the medical profession to say what substances should be included in the Pharmacopœia, but in view of the results obtained by Mr. Dott and the apparent difficulty in securing any improvement in the quality of the article supplied, it would require some better reason than any he had seen to justify the retention of such a substance in the list of official materia medica. The official carbonate of zinc, or, better still, perhaps, the oxide was quite suitable for all purposes, and if a flesh tinted powder must be had it could easily be produced by the addition of a small percentage of ferric oxide to the zinc oxide.

The next communication was on—

CASTOR OIL.

BY D. B. DOTT, F.I.C., F.R.S.E., AND RALPH STOCKMAN, M.D., F.R.S.E.

Castor oil has been the subject of many investigations, but no definite conclusion has yet been arrived at regarding the active principle. The most striking point about it is, that when applied to the skin or mucous membranes, castor oil (unlike croton oil) is a perfectly bland unirritating substance, but when swallowed it causes sufficient irritation to enable it to act as a moderately powerful purgative. Schmiedeberg, Dixson, and others hold that it contains a special acid principle which is the purgative body, while Buchheim long ago stated that there is no special substance, the purgative action depending on the ricinoleic acid which is set free by the oil undergoing partial saponification by the alkalis of the small intestine. The latter is the current view, and has been recently strongly supported by Hans Meyer (*Archiv. Expt. Path. and Pharmak.*, xxviii., 1890). Meyer prepared ricinoleic acid by saponification of the oil with soda, precipitation with calcium chloride and crystallization of the calcium salt from alcohol. The ricinoleic acid was set free by the addition of hydrochloric acid and further purified. The glyceride was also prepared synthetically by heating together glycerine and ricinoleic acid to 300° C. in a stream of carbonic anhydride. Both the glyceride and the ricinoleic acid were found to be purgative to cats and to men, but in men the action was accompanied by more nausea and colicky pains than is usual with castor oil.

As the oil has been heated to 300° C. in an atmosphere of carbonic anhydride, without losing its purgative action, it occurred to one of us that it might be possible to decompose the oil with super-heated steam at the temperature of 300° C., and so obtain the purgative principle in a more concentrated form and free from nauseous taste. The oil was decomposed by superheated steam in the laboratory of Messrs. Duncan, Flockhart and Co. and the products used for physiological experiment.

The glycerine in ½-ounce dose had not the slightest action on a dog, to which it was given by the mouth.

Of the ricinoleic acid 3 drachms given to a dog had no purgative action, and 6 drachms given subsequently remained without effect. The latter amount also proved inoperative in rabbits.

In connection with his castor oil research, Meyer states that dogs and rabbits are very uncertain in their reaction to purgatives, and that cats are much more reliable subjects for experiment. Although we do not agree with this statement we made two trials of our ricinoleic acid on these animals. One cat received 3 grammes, the other 10 grammes, and in neither case was there purgation, although the latter evidently had considerable gastric irritation. As Meyer found that cats were purged by any dose of castor oil over 2 grammes, and that one-half gramme or more of his ricinoleic acid was also quite active, while 15 grammes sufficed to purge a dog very thoroughly, it is evident that his ricinoleic acid and ours are substances which differ in important respects.

The residue remaining in the still after the saponification by superheated steam was tested in the same way and found to be devoid of purgative action.

Mr. GIBSON said he was inclined to think that the active principle of the oil was really the ricinoleic acid. The purgative action of this body was so great that it required the combination with glycerine, as in the oil, to dilute it, and the same action was got when they combined the oil with an alkali in making an emulsion or mixture of castor oil. At the same time he thought Mr. Dott was doing good work in investigating this subject, and it was quite possible something would be got out of it.

Mr. LUNAN said he had noted that six half-drachm capsules of castor oil appeared to have the same laxative effect as ¾ ounce of the oil taken in the usual way.

Mr. ARTHUR asked what was Mr. Lunan's experience as to the usual dose of castor oil.

Mr. LUNAN: From a half to one ounce.

Mr. ARTHUR said he had recently had some personal experience. After having been opiated for four days he took a two drachm dose of castor oil, and it acted in an hour and a half, and induced four evacuations in eight hours.

Dr. STOCKMAN said most people administered absurdly large doses of castor oil, and the same remark applied to many other popular medicines. He was in the habit of ordering about a drachm or so for a dose. This produced a perfectly natural motion of the bowels, whereas a larger dose caused diarrhœa. The usual dose of 4 or 5 grains of colocynth and henbane pill produced diarrhœa, which was usually followed by constipation. One half to one grain was quite sufficient. The larger dose caused irritation of the intestinal canal, the excretions were lessened, and constipation followed. The custom of giving large doses of purgative medicines was a bad one.

Mr. COULL asked if the purgative property of the oil might not be due to a small admixture of the very active albumose referred to in the paper.

Dr. STOCKMAN said it had not been proved that such was not the case, but he did not think it was likely.

The next communication was on—

OPIUM ASSAY.

BY D. B. DOTT, F.I.C., F.R.S.E.

Of the many methods for assaying opium which have been published in recent years, probably that which has been received with most favour, is the process described by Teschemacher and Smith (*Chem. News*, 1888, and *Pharm. Journ.*, xix., 44). Like most other processes which are known by a special name, it is not to be regarded as, strictly speaking, the invention of a particular man, but rather as a piecing together and combining of the best features in several older processes. In outline, the method consists in exhausting the opium with water, concentrating to a small bulk, mixing with spirit, ether and ammonia, collecting the precipitated crude morphine, washing the same with "morphiated spirit," "morphiated water" and with "benzene;" then weighing and titrating with standard acid. Probably, the most original part of the process consists in washing the impure morphine with a saturated solution of morphine in spirit, called "morphiated spirit," the object being to purify the precipitate without that loss which must result from the use of ordinary spirit. This gives a very pure product, but there is just a suspicion that it is sometimes a source of error. The theory is, that as the spirit is saturated with morphine, it is impossible for the spirit to take up a further quantity of the alkaloid. But is this really the case? There is a measure of safety in the fact that morphine is only sparingly soluble in spirit. I feel sure that no one would propose to purify such an alkaloid as atropine, for instance, by washing with a saturated solution of the alkaloid in spirit; because such circumstances as variations of temperature, and the washing solution not being absolutely saturated, would cause serious error in an assay process. But although morphine is sparingly soluble in spirit, is it always equally soluble? Obviously this is an essential condition of accuracy where a saturated solution is used in the manner described. Now we know that morphine in an amorphous or partially amorphous state, as it is frequently when precipitated from an impure solution, is much more soluble than when in the pure crystalline state. There is, besides, a general belief, which I think is quite correct, that the presence of other soluble alkaloids and soluble resins and colouring matters, increases the solubility of the morphine; or, indeed, any alkaloid under similar circumstances. Messrs. Teschemacher and Smith state that in their process the morphine separates in arenaceous crystals. My experience is that it frequently separates at least partly in resinoidal lumps, which gradually become more crystalline but not completely so. Whence we infer that the precipitate must sometimes be to some extent dissolved by the morphiated spirit.

There is another matter which occurred to me as a possible source of error in Teschemacher's process. When the morphine finally obtained in Teschemacher's process is incinerated, an appreciable amount of ash is left. This fact would be of little moment if the ash results entirely from the combustion of neutral salts, which would not affect the titration by standard acid. It is, however, well known that meconic acid forms basic salts with lime and magnesia, and any calcium solution containing excess of ammonia will become turbid from the formation of carbonate by absorption of carbonic acid from the air. The former of these is a very likely source of error; the latter should scarcely come into play if the precipitation is performed in a small, well-corked flask. In order to investigate the point in question, 3·396 grms. of the morphine obtained as above described were treated with a large volume of boiling spirit, the solution filtered in a funnel surrounded by boiling water, and the residue several times washed with hot spirit. When dried the residue weighed 0·132 grams, which is equivalent to 3·88 per cent. in the precipitated morphine. The residue was then suspended in hot water and $\frac{n}{5}$ sulphuric acid added until the reaction was acid to litmus. 0·7 c.c. was required, indicating 0·0039 grams calcium oxide = 0·09 per cent. This percentage of CaO is equivalent to 0·97 per cent. of morphine hydrate, *i.e.*, the ordinary precipitated morphine. Whence it is manifest that no serious error can arise from the presence of basic salts, the error being on the right side, as there can be no doubt that the loss of

morphine in mother-liquors must more than balance any such error. All the same, it would be too much to assume that there are no samples of opium in which the error arising from basic salts will be considerable.

I have, on a previous occasion, given due praise to the assay process of Teschemacher and Smith, and I still think it is the best of published processes. One of its best features is the simple provision that the morphine is precipitated from as small a volume of liquid as possible. All methods in which a relatively large volume of liquid is present are more or less inaccurate. At the same time, experience shows, that the results obtained by this process occasionally show discrepancies and tend generally to indicate a little under the truth. I attribute this principally to the washing with morphiated spirit, though, no doubt, there are other causes at work.

The following method of procedure has yielded me more concordant and rather higher results, and therefore may be usefully brought under your notice:—10 grms. of the opium in powder is exhausted with spirit of ·920 sp. gr. One or two drops solution of ammonium oxalate are added, and then ammonia, until the spirit is only slightly acid. It is then evaporated to one-third its original volume, allowed to cool, and filtered. The filtrate is then concentrated to about 5 c.c., transferred to a small flask, 4 c.c. water and 3 c.c. methylated spirit being used to wash the capsule. 2·2 c.c. solution of ammonia (·960 sp. gr.) are then introduced, 25 c.c. of ether being introduced at same time. The flask is now closed with a well-fitting cork and shaken so as to mix the contents. After eighteen hours the ether is decanted as completely as possible, the precipitate collected on counterpoised filters and washed with morphiated water. It is then dried, washed with benzene, dried, and weighed, and finally titrated with $\frac{n}{10}$ sulphuric acid. 1 c.c. of the acid = ·0303 grm. morphine hydrate. Although it is not essential it is preferable to weigh the morphine before titrating, as an idea is thereby given of the amount of acid which will be required. This process is only to be recommended when the morphine is to be titrated. If reliance is to be placed on the gravimetric result preference must be given to the method of Teschemacher and Smith.

The CHAIRMAN said this was a subject on which it would at once be recognized that Mr. Dott was an authority. The paper was one the significance of which could only be adequately gauged when they had seen it in print.

Tht next communication was a—

NOTE ON NARCEINE.

BY D. B. DOTT, F.I.C., F.R.S.E.

A short time ago I was asked by a friend if narceine is soluble in chloroform, the published statements on the subject being apparently conflicting. It was my impression that narceine is insoluble in chloroform, but the following experiments were tried to make more certain:—

1. ·5 gramme commercial narceine was well agitated with 20 c.c. chloroform (1·497 sp. gr.). After being left in contact for half an hour the chloroform was filtered and evaporated to dryness. A small but distinct residue was left, which gave rather obscurely the narceine reaction with sulphuric acid.

2. A quantity of some chloroform was washed thrice with water, once with strong solution of calcium chloride, and dried so as to remove all but traces of alcohol and water. ·5 gramme of the commercial narceine was then washed two or three times with the chloroform, after which it was transferred to a flask and well agitated with the approximately absolute chloroform. This was filtered and evaporated on the water-bath. Only a minute unweighable residue was left, showing that narceine is practically insoluble in pure chloroform.

The CHAIRMAN said this was an important contribution to their knowledge of this alkaloid, but it did not admit of discussion. He had much pleasure in proposing a very hearty vote of thanks to Dr. Stockman and Mr. Dott for these interesting and valuable notes. They regretted very much the absence of Mr. Dott, and he was sure he had their sympathy in the unfortunate cause of his absence. The vote was passed with acclamation.

The ASSISTANT SECRETARY then directed attention to the following donations to the Museum:—

Ten Specimens of Commercial Goa Powder.
From Mr. WILLIAM DUNCAN, Royal Dispensary, Edinburgh.

Fruit of *Poinciana regia*, the "Forest Flame" or "Gold Mohur" Tree of India.
From Mr. T. SHORTRIDGE TWEEDIE, Edinburgh.

On the motion of the Chairman a cordial vote of thanks was awarded to the donors, and the meeting then closed.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of the Chemists' Assistants' Association, held at 103, Great Russell Street, on Thursday, February 25, Mr. W. Lloyd Williams, A.I.C., President, in the chair, a paper was read on "Milk," by A. W. Stokes, F.I.C.

In this the author dealt exhaustively with the different constituents of milk, also with the subjects of milk-adulteration and milk-products. Various methods of estimating milk fat were described, preference being given to Schmidt's process as the simplest and most rapid. In this the milk is boiled with hydrochloric acid and the liberated fat extracted by ether. He concluded by detailing the precautions observed by large dairy firms to ensure the standard of quality being kept up.

Mr. Symons complimented Mr. Stokes upon his useful and simple modification of Schmidt's method for the estimation of milk fat. He then said Mr. Stokes had stated that milk was cooled down immediately after the milking to facilitate the emission of the various gases it contained; this proceeding was contrary to his experience. Medicines such as potassium iodide, mercury, etc., had been mentioned as abnormal constituents of human milk; he thought that attention might be drawn to another, viz., bile. When igniting the total solids of milk for the estimation of chlorides, he advised a very gentle heat just sufficient to char, the charred mass afterwards being lixivated with water and the carbon filtered out; for as was well known, sodium chloride was easily volatilised by a red heat. Mr. Symons also remarked that the phenolphthalein used in the pellets Mr. Stokes had shown only showed the point where the sodium carbonate was converted into bicarbonate.

Mr. E. J. Parry said that the distinction between acidity and alkalinity must be somewhat lax if we are to find the same body both alkaline and acid according to the indicator used. He thought that normal human milk immediately after drawing was always alkaline, but that in the cow it was sometimes acid. Mr. Stokes, whilst describing the colostrum, had not drawn attention to the fact that there exist in this fluid a large number of nucleated corpuscles, probably leucocytes, often imitating the amœba in their movements. Furthermore, there was a certain quantity of

a proteid, globulin, which caused the fluid to coagulate when warmed, even though alkaline. Michael Foster's most recent statements went to show that there was no evidence at all that the casein formed coats round the fat globules, though the fat does separate with a rich plasma of casein.

Mr. Helbing remarked that the most troublesome part of milk analysis was the estimation of the fat, and it was difficult to find a suitable method. He had tried extracting with Adam's coil in Soxhlet's apparatus, but got good results by mixing with sand, drying and extracting with ether.

Mr. Fell did not understand the gases coming off when the milk was cooled; it was contrary to his experience of the usual behaviour of gases.

Mr. Seccombe said that milk, even when mixed with soda or lime water, disagreed with many individuals. Could Mr. Stokes suggest some mode of mixing likely to suit these cases?

Mr. McDiarmid thought that Wanklyn's process was somewhat barbarous, and the modification of Schmidt's process, suggested by Mr. Stokes, was very acceptable. Was the strong or dilute hydrochloric acid to be used?

The President (Mr. Lloyd Williams) preferred Dr. Pavy's method of estimating milk sugar, but thought that the gravimetric method ought not to be overlooked. Mr. Stokes in his paper had not mentioned the ptomaines occasionally found in milk. These possessed very powerful poisonous properties, and were the cause of a great deal of illness. He thought the precipitation of the fat along with the casein was purely a mechanical process, and this was not unlike the clarifying of syrups by means of coagulating albumen.

Mr. Stokes, in replying, said his paper had necessarily not been exhaustive, and he had not touched on ptomaines or fungi. Strong hydrochloric acid was used in Schmidt's process. For delicate persons, whose stomachs rejected ordinary milk, he thought Koumiss or peptonized milk would be suitable. As to the casein surrounding the fat globules, he thought this point was hardly settled yet. The gases he referred to as being given off on the cooling down of the milk were those originating from the surroundings in the cow house. It was a *sine quâ non* that milk should be so cooled, as milk sent up from the country warm soon went bad, and on examination would be found to be swarming with bacteria.

Parliamentary and Law Proceedings.

Sale of Proprietary Medicines without Stamps

On Monday, February 29, at West Bromwich Police Court, before the Stipendiary, John Vincent Webster, chemist,* High Street, West Bromwich, was charged, at the instance of Mr. F. H. Hoyte, with selling on five different occasions, patent medicines, without stamps, as required by the Act of Parliament.

Mr. Squires, from the Inland Revenue Office, appeared to prosecute, and Mr. J. Clark defended.

Mr. Squires pointed out that the defendant sold patent medicines which were liable to stamp duty under the Act of Parliament. To each bottle should be affixed a proper stamp, which was supplied by the Commissioners of Inland Revenue. Notwithstanding warnings which Mr. Webster had received the supervisor was informed that he was selling those medicines without proper stamps, and accordingly, in order to test to what extent the Act had been infringed, the Inland Revenue officers were directed to make purchases. The result was that on five different occasions medicines were bought and found to have been sold without the conditions required by law having been complied with.

Thomas James Hetherington, Richard Thorne, Alfred Knell, Charles Taylor, and Thomas Fisher, Excise officers, were then called in support of this statement, and evidence was given that no stamps were found upon the bottles which were purchased from the defendant; also that he had obtained a licence for selling patent medicines.

For the defence Mr. Clark submitted that his client had only recently commenced business, and he had been introducing the patent medicines in question to the public by giving bottles away to his customers, together with other medicines bought by them. A quantity of bottles were set aside to be given away in that manner, and there had not been sufficient care exercised by Mr. Webster to keep those (which he did not think it necessary to stamp) apart from the rest. He had no intention whatever of deliberately selling the article without labels.

The Stipendiary asked for information as to the warnings given to the defendant.

Mr. Hoyte replied that some time ago he found that the defendant had committed three or four offences against the Excise Acts, and this happened after he had given the defendant an explanation as to his liability, and on that occasion the offences were compromised by the defendant paying £10. At that time he (Mr. Hoyte) again thoroughly explained the law.

Defendant was ordered to pay £8, including costs, in each case, the total fines amounting to £40.—*Birmingham Daily Mail.*

* The name John Vincent Webster does not appear in the Register of Chemists and Druggists for 1892.

Breach of the Methylated Spirit Act.

On Monday, February 29, at the Airdrie J.P. Court, Dr. Dugald Buchanan, Main Street, Coatbridge, was charged with having, on January 8 last, sold three-quarters of a pint of methylated spirit without having an Excise licence to do so. The defendant pleaded not guilty, but the bench found the charge proved and inflicted a fine of £5 or thirty days imprisonment.

Dr. George Thomson, Bank Street, was charged with a similar offence committed on January 9. His defence was that he had given strict instructions that the spirit should not be sold, and that the day in question was the last of his assistant's service with him. He was convicted, however, and fined £5 or twenty days' imprisonment.

NOTICES OF MEETINGS.

Chemists' Assistants' Association, Thursday, March 10.—Paper, "Recent Researches on the Oxides of Phosphorus" (illustrated by experiments). By T. S. Dymond, F.C.S., F.I.C., Assistant Lecturer in Chemistry to the Pharmaceutical Society.

Manchester Pharmaceutical Association.—Wednesday, March 9. The chair will be taken by Mr. Geo. S. Woolley, President, and a paper will be read by Mr. J. Hart, F.C.S., on "Pharmacy Law."

Society of Chemical Industry.—Monday, March 7, at 8 p.m. Papers on "The Dangers Attending the Manufacture of Explosives," by Mr. Oscar Guttman, and on "The Acid Action of Drawing Papers," by Drs. Evans and Wirtz, and by Messrs. Cross and Bevan.

Sheffield Pharmaceutical and Chemical Society.—On Wednesday, March 16, Mr. William Ward will deliver an address on "The New Bye-Laws."

J. Shillitoe.—Your advertisement is forwarded to the publishers, 11, New Burlington St., W., to whom it should have been sent.

Communications, Letters, etc., have been received from Messrs. Barnett and Foster, Stead, Stonham, Johnston, Kinninmont, Turner, Harvey, Moss.

BOTANICAL NOMENCLATURE, WITH ESPECIAL REFERENCE TO 'PHARMACOGRAPHIA.'

BY G. CLARIDGE DRUCE, M.A., F.L.S.

The subject which, at first sight, may appear apparently insignificant, closer investigation will show to be of very considerable importance. During many ages it has been a burning subject of contention, upon which even the present generation has not arrived at complete uniformity of opinion. Any attempt towards arriving at this is to be welcomed, and a great step in that direction was made by a congress of botanists (in which the Kew botanists, however, declined to take part) which was held at Paris in 1867 under the presidency of M. A. de Candolle, when a most carefully drawn up code of rules for the guidance of botanists was submitted and modified according to the views of the majority. These, for the most part, have been sanctioned by the majority of botanists. One most important rule was made, namely, that of "priority of publication," which means that a plant shall be described under the name which was first applied to it, assuming that the genus in which it was placed is still retained. This name, therefore, consists of a generic and a specific name, which is followed by (usually in an abbreviated form) the name of the author who described it. This is, of course, the binominal system of nomenclature. Simple as it appears, at one time or another it has been interpreted in various ways, which may be best illustrated by examples. For instance, the black mustard was first called *Sinapis nigra* by Linnæus in the 'Species Plantarum,' 1753; this would, therefore, be written *Sinapis nigra*, L. Subsequently systematic botanists have considered that the characters which were considered by Linnæus to be sufficient to separate the genus *Sinapis* from his genus *Brassica* are not sufficient to warrant the keeping up of two distinct genera, consequently one of these genera becomes merged in the other and sinks to synonymical rank. Which should be retained? In the 'Species Plantarum' *Brassica* comes first, and possesses not fewer species than is contained in the Linnæan genus *Sinapis*, the name of the combined genus was called *Brassica*, L., which is better written *Brassica*, L., em. [emendata]. Consequently, our black mustard becomes *Brassica nigra*, and as Koch, in *Roehl. Deutsch. Fl.*, ed. iii., vol. iv., 713, was the first to describe it as a *Brassica*, the name of the black mustard must stand as *Brassica nigra*, Koch. This is sufficiently obvious, yet botanists have written *B. nigra*, L., which is making a man say what he has not said. Still other writers would choose a different way in order to do justice to the original description, and would write *B. nigra* (L.), Koch. This really introduces a trinominal system. If followed it would better be *B. nigra*, Koch. (L). The international rule is to simply write *B. nigra*, Koch. A practice much more deserving condemnation is one followed especially by some of our bryologists, who, for instance, write *Eurhynchium praelongum*, Dill. Dillenius published his 'Historia Muscorum' before the binominal system was introduced, and, in fact, he never adopted it or the system propounded by Linnæus. The moss in question was called a *Hypnum* by Linnæus and separated from that large genus of Linnæus by Schimper under the name *Eurhynchium*. How, therefore, can it be ascribed to Dillenius? He certainly knew the moss in question, which he called *Hypnum repens, triangularis parvis foliis praelongum*, but it is *Eurhynchium praelongum*, not of Dillenius, nor of Linnæus, but of Schimper. It sometimes happens that what one author considers to be a species may later on be more correctly described as a variety; for instance, Olivier* described the gall bearing oak of the Levant as *Quercus infectoria*, but De Candolle† saw no reason for retaining it as a species apart from the Portugal oak *Q. lusitanica*, of which he considered it to be a variety. Hence we more correctly write *Quercus lusitanica*, Lam.,‡ var. *infectoria*, DC. The school of botanists to which the eminent Boissier has given his name would probably not follow this example, they would write *Q. lusitanica*, Lam., var. *infectoria*, Olivier. This again "makes a man say what he has not said." Again, if a plant described as a variety should afterwards be considered to deserve specific rank, the original name should (if no homonymy be caused) be preserved as the new species name, and this is to be followed by the name, not of the writer who called it a variety, but of the one who elevated it to the rank of a species. Hanbury called a tree which yields gamboge, *Garcinia Morella*, Desrousseaux, var. *pedicellata*, Hanbury. Sir Joseph Hooker has since considered this to be a good species, he therefore names it *G. Hanburyi*, Hook. fil. I have not looked into the genus to see if there was already a species called *G. pedicellata*; if there were Sir Joseph Hooker was quite correct in giving it the above name. If there was not it would have perhaps been better, for the sake of retaining the original varietal name, to have called it *G. pedicellata*.

Again, another school of botanists consider that the name of the author who first correctly diagnoses a genus or species, but without changing the name used by a previous botanist who had not thoroughly elucidated the characters, should be cited as the author.

In the Pharmacopœia *Mentha piperita*, Sm., is used for the peppermint. This was first given in Hudson's 'Flora Anglica.' Sir James E. Smith, it is true, more fully described it, and pointed out that the *M. piperita* of the 'Species Plantarum' was a form of *Mentha hirsuta*, but we should correctly write *M. piperita*, Huds., rather than the foregoing or the pedantic *M. piperita*, "Huds.," Sm. When there is great doubt or confusion respecting the original name it may possibly be justifiable to add (not substitute) another author's name.

Formerly many botanists when they deemed a name to be inapplicable, or incorrect, or unclassical, promptly changed it. This, and a desire to perpetuate their own names rather than to facilitate the advancement of science, has led to an enormous number of synonyms which burden our lists. Linnæus himself, I am afraid, set a bad example, he often unnecessarily and arbitrarily changed names which were quite as good as his

* 'Voyage dans L'Empire Othoman,' ii., 64 (1800).

† 'Prodromus,' vol. xv., where De Candolle places it as a variety of the sub. species *Q. orientalis* under *Q. lusitanica*, which is not easily distinguished from a variety of *Quercus sessiliflora*, Salisbury, which is by most British botanists thought to be only a variety of *Q. Robur*, L.

‡ 'Enc. Meth.,' vol. i., 719 (1783).

own. Not only did he change the names given by other writers, but he frequently altered his own. In his earlier days he frequently used adjectival names for genera. Haller, his great contemporary, wrote to him complaining of these names, and Linnæus not only gave up the practice, but in many cases altered those he had already used. For instance, in his 'Materia Medica' he uses an adjectival name for the star anise, namely, *Badianifera*, which was descriptive enough although faulty from being an adjective. Later on, however, he changed it to *Illicium*. Less to be condoned was the case of *Clematis*, which he originally wrote *Clematitis*, which was more correctly applied to our "Traveller's Joy," for this was the name originally given to an eastern species. The name *Clematis* was formerly applied to two or more different genera. Still less to be excused were those cases in which he changed the names given by his contemporaries or rivals.

In England Sir James E. Smith was frequently as unjust, or as careless. He wrote *Galium cruciatum*, overlooking in his zeal for classic correctness the priority of Scopoli's name of *Galium Cruciata*, which was based on the old generic name *Cruciata*, —Crosswort, which Linnæus had placed less correctly in the genus *Valantia*. Another erroneous emendation was that of *Arenaria trinervis* for *A. trinervia*. No departure from the original spelling (except in the case of mere typographical blunders) is to be sanctioned.

Formerly many botanists, and still a few, continue to write the specific name of a plant, when it is derived from a country, with a capital letter. This was contrary to the general practice of Linnæus, and should be given up. We should write *Hemidesmus indicus*, not *H. Indicus*; and *Gossypium barbadense*, not *G. Barbadense*.

When personal names are used for specific names, the usual practice is to write these with a capital. Linnæus himself was by no means consistent in this; compare *Arabis Halleri*, *Cortusa matthioli*, *Hieracium Gmelini*, *Scabiosa gramontia*, *Gundelia Tournefortii*, *Plantago löflingii*, *Juncus Jacquini*, *Anthyllis gerardi*, *Ilex Dodonæa*, *Acanthium dioscoridis*, etc. I counted 60 names derived from persons, which are given in the 3rd edition of the 'Species Plantarum.' Of these, 44 were written without capitals; many of these were, however, *derivatives* of personal names. Again, names which in the 'Flora Suecica' are written with a capital, are written without one in the 'Species Plantarum,' and *vice versâ*.

Another instance where capitals were formerly employed, but now discontinued, is where the specific and the generic name were not in the same case, as *Calystegia sepium*, *Linaria sepium*, etc. These we now write with a small letter.

Only one other sense (but this most important) in which capitals are used for the specific name. That is when the present specific name was formerly employed as a generic or appellative name. This may require some little explanation. Our materia medica teems with examples.

We write *Aconitum Napellus* with a capital because it was the *Napellus verus* of Lobel. *Myroxylon Toluifera* H. B. K. is so written because in the 'Materia Medica' of Linnæus the drug was called *Toluifera*, an adjectival name which Linnæus retained in the 'Genera Plantarum.' *Punica Granatum*, because *Granatum* was an old name (not cited, however, by Linnæus in the 'Species Plantarum') for the Pomegranate.

Linnæus was by no means consistent in the use of capitals for old generic names. He used capitals very frequently, without citing the name for which the capital was used. Over 200 instances of this may be found in the third edition of 'Species Plantarum.' One example I have already given. *Myrtus Pimenta*, *Myrtus Leucadendra*, *Spiræa Ulmaria*, *Rubus Chamæmorus*, *Potentilla Anserina*, *Cambogia Gutta*, *Acorus Calamus* are others. Again, he not very rarely writes a specific name with a small letter, although the name is based on an old generic name which he cites, for instance, *Actaea cimicifuga*, although *Cimicifuga* is cited from the Amœnitates. *Scabiosa succisa*, although based upon Bauhin's *Succisa glabra* (and written *S. Succisa* in first edition 'Sp. Pl.'), *Salsola Kali*, notstanding, he quotes, *Kali spinoso affinis*, Bauhin. *Cotyledon umbilicus* ♀, although this is based on *Umbilicus repens*, Cam., *Nyctanthes arbor tristis*, cited *Arbor tristis myrto similis*, Bauhin, *Hordeum zeocriton*, the *Zeocriton* of Bauhin and Morison, *Yucca draconis*, *Draconi arbori affinis americana*, Bauhin, being cited. In the 'Flora Suecica' *Lythrum Salicaria* is written *L. salicaria*.

(To be continued.)

NOTES ON PHARMACEUTICAL MICROSCOPY.

Permanent Preparations of Aleurone, etc.

D. F. Krasser (*Bot. Centralbl.*, xlviii., 282) treats seeds of *Ricinus communis* as follows to differentiate ground-substance, crystalloids, and globoids in aleurone grains:—Sections fixed with solution of picric acid in absolute alcohol, have excess of acid removed by strong alcohol, and are then stained with solution of eosin in absolute alcohol. They are cleared by oil of cloves and mounted in chloroform-balsam. The ground-substance appears dark red, crystalloids yellow with sharp outlines, whilst the globoids are reddish or nearly colourless. An alternative method is to fix in saturated solution of picric acid and nigrosin in absolute alcohol and allow this stain to act until the ground-substance becomes blue. Wash with absolute alcohol, place for a brief time in oil of cloves and mount in balsam. The ground-substance is blue, crystalloid yellow-green with sharp outline, and globoid colourless. To obtain good preparations of the crystalloids alone, first dissolve off the ground substance and globoids by a very dilute aqueous solution of sodium phosphate, then stain with eosin.

Mounting in Balsam.

V. A. Latham (*The Microscope*, xi., 281) considers that many imaginary difficulties exist with regard to balsam mounting and recommends this method:—Have a mounting card made so that you can centre the slip. In this centre place a medium sized drop (the second falling from the glass rod is about right) of a mixture of balsam, 3 ozs.; rectified turpentine, 1 oz.; chloroform, 1 oz., which has been allowed to stand until free from air-bubbles and thoroughly mixed. The drop is carefully spread over the surface, not quite to the position to be subsequently occupied by the edge of the thin cover. Lift the object from the clove oil, draining

off excess, and transfer it to the centre of the slide. When the section is properly arranged take a clean cover-glass in the forceps, near the edge of it let fall a drop of balsam, invert the cover and place the point of a needle on the slip at about the place to be occupied by its edge. Now place this cover-glass edge against the needle, gently lower the cover till the drops meet and flow evenly; when the balsam reaches the middle of the specimen gently draw away the forceps and the cover is then in place. Do not press down the cover but put the slide in a warm place, perfectly flat, and in drying the balsam contracts and draws down the cover to the specimen. Air-bubbles will probably disappear at the same time. Hollis's glue is best for ringing the slides, since it may be used with immersion lenses.

Aleurone-Grains as an Aid to Diagnosis. Lüdtke (*Ber. Pharm. Gesell.*, 1891, p. 53) has investigated the physical peculiarities of the aleurone-grains in a number of seeds from different plants. He finds variation in the solubility of the ground-substance in water, and that oily seeds have but few aleurone-grains. Most seeds are filled with them, however, and he considers that their comparative sizes may be found of value in the diagnosis of substances used in pharmacy.

Micro-chemical Reactions of Tannin. S. Le M. Moore (*Journ. Linn. Soc.*, xxvii., 527) says three kinds of tannin may be distinguished in plants by their reactions with Nessler's fluid. The first gives an immediate brown precipitate, sometimes with a tendency to brown-pink; the second gives a yellow colour, changing quickly to red-brown, and, finally, a cold-brown precipitate; the third gives a yellow colour and the yellow substance readily diffuses through the cell-walls into the surrounding fluid leaving the cells colourless after some time has elapsed.

Cleansing Used Slides and Covers. Dr. J. B. Nias (*Lancet*, 1891, p. 1414) suggests putting slides, etc., into a saucepan with a lump of washing soda, covering with water and boiling. The heat softens any cement and the soda converts the balsam or other resinous substance into a grumous mass which is easily wiped off after mixing. A much simpler plan which we can personally recommend is that mentioned by Lee ('Microtomist's Vade-Mecum'), and consists in wetting the slides with water and scraping with an old knife. A defect of this method, however, is that the covers are destroyed.

Crystals of Calcium Oxalate. G. Arcangeli (*Nuov. Giom. Bot. Ital.*, xxiii., 489) states that in some cases where calcium oxalate is found in plant tissues single crystals belong to the monoclinic system. Clusters of crystals are most often the same, and but rarely dimetric.

Formation of Starch in the Radish. M. P. Lesage (*Comptes Rendus*, cxii., 373) finds that though the radish contains normally practically no starch, yet a considerable quantity is formed in seedlings when watered with solutions of sodium chloride.

Diastase. J. C. Lintner and F. Eckhardt (*Journ. f. Prakt. Chemie*, 1890, p. 91) consider that the ferment of ungerminated barley or wheat-grains is distinct from that of malt. They think that bacteria play no part in the formation of the latter, which is a product of the chemical changes accompanying germination.

Dehydrating Alcohol. This may be accomplished by cutting gelatine into thin strips, immersing in the alcohol, and shaking well at intervals. In a day or two the gelatine will be swollen by absorption of water and may be removed. If then dried it may be used again.

Staining of Tubercle Bacilli. Arens (*Centralbl. f. Buki. u. Purus.*, Jan. 2, 1892) adopts the following method:—A crystal of fuchsin, the size of a millet seed, is put in a watch glass with 3 drops of alcohol, and 2 or 3 c.c. chloroform added. A cover-glass preparation of sputum is put into the clear solution for four to six minutes, then removed, and the chloroform allowed to evaporate. Decolorize with 96 per cent. alcohol to which 3 drops hydrochloric acid have been added, then wash and stain with weak methylene blue for the ground colour. Treat sections in a similar way. Bacteria in milk may be stained by immersing a cover-glass preparation of equal parts milk and water in a mixture of 12 to 15 drops sat. sol. methylene blue and 3 to 4 c.c. chloroform for four to six minutes. When removed, allow chloroform to evaporate and wash the specimen. Bacteria stain deep blue.

Collodion for Infiltrating Plant Tissues. M. B. Thomas ('Proc. Amer. Soc. Micr., 1890, p. 123) recommends this in preference to paraffin. The tissue after dehydration and hardening in alcohol is placed in a solution made by dissolving 2 grammes guncotton in 100 c.c. of equal parts of ether and 95 per cent. alcohol. Leave for 12–14 hours, then transfer to a 5 per cent. solution, and again leave for twelve hours. On removing lay on cork and cover with successive layers of collodion until quite enclosed in the mass. After a few hours the collodion will be firm enough to cut. This step may be hastened, however, by immersing the cork and attached mass in alcohol or, quicker still, chloroform.

Use of Polarized Light in Botanical Work. Amann (*Arch. Sci. Phys. et Nat.*, xxiv., 502) in observing the tissues of mosses finds that the degree of cuticularization of different cell-walls caused them to present very different appearances when viewed by polarized light. It is possible in this way to define the characters of cells belonging to different organs in a moss, and to a certain extent to distinguish between characters presented by different families.

Benzol for Microscopical Use. The presence of a small proportion of water, caused perhaps by the use of a damp bottle, sometimes renders benzol opalescent and unfit for use. It has been recommended to place a pellet of absorbent cotton wool in the bottle, shake well and afterwards filter through fresh absorbent wool. The water is absorbed and benzol left clear and bright.

The Micro-Chemical Detection of Sulphurous Acid. G. Denizes (*Jour. Phar. Chim.*, xxiv., 289) describes a method used by him which consists in exposing a glass rod, wet with a mixture of chlorine water, hydrochloric acid and barium chloride, to the suspected gas. The lozenge-shaped crystals of barium sulphate, which are either isolated or in cruciform groups, are then recognized under the microscope. It is

first necessary to prove the absence of sulphuric acid vapour by making a similar test with barium chloride solution and hydrochloric acid only.

Double Staining Vegetable Sections.

Cole's method is as follows:—1st. Place the section in an alcoholic solution of iodine green (3 grains to the 1 ounce of alcohol) for one or two hours. 2nd. Soak it in alcohol for ten minutes. 3rd. Remove it to water for one minute. 4th. Immerse it for two hours in carmine fluid, made as follows:—Carmine, 15 grains; ammonia, 15 grains; water, 2 ounces. Dissolve the carmine in the ammonia by means of gentle heat, add the water, and filter. 5th. Wash thoroughly in water. 6th. Place in alcohol for ten minutes. 7th. Float upon oil of cloves and mount as previously described (*ante*, p. 490). Mr. Gilburt, whose vegetable preparations are most successful, recommends the following double-staining fluid, in which the sections are immersed, and which produces perfect differentiation. Dissolve of magenta crystals $\frac{1}{4}$ grain in 1 ounce of alcohol, and of Nicholson's soluble blue $\frac{1}{6}$ grain in 1 ounce of alcohol; add to this four drops of nitric acid. Filter both solutions. To two parts of the blue add seven parts of the magenta solution. Immerse the section for from one to two minutes, remove it to absolute alcohol, hence to benzole (to fix the magenta); thence to oil of cloves, and mount in balsam.

NEUTRALITY.*

BY A. H. ALLEN.

Except in certain cases litmus is a very uncertain indicator of constitution. Many of the salts of the alkali-metals exhibit an alkaline reaction, those of the heavy metals frequently redden litmus, while many acids and bases do not affect litmus at all, or at least very feebly. Thus it is impossible to use litmus for the titration of boric, carbonic, hydrocyanic or hydrosulphuric acid, and it is by no means a desirable indicator for the weaker organic acids, such as acetic or citric. Yet litmus is still employed by some of those who habitually assay lime and lemon juice, and to make matters worse they employ standard solution of sodium carbonate, instead of caustic alkali, for the titration. I do not say that accurate results are not obtainable in this way with care and practice, but it is surprising that such a clumsy method of analysis should still survive.

Of the natural colouring matters litmus is undoubtedly the most generally available, and in certain cases it is still the best indicator of neutrality which can be used. The end reaction is not readily observed by gas-light, but when day-light is not available the neutral point can be ascertained very sharply by employing the monochromatic light of an incandescent sodium compound (such as a bead of sodium carbonate held in a loop of platinum wire in a bunsen flame). By this light an acid solution of litmus appears nearly colourless, while the blue solution looks almost black.

Cochineal may be advantageously used in some cases, as the change from yellowish-red with acids to purple with alkalies is sharply marked, and the indicator is not affected by carbonic acid. It gives an alkaline reaction with the carbonates of the alkaline-earth metals, and hence the so-called "temporary hardness" of water can be rapidly and accurately ascertained by titration with cochineal and standard acid. But as pointed out by R. M. Thomson, a radical objection to its general employment is the fact that in presence of any small quantities of iron or aluminium, the pink colour, though modified, persistently remains after the neutral point has been passed.

Turmeric is an indicator which has received but little application. Its chief advantage is the possibility of using it in an alcoholic solution. Its most curious reaction is that with boric acid, which turns litmus a wine-red, but behaves with turmeric just like a free alkali.

The colouring matters of logwood, barwood, oranges, red-cabbage, violets and other plant-products have been occasionally recommended, but none of them is at all equal to litmus in general applicability.

The progress of organic research has of late years enriched the laboratory with a number of indicators of neutrality, which may in many instances advantageously replace the formerly universally employed litmus. Among these indicators may be mentioned methyl orange, phenolphthalein, phenacetolin, aurin, congo-red, lackinoid, cyanin, alizarin, Poirrier's soluble blue, and many others.

The use of these indicators requires discretion, and the first thing the user is likely to discover is that they cannot be employed indiscriminately as a substitute for litmus. But this circumstance, which at first sight might appear to be an obstacle to their use, is, in reality, one of their great recommendations; for they often give perfectly sharp end-reactions when the indications ofttimes are helplessly indefinite.

The great majority of indicators of neutrality, including the colouring matter of litmus, are bodies of an acid character, and they owe their value to the fact that the solutions of their alkali-metal salts have a colour distinctly different from that of the free acid or hydrogen salts. When the acid properties of the colouring matter are very feeble, or in other words when its "affinity" for bases is very weak, very feeble acids will displace it from its salts, with the characteristic change of colour indicating the liberation of the colour-acid. Such an indicator will be available for the titration of very feeble acids, and we have it in the invaluable colour-acid phenolphthalein, a body which when in solution in the free state is practically colourless, but the soluble metallic salts of which have in solution a magnificent crimson-red colour. By means of phenolphthalein and caustic alkali we can titrate very feeble acids, and either in aqueous or alcoholic solution, as may be preferred. With phenolphthalein, acetic, benzoic, citric, tartaric and other organic acids can be titrated far more accurately and sharply than with litmus, and it is equally available for stearic, oleic, and other insolule fatty acids. In these latter cases, however, the operation should be conducted in alcoholic solution; not merely because the acids are insoluble in water, but because water effects more or less decomposition of their salts (soaps). Thus on titrating an alcoholic solution of oleic acid with caustic soda and the end-reaction is perfectly sharp, but on adding water a marked pink colour is developed, indicating that a certain amount of decomposition has taken place, probably owing to the partial hydrolysis of the soap with formation of an acid oleate and free caustic alkali.

Phenolphthalein is also available for the titration of many feeble mineral acids, including hydrocyanic, carbonic and arsenious acids, and even sulphuretted hydrogen.

An interesting demonstration that phenolphthalein is affected by carbonic acid is obtained by adding phenolphthalein to water rendered faintly alkaline by caustic soda. On then blowing through the liquid it becomes decolorised by the carbonic acid of the breath.

But the very fact that carbonic acid reacts on the indicator shows that the standard alkali used for a

* Abstracted from a paper read before the Chemists' Assistants' Association.

titration must be caustic and free from carbonate. This is very difficult to ensure in the case of caustic potash and soda, and ammonia cannot be employed with phenolphthalein. By far the best standard alkaline solution for use with phenolphthalein is decinormal baryta water, which must necessarily be free from carbonic acid.

It may be set by any ordinary acid, but the compound to which I give the preference is the quadroxalate of potassium, a salt of the composition KHC_2O_4, $H_2C_2O_4$ + 2 aqua. It is prepared by making a saturated solution of recrystallized oxalic acid in water and filtering the liquid. One-fourth of the filtrate is then heated to boiling and neutralized with pure potassium bicarbonate, employing litmus paper as the indicator of neutrality. This neutralized portion is then added to the main quantity, whereupon there is copious deposition of the quadroxalate in the form of granular crystals. This is filtered off, washed with a little cold water, and dried over sulphuric acid. It is perfectly permanent in the air, and in that respect presents a great advantage over oxalic acid. In using the quadroxalate for setting the standard baryta solution, about 0·25 gramme is exactly weighed and dissolved in a little warm water. Phenolphthalein (1–500 solution in proof spirit) is then added, and the baryta water run in until the pink colour becomes permanent. During the first part of the titration the solution remains quite clear, but subsequently a white precipitate of barium oxalate is produced, and this forms an extremely delicate background for viewing the end of the reaction. In fact, it is distinctly advantageous to aim at the presence of a finely divided white precipitate in the liquid, rather than to employ a white background to the vessel. Potassium bitartrate may be substituted for the acid oxalate, but it is difficult to obtain it perfectly pure.

In many cases phenolphthalein can be advantageously employed with an ethereal solution of the acid to be determined. Thus, suppose it be desired to determine the benzoic acid in a sample of paregoric suspected not to be of B. P. quality, 20 c.c. may be taken, rendered slightly alkaline to litmus, the spirit evaporated off, and the camphor and oil of anise extracted by agitation with ether. On adding hydrochloric acid to the separated aqueous liquid benzoic acid will be precipitated, and on agitation with ether will be extracted. The ethereal solution is separated, washed with small quantities of water till the washings no longer appreciably redden litmus, and placed in a small cylinder together with about 5 c.c. of water to which a drop of phenolphthalein solution has been added. On now dropping in $\frac{N}{20}$ or $\frac{N}{50}$ caustic soda or baryta, and agitating well between each addition, the estimation of the benzoic acid can be readily and accurately effected. The meconic acid of the opium is dissolved more or less completely by the ether used for extracting the benzoic acid, but the proportion present is too small to interfere with the determination of the latter.

The foregoing method of titrating benzoic acid also finds an application in the process of assaying aconite alkaloids suggested by me at the British Pharmaceutical Conference in August. By its means the proportion of saponifiable alkaloids in as little as half a grain of material can be ascertained with a considerable approach to accuracy. This is an important improvement in practice on the method based on the same principle originally proposed by Dr. Alder Wright, whose experiments were made prior to the utilization of phenolphthalein as an indicator, and on such large quantities of material as to render the process quite prohibitive in actual practice.

But although phenolphthalein reacts perfectly with such weak acids as carbonic and hydrocyanic, there are bodies of an acid character which have little or no action on it. This is the case with phenol and other bodies of that class, such as morphine, the molecule of which contains a hydroxyl group having a phenolic function, which enables it to form compounds with the alkalies, and is the cause of its solubility in caustic alkalies and lime water. I lay some stress on the behaviour of morphine with phenolphthalein, because at the British Pharmaceutical Conference at Cardiff it was stated by Mr. F. W. Short that morphine reacted as an acid to phenolphthalein. The statement made by Mr. Short was novel to me, and I therefore wrote to that gentleman asking the source of his information, and in the course of a courteous reply he wrote:—"I cannot now remember where I saw the statement that morphine acts as an acid to phenolphthalein, but it was to the effect that it might be made use of quantitatively, as the red colour only appeared when one molecular weight of NaHO had been added for each molecular weight of morphine," or in other words, for the reaction $C_{17}H_{19}NO_2 \cdot OH + NaOH = C_{14}H_{19}NO_2 \cdot ONa + H_2O$.

In consequence of Mr. Short's statement, I have since submitted the behaviour of morphine with phenolphthalein to direct experiment. The end-reaction is not a sharp one, and appears to be modified by the presence of alcohol and other conditions, but in all cases I found the acidity of morphine to phenolphthalein extremely trifling, and the caustic alkali required for the production of a pink colour was only a small portion of that which would be required for the above reaction. This is also Mr. D. B. Dott's experience, who adds that "the same holds true substantially of phenol, as the alkaline reaction is given long before anything like an equivalent of soda has been added. This is noted by Mr. Thomson in his well-known table."

P. C. Plugge (*Arch. Pharm.*, [3], xxv., 45) also states that in titrating morphine hydrochloride with caustic alkali and phenolphthalein a red coloration make its appearance before the end of the reaction (that is the neutralization of the HCl), but states that a little experience enables the difficulty to be overcome.

It is evident, therefore, that morphine has a faint acid tendency, but the statement that it reacts quantitatively as an acid to phenolphthalein was a mistake, and I think there is little doubt that Mr. Short was confusing the behaviour of morphine to phenolphthalein with that to Poirrier's soluble blue C4B. This colouring matter, not now obtainable, was found by M. R. Engel in 1886 (*Compt. Rend.*, cii., 214, 262, 431), to be capable of being used as an indicator for the very weakest acids.

The concentrated solutions of the compounds KBO_2, K_3PO_4, K_3AsO_4, K_2PHO_3, K_2PHO_2, and K_2CO_3 are stated to have been found approximately neutral to this indicator. About 85 per cent. of the hydrogen of H_3PO_4 and H_3ASO_4 was indicated, so that the colouring matter could not be used for the actual titration of these acids. It is only to be expected that the salts of very feeble acids should readily suffer hydrolysis, especially the salts in which the last atom of hydrogen is replaced.

Morphine, phenol, resorcin and chloral all reacted as acids to Poirrier's blue, the last three being capable of accurate titration by means of it. Phenol and chloral act as monobasic, and resorcin as a dibasic acid. Morphine did not give such good results, a quantity of caustic alkali being required somewhat in excess (24 c.c. against 20) of that corresponding to the double phenol function. The meaning of this is apparently that Engel found at least 2NaHO to be required for $C_{17}H_{20}NO_3$. This result is interesting, but requires confirmation, as do other of Engel's observations. Engel found Poirrier's blue to be neutral to the hydroxyl group existing in monovalent alcohols (some of these were of tertiary constitution, like trimethyl

carbinol and pinacone); but in strong solution polyvalent alcohols, such as glycerol, erythrol and mannitol showed an acid tendency, though they were not capable of being accurately titrated. Hydrocyanic acid could be determined by titration with Poirrier's blue, and glycocine, alanine and taurine also behaved as acids, but the end reaction was indistinct.

CHLOROFORMIUM MEDICINALE PICTET.*

BY DR. R. DUBOIS-REYMOND.

Hitherto Pictet's medicinal chloroform has been looked upon very much as a novelty, calculated to arouse curiosity on account of its production with the aid of an apparatus that is of equal importance for all branches of natural science. It has been denied that Pictet's medicinal chloroform differs chemically from ordinary chloroform.† Fortunately, however, we are in a position to furnish ocular demonstration of the vast difference between both products, in the form of the separated residues. These substances are of the nature usually designated by chemists as "schmiere."‡

The absolute purity of the new product cannot be doubted, if for no other reason than that crystallization has always been looked upon as a mark of chemical purity. The best distinguishing reaction is that against sunlight; ordinary chloroform, especially chloral chloroform, is decomposed by sunlight almost instantaneously. Pictet's medicinal chloroform, on the other hand, is affected less by sunlight than any other chloroform with even the addition of alcohol. It is only to satisfy the requirements of the German pharmacopœia that any alcohol is added to Pictet's medicinal chloroform, and that is especially purified for the purpose; however, Professor Pictet contemplates placing on the market, in the near future, an absolutely pure chloroform. At the same time, the process is so economical that the new chloroform is even less expensive than some special brands now on the market.

The advantages offered by Pictet's medicinal chloroform are threefold. Prevention of untoward effects, greater perfection of the narcosis, reliable permanency. The mode of action of chloroform, and hence the cause of the so-called "chloroform death," is absolutely unknown. A considerable percentage of cases, especially those in which death ensues immediately upon the first inspiration, may, moreover, not be due to chloroform at all.§

Simpson enumerates a number of cases antedating the introduction of anæsthesia, which at present would most likely be classed as chloroform deaths.‖ But in all indubitable cases the nature of the chloroform most certainly plays an essential *rôle*.

According to almost all authorities, the first danger consists in an interruption of respiration. Kappeler plainly says that this threatening danger is only lessened by our ability to resort to artificial respiration. It is only since the observation of the pulse has superseded that of the respiration that chloroform deaths have become more frequent.¶ Hence every obstacle to respiration, however trifling, must be removed. A very slight irritation of the respiratory passages exerts a far stronger influence upon breathing than do oppressive garments, for instance. Liebreich teaches that for this reason, chloroform narcosis in the case of rabbits proceeds normally only with tracheal intubation.

According to von Bergmann, there occurs one death for every 7000 chloroform narcoses in Germany, and, according to Behrend,* one death for every 1250 cases in England. And yet in the latter country anæsthesia is looked upon as a speciality and practised as such.

Liebreich, the virtual originator of the method, as well as Bardeleben, in whose clinic an extended series of narcoses with Pictet's medicinal chloroform were first undertaken, consider success as reasonably certain. In France, Sedillot, who laid the greatest stress upon employing none but the purest chloroform, did not have to record a single chloroform death.† He summed up his experience in the sentence: "Le chloroforme pur bien donné ne tue jamais." Lucas Championnière considers the dangers of chloroform as follows: First, individuals differ in their susceptibility to the deleterious action of chloroform; secondly, the deleterious action of chloroform varies greatly in consequence of the imperfections of the same.

Vomiting, excitement and distress are of rare occurrence in the use of Pictet's medicinal chloroform, as is seen from the satisfactory reports from all sides.

The narcosis induced by this preparation is of a more desirable character, inasmuch as anæsthesia will set in very soon, even while reflex action is still observable, while on the other hand the condition persists long after discontinuing its administration.

When the advantages of a really pure chloroform become manifest under the most favourable conditions, as found in well-appointed operating halls, this would be much more the case in private practice. By far the greater number of narcoses are undertaken in rooms not designed for that purpose.‡ The chloroform taken along on a hasty call by country practitioners, who do not operate every day, or that employed on shipboard and in warmer climates, is certainly often inferior to that demanded by the Pharmacopœia. It is for similar reasons that ether, otherwise unduly extolled by English authorities, is considered entirely unfit for use in India. The chloroform supplied to the army hospitals during the late Franco-Prussian war was for the most part notoriously unfit for use.

The pharmaceutical aspect of the chloroform question has unfortunately remained neglected by casuistics, and has not been treated of in literature, except by the two French authors above mentioned. Though rules for administering anæsthetics have been enumerated by various writers, there is nowhere any injunction that the physician must test his chloroform before administering it. In nine-tenths of the reports of chloroform deaths, not a word is said about the article employed, and thus an important factor for forming an opinion is entirely excluded. In view of the general prevalence of this negligence the reliability of Pictet's pure chloroform must be of the greatest importance for even a long time to come.

But in order to gain information on the value of this method of purification from the other direction, investigations have been instituted on the physiological action of the residual substances. A series of experiments upon animals, now in progress under the personal supervision of Professor Liebreich, in his pharmacological institute, have already yielded results calculated to assign a high position to the new chloroform.

* *Pharmaceutische Centralhalle*, xxxii., 658.

† *Western Druggist*, 1891, p. 379.

‡ As long as nine years ago the question as to the deleterious contaminations of chloroform was raised, and these were characterized as a yellowish oil of a specific odour. At that time one of the largest firms offered to furnish chloroform and preparations thereof to any scientist desirous of instituting physiological researches on the subject. This offer, however, appears to have remained unheeded (*Brit. Med. Jour.*, 1882, p. 563); see also Lucas Championnière (*Bull. de la Soc. de Chir.*, 7, 1881).

§ Nussbaum, 'Handb. d. Allg. u. Spec. Chir.,' 1867, I. and II., p. 612; Lawrie, *Lancet*, 1890, i., p. 149.

‖ *Brit. Med. Jour.*, 1870, i., p. 199.

¶ F. Hewitt, 'Proc. Roy. Med. and Chir. Soc. Lond.,' 890.

* 'Chloroformcasuistik,' Hanover, 1880.

† *Bull. de la Soc. de Chir.*, 7, 1881.

‡ Bernard, 'Chloroformcasuistik.'

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, MARCH 12, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THEOPHILUS REDWOOD.

THOUGH death has now finally closed the long career of useful association with the work of the Pharmaceutical Society by which the name of REDWOOD has, in the past, acquired a prominence equal to those of BELL, PEREIRA and FOWNES, that name must always remain indissolubly connected with the earlier history of the Society. In the various official capacities of curator, director of the laboratory, professor and editor of this Journal THEOPHILUS REDWOOD had a large share in the work of inaugurating every one of the departments of the Society's action. Nor have his services to British pharmacy during the last fifty years been confined to the educational and other official work of the Society. By his scientific position combined with his proficiency as a pharmacist, and by the recognition which for those reasons he received from medical authorities, he contributed largely to pave the way for that improved position in regard to the production of our national Pharmacopœia which his fellow-craftsmen now enjoy.

THE BENEVOLENT FUND.

THE decision arrived at by the Council at its last meeting in regard to increasing the amount of annuities may be expected to exercise a very important influence in augmenting the support of the Fund by chemists and druggists generally. It will impress upon all who belong to the trade the fact that it is a duty which rests on them to provide the means for supporting those of their colleagues who may by misfortune be reduced to the necessity of seeking temporary assistance, or more continued provision for their necessities. For a long time the Fund was administered in accordance with the policy of trusting to interest from invested capital for the funds to relieve necessitous members of the trade. It is only fourteen years ago that the modest increase of the annuities by five pounds a year was decided upon in the case of annuitants over sixty-five years of age. At that time the desirability of trusting to subscriptions for the payment of a large portion of the annuities was recognized and acted upon with results which have been highly satisfactory. The decision which has now been taken is another step in the same direction. It will take effect in October next, and in regard to the whole of the annuitants now on the list, as well as those who may be elected in future. As a consequence the administrators of the Fund will have to look to subscribers for an additional annual contribution of at least three hundred pounds, and with that further support they will have the satisfaction of being able to grant annuities of an amount more in accordance with the position of average chemists and druggists than the small allowance which has hitherto been given.

For securing such an increased amount of support as will admit of the plan now contemplated being carried out, it will be necessary not merely to state the nature of the claim which the Fund has upon every registered chemist and druggist as we have now done. In addition to that, dependence must be placed upon the efforts of Local Secretaries throughout the country. It is indeed chiefly by the personal influence they can bring to bear upon the chemists and druggists in their respective localities, that any addition can be made to the number of present subscribers, which will be commensurate with the aggregate number of those engaged in the business. And it is mainly number of subscribers rather than large subscribers that is desirable. There is already a large invested capital, which yields a considerable revenue, though insufficient for all requirements. There are continual additions to this invested capital, in the shape of donations and legacies which must be disposed of in that manner. But it is by the subscriptions from year to year that the capability of the Fund to deal adequately with cases of distress must be in future chiefly maintained. And when it is considered that a contribution of only half-a-crown from each person on the register would yield upwards of fifteen hundred pounds a year, there ought to be no reason for fearing that the revenue from invested capital and the supplementary support of subscribers should not be amply sufficient for meeting all the reasonable demands that can be made upon the Fund, and for maintaining the indigent members of the trade in a manner that would secure comfort for them and credit for their more fortunate brethren.

We trust, therefore, that Local Secretaries will generally avail themselves of the opportunity afforded, by this new departure in the administration of the Benevolent Fund, for impressing upon members of the trade with whom they are more directly in contact, the merits of the Fund, its requirements and the claims it has upon them for support. In the past the exertions of those who have held the position of Local Secretary

have been of great service in the same direction, and as there has never been an occasion when the services of Local Secretaries could be more usefully rendered than at the present time, it is to be hoped that those who now hold that position will not the less zealously endeavour to secure an approximation to the very desirable condition of having the name of every registered chemist and druggist inscribed on the roll of subscribers to the Benevolent Fund.

THE DISPENSING OF MEDICINES IN HOSPITALS.

We believe it is fast becoming the rule that at all public institutions throughout the country candidates for the position of dispenser are expected to be registered under the Pharmacy Acts. In this connection it is interesting to note the progress of similar ideas in America, as instanced by the report of the Pennsylvania State Board of Charity, acting through its Committee of Lunacy, of whose five members two are physicians, as is also the Secretary. This, which we quote from 'The Alumni Report' for February, says :—

"It is to be feared that in some of our hospitals the actual dispensing and distribution of medicines is not regulated with the care and precision which its importance demands. Relatively few physicians possess the special knowledge and training in the theory and practice of pharmacy which is essential to the success of practical medicine. Pharmacy is a special art, acquired only after years of laboratory training and of study, for which the so-called 'pharmacy course' of our medical schools offers but an indifferent substitute, so that even hospital physicians are but seldom properly equipped to prepare and dispense their own prescriptions, admitting that they can spare the time to do so, which is very debatable.

"Some of our hospitals for the insane employ resident apothecaries, while others depend upon the junior medical staff to perform such duties. There is, we think, no doubt that the best interests of the insane require that each large hospital should employ a resident apothecary.

"Under different methods there is much reason to fear that, at times, the responsible duties of compounding large quantities of potent and poisonous remedies, and of dispensing doses, are relegated to persons who would fail to qualify if examined in the most elementary details of practical pharmacy.

"This question has such a direct bearing upon the daily safety and well-being of the insane, to say nothing of unfavourable influence upon well-directed plans of treatment, that it has been thought important to bring the matter to the serious consideration of the hospital authorities."

A meeting was held at the Society's house on Wednesday, the 9th instant, for the purpose of making preliminary arrangements for the Annual Dinner of the members of the Pharmaceutical Society and their friends. It was decided that the Dinner should take place on Tuesday, May 17th next, at the Freemasons' Tavern, and that the price of dinner tickets should be one guinea each, the incidental expenses being defrayed as in former years by the stewards. A preliminary list of stewards was announced at the meeting, and we are requested to invite pharmacists or other gentlemen interested in pharmacy who are desirous of co-operating with the President in making this dinner a success to send in their names at once to Mr. Richard Bremridge, 17, Bloomsbury Square, W.C., the Honorary Secretary to the Dinner Committee.

* * *

Some week ago mention was made in this Journal of the retirement of Professor Flückiger from the chair he has occupied in the University of Strassburg. It was then suggested that for the purpose of obtaining an expression of esteem for the Professor, and giving to it a permanent form an international committee should be formed to consider and decide whether this should be done by the foundation of a scholarship or otherwise. The President of the Pharmaceutical Society, President of the British Pharmaceutical Conference and Professor Attfield have authorised the addition of their names to the Committee, and at the request of Professor Tschirch, the Treasurer, the President of the Society has sent out a number of the circulars which have been issued asking for subscriptions. Already a large number of names have been received, a preliminary list of which will be published next week. As Professor Flückiger was the collaborateur of Daniel Hanbury, and has been for many years associated with the Society as an honorary member, many will probably be desirous of joining in this expression of regard for him. We therefore take this opportunity of stating that intending subscribers should at once communicate the fact to the President of the Pharmaceutical Society.

* * *

The report, at page 760, of the legal proceedings at Maidstone Assizes will no doubt be read by many with a feeling of commiseration for the defendant, though it cannot be a matter of surprise that his extraordinary conduct should necessarily have resulted in placing him in such a disagreeable position. Apart from any inference that might have been drawn from the incoherent nature of the letters which the defendant has been sending about for many months past they presented evident indications of apparent hostility to the Society and its officers. It is therefore satisfactory to find that Mr. Sargent now disclaims such motives, and with regret for his misguided conduct desires to apologize to every one to whom he has caused annoyance.

* * *

We learn that Mr. E. S. Bradley, the Society's Local Secretary for Ashbourne, has been elected to represent the Ashbourne division of Derbyshire as County Councillor.

* * *

It is announced that the University of Munich has created the degree of "Doctor of Pharmacy." This will only be granted after a curriculum of seven academical sessions and after passing an examination in chemistry, physics, botany and zoology or mineralogy ; and the presentation of a thesis by the candidate.

* * *

Old members of the Pharmaceutical Football Club who wish to attend the annual dinner to be held on Friday, March 18, at the Holborn Restaurant, can obtain all particulars from the Hon. Sec., 17, Bloomsbury Square, W.C.

Transactions of the Pharmaceutical Society.

EVENING MEETING IN LONDON.

Wednesday, March 9.

MR. MICHAEL CARTEIGHE, PRESIDENT, IN THE CHAIR.

At the evening meeting held on Wednesday, March 9, Professor Armstrong delivered his fourth and concluding lecture on the "Phenomena of Fermentation."

The chair was taken at 8.30 by the President, Mr. Michael Carteighe.

Professor ARMSTRONG said he had endeavoured to impress upon them in his previous lecture that the fermentation phenomena connected with the conversion of a substance like cane sugar into two glucoses, and the subsequent conversion of the glucoses into alcohol and carbon dioxide essentially consisted of a series of hydrolytic changes. During the enzyme stage, when the cane sugar was converted into the two glucoses, the change was brought about by a non-vital action; but during what he had called the zymic stage, the change involving the formation of the alcohol and the carbon dioxide, took place under the influence of a living cell, and was a vital action. In the first stage simple hydrolysis took place, and there was merely a resolution of the molecules into a simpler form; but during the zymic stage there was recurrent hydrolysis, and the molecules of ordinary alcohol and carbon dioxide were produced by the rearrangement of the oxygen and hydrogen atoms, in consequence of the localization of hydrogen in one part of the molecule and of oxygen in other parts of it. That was brought about no doubt by the action of water under certain conditions. There was nothing in any degree mystical about the action of those organisms, as they could imitate that action by means of such agents as ordinary milk of lime. The enzymic stage—the conversion of the cane sugar into the two glucoses took place at a much greater rate than the conversion of the glucoses into alcohol and carbon dioxide. If yeast be placed in a cane sugar solution it would, within a short space of time, convert the whole of it into glucose. The explanation that the fermentation was due to electric hydrolysis was suggested by Baeyer in 1870, and there were far more precedents in the present day in support of this explanation than there were then. A great many cases were known to us now in which by the action of water under the influence of either acids or alkalies, precisely similar changes might be brought about in substances of the carbohydrate type, and Baeyer's suggestion that there was merely a re-arrangement brought about by the withdrawal of the elements of water and their re-admission in a new order was a perfectly satisfactory explanation from our present point of view. He suggested that there was an electric hydration and dehydration—that the elements of water were withdrawn and then added on in a different order; but he offered no suggestion as to the way in which the action might be brought about. He (the lecturer) had pointed out that it was not necessary to assume that there ever was any actual separation of the elements of water from the molecule and their subsequent re-admission, and had shown that the action might be brought about by a kind of electrolytic change taking place locally within the molecule. In a galvanic cell there might be the liquid with the two plates in it, but of course nothing would take place until they made the circuit by uniting the plates outside the liquid; and in the phenomena they were considering, the organism practically did nothing more than make possible the formation of the circuit. Although it had not been absolutely stated by Pasteur in so many words, there was very little doubt that he looked upon fermentation as pathological phenomena. He took the view that the conversion of glucose into alcohol and carbon dioxide took place when the organism was living in an atmosphere free from oxygen, but that it was necessary for the life of the organism that it should have hydrogen at its disposal, and when it could not get atmospheric oxygen it set to work to get it from the sugar molecule. That explanation did not, however, satisfy the modern chemist. Pasteur based this theory on experimental observations, but there was no doubt the facts were not quite as he thought they were. He thought that fermentation did not take place in presence of oxygen, that oxygen prevented it, but it was now known that such was not the case. Yeast was one of those organisms apparently which was not affected by oxygen. So far as we know at present fermentation goes on briskly in the presence of oxygen, which, in fact, rather favours it than otherwise. Pasteur's view was based on certain experiments which seemed to show that fermentation, which did not otherwise take place, took place when oxygen was withdrawn. He describes experiments with ripe fruit in which they were taken and put in an atmosphere of carbon dioxide, when it was found that alcohol was produced in considerable quantity; and he came to the conclusion that the living cell of the fruit set to work and brought about the formation of sugar and the other changes. Those experiments, however, could not be considered satisfactory, as it was impossible to properly sterilize the fruit. The surface of the fruit was covered with organisms, and whatever care might be taken, it was pretty clear that they could not be killed so as to prevent their acting and vitiating the experiment. Until that experiment had been repeated, in such a way as to satisfy modern requirements, he should not attach much importance to the conclusions drawn from it. Alcoholic fermentation was a purely analytical process. The sugar molecule was simply taken to pieces and resolved into simpler elements; and that was true also of lactic fermentation. The text-books had got a way of saying that lactic fermentation involved the resolution of the sugar molecule into two lactic molecules; but lactic acid was not the only product of lactic fermentation, and there was nothing to justify the statement that the sugar molecule was simply resolved into two lactic molecules. Bacterial fermentation generally gives rise to products which bear a far less simple relation to the original substance. Lactic acid is converted under the influence of an organism into butylic acid, and glycerol is converted by a particular organism into normal butyl alcohol. The formation of butylic acid from lactic acid is similar in character to that which is involved in the formation of fats from carbo-hydrates in the animal organism. Sugars which contain a large amount of oxygen are converted into fats which contain very little oxygen indeed. Butylic acid contains relatively very little oxygen when compared with lactic acid. The bacteria have the power of taking the oxygen from the water and liberating a large part of hydrogen. Their action is that of an oxidizing agent. By the action of the organism compounds are formed capable of acting upon one another, leading to the formation of compounds, which in turn can undergo fermentation. These compounds are exceedingly sensitive to the action of oxidising agents. The tendency of hydrogen to became liberated is very strong, because there is an enormous desire on the part of two atoms to unite and form a hydrogen molecule. There is every reason to think that the affinity of like atoms, such as hydrogen for hydrogen, and oxygen for oxygen, is very great. There is a strong desire on the part of the hydrogen atoms to get away in each other's company, and in that way there

is no difficulty in accounting for the currents of changes taking place in these phenomena of fermentation. When we make spirit in the ordinary way, we do not get a pure spirit, but there is a good deal of high boiling products. Fusel oil, which is a complex mixture, contains sometimes propyl alcohol, hydrobutyl alcohol and amyl alcohol. Those alcohols have one thing in common, that one of the carbon atoms is associated with two others. In the dextrose formula we have a simple chain of carbon atoms, so that clearly in the formation of amyl alcohol by fermentation, a change is brought about, of a different character to those we have been dealing with in which there was merely a re-arrangement of the oxygen and hydrogen atoms. These amyl alcohols are not products of alcoholic fermentation proper. There is reason to believe that heat does not give rise to fusel oil, but that fusel oil is due to bacterial fermentation. Another class of fermentation is brought about by the influence of a great variety of moulds and of that organism so useful to the vinegar-maker. Vinegar is made by trickling alcohol through a vessel over a surface usually of wooden shavings. So long as those shavings are clean no effect is produced, but it is found after a time that a growth takes place in these shavings, and that under the influence of these organisms the alcohol becomes oxidised. The organism simply has the power of laying hold of atmospheric hydrogen and making use of it for the purpose of oxidising the alcohol. It is an exceedingly interesting organism, because, although it has the power of oxidising a great number of substances, it has its likes and dislikes. It has not the slightest effect on methyl alcohol, but it oxidises propyl alcohol readily enough. It will not look at fusel oil, but it oxidises glycol and also glycerine.

With regard to that great class of fermentations commonly called putrefactive, and which give rise to unpleasantly smelling substances, the bodies attacked are such as we know little about, and products ultimately obtained are in no sense primary products of fermentation. The bacteria resolve the albuminoid substances into simpler substances, which undergo change in a variety of ways in consequence of their entering into combination with each other and of their being acted upon by hydrogen. These phenomena of fermentation of albuminoid substances are of special importance owing to the recognition in recent years of the part which the organisms play in zymotic diseases. It is clearly recognized at the present day that the fatal effects are in consequence of poisoning by products of the fermentative changes which go on in the system under the influence of these organisms. It was long supposed that certain substances which had been isolated were the actual poisons, but recent results seem to show that the actual poisions have entirely eluded our grasp, and within the last two or three years there has been a sort of reaction against the idea that they were alkaloid substances and in favour of the view that they belong to the so-called peptone class—much more nearly allied to the albumens. Unfortunately, up to the present time the evidence on record is of such a kind that it is practically impossible to give any opinion with regard to it. It was almost hopeless to expect much progress in this direction so long as we remained ignorant of the composition of the albuminoid substances which are acted upon. With reference to the selective action of these organisms it was probable that by studying this we should get some kind of explanation as to the susceptibility of some persons and the non-susceptibility of others to certain diseases. All the substances which undergo fermentation are capable, when in solution, of rotating polarised light. Lactic acid is a substance of that kind. That is true of all the carbohydrates and all the alkaloids. On looking at the formula of the lactic acid molecule it will be seen that the carbon atom is associated with four different groups, and the idea is that all compounds of that kind in which there is present an azometric carbon are capable of rotating polarised light. This subject was of great importance with regard to the immunity from disease being conferred by certain substances. They knew that vaccination prevented small pox, but up to the present they had not been able to form any idea as to the way in which it acts. If they took the liquid in which anthrax bacillus had grown and administered that to an animal it protected that animal to a very considerable extent against the anthrax. In following that out in the future, a triumph of an astounding character might be achieved, and they might be able to produce substances capable of entering into combination with the human organism, and in some way or other of altering the composition of the tissues to a sufficient extent, so to speak, to turn the activity into other channels, and to secure immunity from certain diseases. In conclusion, Professor Armstrong regretted that it had not been possible for him to do more. The subject was one of such tremendous complication that it would be necessary, in order to deal with it thoroughly and discuss the various problems arising out of it fully, to give not four, but forty lectures. He understood the object to be to have new matter brought forward as far as possible, and to have suggestions thrown out which might in future serve to promote the increase of knowledge. To him it had been a very great pleasure indeed to speak there. There was no other school of research in London which openly proclaimed itself such, and as an outsider he felt that the Society was doing most important work in establishing in this country what was so very necessary at this time, namely, a proper understanding of the objects and aims of scientific research.

The PRESIDENT, in proposing a hearty vote of thanks to Professor Armstrong for his lecture, said it was the fourth lecture on a subject which, even for an able man, was a complicated one. The object of the lecturer had been rather to show the light which recent research had thrown on the subject of fermentation than to go into minute points of detail. The subject was undoubtedly a difficult and complicated one, but there had been a fund of information put before them and suggestions made of great value. Those who knew as he did the claims on Professor Armstrong's time would appreciate to the full the kindness and consideration he had shown in coming there and giving them the instruction he had done.

Professor GREEN, in seconding the motion, said he had listened with fascination to the wonderfully interesting lecture they had just heard. The lecture had bristled with points of interest, some of which might, no doubt, give rise to a good deal of controversy. The immunity from disease which was supposed to be given by the action of these organisms opened up a very large field, and there might be some room for differences of opinion with regard to that point. He desired to express his deep gratitude to the lecturer, and his appreciation of the lecture, and he had great pleasure in seconding the vote of thanks.

The resolution was put and carried by acclamation

DONATIONS TO THE LIBRARY AND MUSEUM.

At the meeting of the Library, Museum, School and House Committee, held on Wednesday, the 9th inst., the undermentioned donations were reported, and it was ordered that the thanks of the Society should be communicated to the respective donors:—

To the Library in London—

Chemists' Assistants' Association, Proceedings 1889–90. 2 copies. From the ASSOCIATION

Central Throat Hospital Pharmacopœia, 1890.
From Mr. A. A. DECK.
Victoria, Pharmaceutical Register for 1891.
From the PHARMACY BOARD.
Durham University Calendar, 1892.
From the UNIVERSITY.
Royal College of Physicians of London, List, 1892.
From the COLLEGE.

To the Library in Edinburgh—
Victoria, Pharmaceutical Register for 1891.
From the PHARMACY BOARD.

To the Museum in London—
Specimen of Ginger from the Botanical Station at Fiji; specimen of *Seidlitzia florida*, used for washing wool in Persia.
From the DIRECTOR, Royal Gardens, Kew.

To the Museum in Edinburgh—
A fine collection of typical specimens of cultivated Cinchona Barks.
From the Royal Botanic Gardens, Edinburgh, per Professor I. B. BALFOUR, Regius Keeper.
A specimen of muriate of aconitine in large well-defined crystals. From Mr. T. SMITH.
Ten specimens of Commercial Goa Powder.
From Mr. W. DUNCAN.
Fruit of *Poinciana regia*.
From Mr. T. SHORTBRIDGE TWEEDIE.

To the Research Laboratory—
Gmelin's Handbook, 16 vols.; Lehmann's Physiological Chemistry, 3 vols.; Laurent's Chemical Method, 1 vol.; Henry's Life of Dalton, 1 vol.; Day's Life of Cavendish, 1 vol.; Chemical Reports and Memoirs, 1 vol. From Mrs. MIDDLETON.

Proceedings of Societies in London.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting was held on Thursday, March 3, Mr. E. F. Harrison, Vice-President, in the chair, and a paper, of which the following is an abstract, was read:—

LABORATORY APPARATUS.

BY GEO. A. SHAW.

The author first dealt briefly with a few points to be observed in glass blowing, including a description of the construction of a useful form of blowpipe, together with an automatic blower which was used with an ordinary injector air pump. He then described a method by which glass of any size or shape could be cut. It consisted in taking a piece of narrow combustion tubing and drawing it out to a fine jet. By means of a flexible rubber tube this is attached to the gas, which is so regulated as to produce a flame of about one-eighth of an inch long. A small crack is first started in the glass, and by the use of the small flame the crack is led in any desired direction. This method is particularly well adapted for cutting broken test-tubes or flasks. The rough end of a test-tube may be readily rounded off by fusing the body in a blowpipe or bunsen and gently opening out with a charcoal cone.

Filtration may be aided by attaching to the stem of the funnel, in which is a well-fitting filter paper, a tube about twenty-four or thirty inches long; in order to keep the tube full of liquid it is bent into a loop about three inches from the top. The column of liquid in the tube reduces the pressure on the under side of the filter paper and so causes a material increase in the rate of filtration. A convenient and inexpensive stoppered funnel is made by grinding into the neck of an ordinary thistle funnel a short piece of glass tubing closed at both ends. The grinding is quickest effected by the aid of a little emery and camphorated turpentine. By raising the stopper the liquid which is placed in the funnel can be let out at will.

The next piece of apparatus described was a cheap and simple, constant generator for such gases as H_2S, or CO_2. It was composed essentially of a reservoir for the acid, a column containing the carbonate or sulphide, a wash bottle and a small clamp for the regulation of current of gas. The column is an ordinary argand lamp glass and stands in the centre. At the bottom of this is fitted a cork, pierced with one hole and bearing a tube bent twice at right angles. To this tube is attached the acid bottle by means of a rubber tube. The acid bottle stands on a block three or four inches high, and is supplied with tubes exactly as an ordinary wash bottle. The tube reaching to the bottom of the new bottle is attached by means of a flexible rubber tube to the bent tube fixed in the bottom of the central column so that the acid reservoir and the central column are connected by a syphon. The column is fixed to the stand by hollowing out the board to accommodate the bent tube and imbedding in plaster of Paris. In the contracted portion of the lamp glass is placed a small piece of copper gauze, on which HCl has no action, and over this is placed the carbonate or sulphide. To the top is attached a tube leading to the wash bottle and thence to a delivery tube, bearing a small clamp to regulate the gas supply. The apparatus is started by opening the clamp and filling the syphon by blowing into the acid bottle. By the action of the syphon the acid rises in the column and reaches the marble whereupon the evolution of gas commences. As long as the clamp is open effervescence continues, but immediately the clamp is closed a pressure is created in the upper part of the column and the acid is forced back from off the carbonate into the wider part of the glass column, where it remains and keeps the syphon full and ready for action, when the clamp is again opened. The strength of the HCl used should be about 1 in 4 for CO_2 and about 1 in 3 for H_2S. Should a stronger acid be used the liquid is forced back into the bottle and the apparatus must be again started by blowing. All the corks used should be previously soaked in paraffin. The paper concluded by the description of the following burette reader. Two pieces of white cardboard are taken, one $1\frac{1}{2}$ inch by 1 inch, the other $1\frac{1}{2}$ inch by $\frac{3}{4}$ inch. On the larger one is gummed a piece of black paper, $1\frac{1}{2}$ inch by $\frac{3}{4}$, so as to leave a white space $\frac{3}{4}$ inch wide on one side. By means of drawing pins one end of each of these is fixed to an oblong piece of cork cut to the same thickness as the burette, the larger piece at the back in such a manner that the black side is innermost and the upper edge of the black paper comes exactly on a level with the top of the smaller card in front. When the burette has to be read the indicator is slipped on and run up until the bottom of the meniscus appears as a black line. This is due to an image of the black paper being produced in the meniscus which is thus sharply marked off. The height can be accurately read without the use of a float.

A discussion followed in which the Chairman, Messsrs. Jowett, Gane, and the Secretary joined.

Mr. R. H. Jones then read some "Dispensing Notes," in which he discussed the methods of obtaining the most satisfactory results with mixtures whose ingredients were more or less incompatible, such as tannin and iron, iodide of potassium and tartarated iron, citrate of iron and quinine and aromatic spirit of ammonia, salicylate of sodium and citric acid, etc. Suitable excipients and manipulation for getting some refractory substances into a condition fit for rolling into pills were also described, as well as one or two lotions and suppositories which presented a little difficulty.

The note produced a discussion in which the Chairman, Secretary, Messrs. Shaw, E. Brooke, Gane, Jowett, Donington, Fuge, Bowden, Taylor, Boucher, Sturton, and Patchitt took part.

Provincial Transactions.

ROYAL SOCIETY OF EDINBURGH.

At a meeting of this Society on March 7, an interesting note was contributed by Dr. J. Murray and Mr. R. Irvine, on "The Manganese Nodules in the Marine Deposits of the Clyde Sea Area."

Professor Geikie and others took part in the discussion, and the weight of opinion indicated that these deposits of manganese originate from the Glasgow chemical works and not from the breaking up of volcanic rocks.

Dr. D. Noel Paton gave an account of a crystalline globulin, which Dr. Bramwell had found as a deposit in the urine of a patient. Dr. Paton stated that it was the first crystalline globulin which had been obtained from an animal source. It has been purified so as to be quite free from ash, and is crystallized free from colour. Analysis indicates a higher percentage of sulphur and less nitrogen than were found in the crystalline vegetable globulin. It is hoped, by analysis of silver compounds, etc., to arrive at the molecular weight of the compound, which would be an important addition to our knowledge of proteid substances.

Parliamentary and Law Proceedings.

The Pharmaceutical Society of Great Britain v. Preston.

Before His Honour Judge Prentice, on the 7th inst., at the Bow County Court, the Council of the Pharmaceutical Society of Great Britain sued Thomas Preston, of 2, Leyton Green, High Street, Leyton, to recover a penalty of £5 for selling poison, to wit, "oxalic acid," contrary to the provisions of the Pharmacy Act, 1868.

Mr. T. R. Grey appeared for the Council.

Defendant did not appear but was represented by his wife.

Mr. Grey stated that the Council were suing the defendant for a penalty for selling poison, namely, "oxalic acid," a poison enumerated in the schedule to the Pharmacy Act, 1868, he not being a duly registered person as required by the statute. The proceedings were taken under section 15 of the Pharmacy Act, 1868, which makes it unlawful for any person to sell poison unless he is a duly registered pharmaceutical chemist or chemist and druggist, and the penalty for so doing, unless he has one or other of those qualifications, is fixed at £5 for every offence. Mr. Grey called his Honour's attention to the various sections of the statute which had a bearing upon the action. The defendant had for some time past carried on the business of a chemist and druggist, and he should prove that oxalic acid was purchased at 2, Leyton Green, on December 7 last, and that at the time defendant was the occupier of the premises and carried on business there. He would put in the Register for 1891 which by sec. 13 was made evidence, wherein defendant's name did not appear, and upon that evidence he should ask his Honour for judgment.

James Hogger, examined by Mr. Grey: I am a porter in the employ of the Pharmaceutical Society. On December 7 last, I went to 2, Leyton Green, High Street, Leyton. The front room is fitted up as a chemist's shop, and various articles are exhibited for sale in the window. I saw defendant there. I asked him for one pennyworth of oxalic acid, and he served me with the packet produced. It was only labelled "Poison."

Defendant's wife asserted that the packet could not have come from her husband's shop, as they always properly labelled everything, and further that the shop was not open on December 7.

Mr. Ernest John Eastes, examined by Mr. Grey: I am an analyst. On January 7, I received from James Hogger the packet produced. It was then sealed up. I have analysed the contents, which I find to be oxalic acid.

Mr. C. F. Thomas, examined by Mr. Grey: I am rate collector for the parish of Leyton. I produce the rate-book. Defendant's name is entered therein as the occupier of 2, Leyton Green. He has been in occupation there at least six months.

His Honour: I give judgment for a penalty of £5 for selling poison, with costs. The more this Act is followed up the better.

Extraordinary Libel Upon a Chemist.

At the Kent Assizes, on Monday, before Mr. Justice Day, George West Sargent, a dispensing chemist, carrying on business at 75, Church Street, Kensington, was indicted for unlawfully and maliciously publishing certain defamatory libels of and concerning Alexander Bottle, at Dover, on November 21 and December 22, 1891, and January 22, 1892.

Mr. Forrest Fulton, M.P., appeared for the prosecution, and prisoner was defended by Mr. Marshall Hall.

Prisoner pleaded guilty to the indictment.

Explaining the facts of the case to the learned judge, Mr. Fulton said: Prisoner appears to have been animated with a strong feeling of hostility against any person connected with the Pharmaceutical Society of Great Britain, and has written libellous letters addressed to Mr. Knocker, Town Clerk of Dover, in which he has made serious charges against Mr. Bottle, who is Vice-President of the Pharmaceutical Society, and engaged in business at 37, Townwall Street, Dover, of which place he has been Mayor. The letters are very short, my lord.

His Lordship: I have read the depositions through very carefully, but not the letters.

Mr. Fulton: They are addressed to the Town Clerk of Dover, and run:—

"November 20.—Transit of poisons, inflammable drugs, etc. Dear sir,—May I venture to inquire if the Corporation have made investigation of charges of fraud against the President of the Pharmaceutical Council, in conjunction with Mr. A. Bottle, also member of the Council, 'abstraction of regulations as to poisons,' etc., from various issues of the Calendar of the Society, which appeared in 1890. Dover seems to be mentioned rather freely throughout the entire trade.—Yours truly, G. W. Sargent."

"December 21.—Dear sir,—I should be glad to know if my letter under consideration with regard to Mr. A. Bottle, Vice-President and member of the Pharmaceutical Council, by fraud, corrupt practices, and also at present filling the position of local secretary to the Pharmaceutical Society; and also if any steps have been taken to restrain the said Mr. A. Bottle from administering the Pharmacy Act by fraud, corrupt and illicit practices.—Yours truly, G. W. Sargent."

"January 21, 1892.—Transit, storage, etc., poisons, inflammable drugs, *re* Alexander Bottle, 37, Townwall Street, Dover. Dear sir,—I am instructed to inquire the reason no criminal proceedings have been instituted against the above with regard to the abstraction of poison regulations from various issues of the Calendar of the Society, which appeared in the issue of 1890, page 45. The Corporation of Dover continue to be reported badly and placed the country into confusion and alarm. Yours truly, G. W. Sargent."

Mr. Fulton: The prisoner charges Mr. Bottle with having obtained the position of Vice-President of the Pharmaceutical Society by fraud and corrupt and illegal practices. This case might not have been

brought before the court, but prisoner has been sending similar charges all over the country regarding other people, and I think there is scarcely a town of any consequence to which these letters have not been sent. It is thought that such a state of things should be put a stop to, and all the prosecutor desires is that prisoner should be bound over, and so long as he refrains from a repetition of the offence he will not hear anything more about it. Some people of whom the prisoner has written are not so well known as the prosecutor, and the consequences might have been serious.

Mr. Hall (addressing the learned judge on behalf of the prisoner): This is a very sad case, because the prisoner has occupied a good position for a great many years, and having passed all his examinations is a qualified member of the Pharmaceutical Society of Great Britain. Wholesale drug stores have been opened in prisoner's neighbourhood at which goods have been sold at small profits, so small, indeed, as to make it almost impossible for a retail trader to keep pace with the competition. The result has been to hurt those who have only small businesses. I will suggest, my lord, that this has preyed upon prisoner's mind in one direction. He is now under the impression that every man's hand is against him. Prisoner wishes to say through me that he is extremely sorry for what he has done and wishes to withdraw every accusation. He also wishes to apologize to every one to whom he has caused annoyance and promises that he will not let it occur again.

The learned judge ordered him to be bound over to come up for judgment when called upon, and the case ended.

Prosecutions under the Food and Drugs Act.

On Wednesday, March 2, at the Dumfries Sheriff Court, Sarah Hughes and Ellen Hughes, grocers, Loveburn Street, Dumfries, were charged before the Sheriff with selling to an inspector one pound of linseed meal containing 30 per cent. of starch, contrary to the Sale of Food and Drugs Acts. The accused pleaded "not guilty," and stated that the meal was sold in the same condition as purchased. After the production of the analyst's certificate and a lengthy discussion of the case, the Sheriff decided that it would be sufficient under the circumstances to record a conviction, but warned retail dealers to protect themselves, as future cases would not be dealt with so leniently.

Robert Anderson and William M'Clure, grocers, High Street, were charged with a similar offence, and on the advice of their solicitor, pleaded guilty. One sample purchased contained 30 per cent. of starch and another 38 per cent. The Sheriff said he did not make any distinction in the cases, and repeated his warning that dealers should be on their guard.

David Clow, grocer, Ecclefechan, was fined £3 for having on January 9, sold a quarter of a pound of coffee adulterated with 28 per cent. of chicory.—*Scotsman.*

Reviews and Notices of Books.

Outlines of General Chemistry. By Wilhelm Ostwald, Professor of Chemistry in the University of Leipzig. Translated with the Author's sanction by James Walker, D.Sc., Ph.D., Assistant in the Chemical Department of the University of Edinburgh.*

The object with which this work was written was that of providing for the requirements of students who do not intend to devote themselves to the study of chemistry as a specialty, but still wish to follow intelligently the progress of that important branch of natural science. At the present time there must be many who are in this position, and that fact may be taken as a sufficient reason for the author's belief that there is an actual demand for such a book as he has produced. In regard to some of the views which have been introduced of late years in connection with chemical science there is in England some want of appreciation even among professed chemists, and this circumstance alone is a sufficient justification for the issue of an English translation of Professor Ostwald's book. The volume is divided into two parts, the first of which treats of chemical phenomena chiefly in regard to their material aspects, and the second deals with the manifestations of energy by which those phenomena are accompanied. The first part is subdivided into six books, with chapters treating respectively of the various chemical laws affecting relations of mass, the atomic weights of the chemical elements and their numerical relations, the physical properties of solids, of gases, and of liquids, the nature of solution, and the theoretical considerations on the basis of which chemical phenomena are systematized. The second part of the book deals with the less tangible entity of chemical phenomena to which the term energy is applied, whether that be manifested as kinetic, potential, thermic, electrical, or chemical energy. The first seven chapters of this part deal with the subject of thermo-chemistry, four are devoted to photo-chemical phenomena, five to electro-chemistry, five to chemical dynamics, and the remaining five to the consideration of chemical affinity and the influence of the various conditions by which its action is modified. Within the limits above indicated a very complete *résumé* is given of the prevailing chemical theories of the present day, and the growing tendency towards a mathematical treatment of the science is amply illustrated. But in conformity with the design the author had in view he has abstained as much as possible from the use of mathematical formulæ in order to secure clearness of exposition and to adapt the book to the course of study still pursued by the average chemist. At the same time it is stated that, though the methods and results of general chemistry may be understood without the aid of the higher mathematics, such knowledge is indispensable for successful work in that field. The translator refers in his preface to the singular disregard with which the views of van t'Hoff and Arrhenius have hitherto been treated in this country, and as he attributes that circumstance in great measure to the want of a connected account of them from one uniform point of view, he anticipates that the provision for that want in the work now referred to will help to secure for it the attention of chemists.

* London: Macmillan and Co. 8vo. Pp. 396. Price 10*s*.

Outlines of Theoretical Chemistry. By Lothar Meyer, Professor of Chemistry in the University of Tübingen. Translated by P. Phillips Bedson, D.Sc. (Lond.), B.Sc. (Vict.), Professor of Chemistry in the Durham College of Science, Newcastle-on-Tyne, and W. Carleton Williams, B.Sc., Professor of Chemistry in the Firth College, Sheffield. With a preface by the Author.*

This work is a translation of the smaller treatise on Theoretical Chemistry, by Professor Lothar Meyer, which was written to satisfy the requirements of students for whom the larger and more technical work on Modern Theories of Chemistry dealt with the subject in too great detail. It has already been very well received in Germany as a useful book for the generality of chemical students, and in the translated

* London: Longmans, Green and Co. 1892. Pp. 220. 9*s*.

form it may be expected to meet with similar acceptance in this country. The importance of chemical science is now becoming so much more generally recognized that acquaintance with its doctrines is, at the present day, a requisite not only for those who are engaged in chemical pursuits, either of investigation or practical application, but also for all persons of liberal education. The subject is dealt with in sections to which reference is made in the index. Side by side with the descriptions of modern chemical theories the historical developments and changes of ideas relating to chemical phenomena are mentioned.

Opening with a definition of chemistry and a statement of the marked characteristics of chemical change the method of chemical investigation is briefly described, together with the great advance made at the end of the last century by the substitution of the Lavoisierian theory, for that which assumed the existence of a peculiar combustible principle termed phlogiston. Then follows the explanation of Stöchiometric laws and of the atomic theory as established by Dalton, and developed by Berzelius and others, with references to the thermic equivalents of the chemical elements, the hypotheses of Avogadro and Prout. This leads to the subject of the classification of the elements as suggested by the relations pointed out by Dobereiner and ultimately further developed by Newlands, Mendeleeff and Lothar Meyer. Chemical valency is then treated of and the influences exercised by the position of atoms in molecules and by the linking of atoms, in illustration of which Kekule's hypothesis of the constitution of the aromatic compounds is described as well as the facts of isomerism and allotropy. The views relating to the relations between chemical constitution and physical characters such as vapour density, boiling point, etc., are then dealt with, as well as the constitution of gases and the phenomena of diffusion and absorption. The various modes of chemical change and its causes, the phenomena of dissociation and electrolysis follow next, with illustrations of the influence of mass and other conditions, such as that termed catalysis by Berzelius, and contact action by Metscherlich. Finally, reference is made to the fact that the hypothesis which regards chemical affinity as a special attractive force, is no longer of much use for explaining chemical phenomena. The tendency is now to consider the atoms of which molecules are built up as being in a state of active movement, and their relations to each other as being determined by the magnitude and form of their motions. In fact chemical theories grow more and more kinetic. Though habit and expediency lead us to speak of chemical affinity as an attractive force exercised between atoms, that mode of expression is only an admission of our imperfect knowledge of the real cause of internal cohesion in chemical compounds.

This cursory *résumé* of the contents of Professor Meyer's work may serve for indicating the benefit which the chemical student may derive from its careful perusal, and if in that respect it has the effect of directing attention to this important contribution to chemical literature, the purpose of this notice will have been attained, though the intrinsic excellence of the book may have been but scantily represented. In that respect, however, it may safely be assumed that those who are induced to open the work with serious intentions will not rest satisfied until they have made themselves masters of its contents, and thus largely profited by its teaching.

AN INTRODUCTION TO CHEMICAL THEORY. By ALEXANDER SCOTT, M.A., D.Sc.*

This work is intended to provide for a difficulty experienced in the teaching of chemistry and resulting partly from the multitude of apparently disconnected facts to be considered, partly also from the greater prominence given to the statements of facts and description of experiments in most elementary text books than to the philosophical aspects of the subject. In this respect the author's object is similar to that of Ostwald and Lothar Meyer in their more comprehensive treatises on chemical theories, and he seeks to direct the student's attention especially to those theories by which a more general view is to be obtained of the connection existing between chemical facts. In the treatment of the subject it is assumed that the student already possesses a fair knowledge of chemical facts and methods of experimenting, or that he has the advantage of access to a teacher for assistance; but at the same time the illustrations furnished are of a nature to meet the requirements of average students. The book is divided into eleven chapters, commencing with a description of the views now held concerning the constitution of matter, then passing on to the consideration of atomic and molecular weights, the classification of chemical elements and their compounds, chapter six being devoted to the special consideration of carbon compounds, their constitution and classification. The opportunity thus afforded for illustrating the great value of the determination of the density of substances in a state of vapour, prepares the way for treating more in detail the subject of abnormal vapour densities and dissociation, which are dealt with in the seventh chapter. In chapter eight the general physical properties of compounds and their relations with differences of constitution are treated of. Chapter nine is devoted to the phenomena of the evolution of energy in the form of heat, which accompany chemical reactions, and chapter ten deals generally with the subject of chemical change, the ideas connected with what is termed chemical affinity, and the various modes in which it is exerted in the production of different classes of chemical change, such as analysis, synthesis, substitution, isomeric change, the phenomena of fermentation, and explosion. In the concluding chapter on the subjects of solution and electrolysis a description is given of the modern views as to the nature of solutions, the conditions in which the constituents of a dissolved substance exist, and their probable relation to the phenomena of electrolysis. Students who have acquired some general acquaintance with chemistry will find this work very serviceable in enabling them to grasp in a comprehensive manner the import and the connection of the facts they have learnt by attending lectures or by laboratory work. They will thus gain a more philosophical insight into chemical science, and find their progress in its comprehension and application very materially facilitated. The work is written in a very plain and intelligible manner, it has a sufficiently full index for purposes of reference, and it may be recommended to all students of chemistry as an excellent compendium of the theoretical aspects of the science to which they should not omit to devote their careful attention, whether they desire to become proficient chemists or merely to acquire a general acquaintance with this important branch of natural science.

* Edinburgh: A. and C. Black. Crown 8vo. 5*s*. Pp. 266.

COOLEY'S CYCLOPÆDIA OF PRACTICAL RECEIPTS AND COLLATERAL INFORMATION. Seventh Edition. Revised and greatly enlarged. Two vols. Pp. 1827 By W. NORTH, M.A.*

This is a new edition, published after an interval of twelve years, of what has been considered the most useful work of general reference for pharmacists. In the preface we are told that "the object kept in view has been the revision and amplification of the matter ori-

* London: Churchill. 2 vols. Royal 8vo Price 42*s*.

ginally contained in the work, rather than the enlargement of its scope." The additions increase the size of the book by thirty-one pages. The more important of these are found under the headings Photography, Surveying, and Insects Injurious to Crops. It is noticeable also that the articles on Bacteria, Microscopy, Burettes, etc., have been considerably and usefully extended.

The special revision has been carried out by authorities in their respective departments and, so far as revision has taken place, the matter is brought well up to date.

Thus, the pharmacy and general chemistry are dealt with as satisfactorily and with as comparative fullness as the scope of the volumes will admit. Information concerning most of the new remedies introduced during recent years, will be found in a concise and comprehensive form. But it is very evident that the revision of the book has been partial only. In a work of this class an interval of twelve years, full of scientific activity inciting to new discoveries almost daily, should almost ensure the evolution of a totally distinct book. Yet here we find, page after page, exact repetition of what appeared in 1880. Stereotyped recipes might be allowed to pass, especially since a book recipe is generally valued merely for any ideas it may suggest fit to be worked upon, but in descriptions of electric lighting methods, telephones, etc., one would expect to find something more novel. The article on opium appears to be simply a reprint, and that on the Weights and Measures Act refers to the Act of 1878, omitting any reference to that of 1889, with its important provisions respecting the verification of weighing instruments. It is matter for regret also that in the article on "Poisons" there is no reference to the poison schedule.

However, as a work of reference, indicating where fuller details in any subject may be found, this compilation will be found exceedingly useful by the retail pharmacist, and most of those who have been assisted in their work by former editions will doubtless be well satisfied with the present.

ELECTRICITY UP TO DATE FOR LIGHT, POWER AND TRACTION. By JOHN B. VERITY, M.I.E.E.*

This little book has been written with the view of furnishing in a clear and popular manner information on various points connected with the application of electricity, which is not obtainable in a suitable form in the technical works upon that subject. The object in view has been very happily attained, and a careful perusal of the thirteen chapters into which the book is divided, will enable any person of ordinary information and intelligence to form correct ideas of the terms used by electrical engineers, the modes of electric supply and measurement adopted, as well as the conditions under which electricity is applied to the purposes which are now becoming general. A very useful glossary is appended to the book comprising explanations of all the ordinary terms used in electrical work. The concluding chapter deals with electrical engineering as a calling, and some very sound advice is given to those who seek to obtain employment in the carrying out of such work, or to extend their study of the modern applications of electricity.

BOOKS RECEIVED.

TRANSACTIONS OF "THE INSTITUTE OF BREWING." Vol. V. Edited by J. HERON, F.I.C. and E. B. PYMAR, M.A., LL.B. London: J. S. Phillips. From the Editors.

LESSONS FROM FIELDS AND LANES. By G. A. GRIERSON, F.L.S. Price 1*s*. York: Wm. Bleasdale and Co. From the Author.

REACTIONEN VON F. A. FLÜCKIGER. Berlin: R. Gaertner. From the Author.

BOROUGH OF HASTINGS SANITARY REPORT FOR 1891. By A. S. WILSON, M.A., M.B. St. Leonards: Daniel and Co. From the Hastings Urban Sanitary Authority.

THE MEDICAL ANNUAL, 1892. Bristol: John Wright and Co. From the Publishers.

THE TANNINS. By HENRY TRIMBLE, Ph.M. Volume I. Philadelphia: J. B. Lippincott Company.

---

* London and New York: Frederick Warne and Co. Pp. 178; 1*s*. 6*d*.

Obituary.

EMERITUS PROFESSOR REDWOOD.

We record with great regret the death of this distinguished pharmacist who was for so many years associated with the fortunes of the School of Pharmacy at Bloomsbury Square and has in that position done so much for the advancement of pharmaceutical education in Great Britain.

By some he will be recollected as a chemist of no mean ability; by others on account of his editorial work and literary attainments—specially by his numerous contributions to the scientific literature of the day; and by the medical profession for the large share he took in official pharmacy. Yet none will gainsay that he will be gratefully remembered as an instructor in his own department to many successive generations of pharmaceutical students, and that his true title to honourable recollection is that he was among the first who successfully endeavoured to raise the intellectual standard of the British pharmacist.

Theophilus Redwood was born at Boverton, Glamorganshire, on March 2, 1806. His father was a schoolmaster who lived in the above-named country village, and there he gave three of his sons their early education. The schooling was too suddenly interrupted, and young Redwood was sent as a temporary assistant to an apothecary, Mr. Charles Vachell, his brother-in-law, who in addition to medical practice combined general pharmacy and was considered the principal druggist of the town of Cardiff. His master realized a fortune by means of great business aptitude, but as far as the apprentice was concerned, the surroundings were not congenial. The duties were of a varied character—paints had to be ground; drugs powdered; teeth were drawn; while innumerable sundry occupations entitled the concern to the expressive appellation—mixed.

Three years thus spent formed a rough introduction into pharmacy, but the practical knowledge gained was a distinct advantage.

The apprentice however longed for more attractive work and a wider range—he also felt a strong desire for the acquirement of some better professional knowledge. The opportunity soon came and by the kind intervention of a Quaker lady who was a visitor at his father's house, he was released from this laborious round of duty and was transferred to the firm of John Bell and Company, in Oxford Street.

Young Redwood came to London in 1823 and entered upon his new duties with a three years' engagement which might be termed a second apprenticeship.

The business, it need not be stated, was purely pharmaceutical and was the School of Pharmacy in which the future Professor began and pursued his studies. Fortunately for him he had to pass through every stage: he had to put up stock—weigh seidlitz powders and fill the bottles.

Later he was entrusted with infusions and decoctions, and in due course was promoted to 'repeats.'

This is a lost department of the healing art, and one probably unknown to the pharmacist of to-day. Whole families were accustomed to take medicine with a regularity which was grateful to the chemist, and comforting to the till. The conduct of certain individuals was praiseworthy in the extreme.

It was the age of draughts and mixtures, and these were continued for such lengthened periods that a special branch of business was created.

This formed excellent practice for the dispenser, and when Mr. Redwood had faithfully discharged his duties for an allotted time, he was promoted to the head dispensing counter, where he was recognized as an experienced and admirable assistant.

The hours were long and the routine sufficiently heavy, yet never was there a period when more quick desire was manifested for personal improvement.

It was a reading community—much given to discussion, while possibly the very absence of external aid stimulated their endeavours.

Many of the then assistants left Oxford Street only to make themselves a name in their several avocations. The business outgrew the accommodation of the shop. John Bell, cautious in all his proceedings, was slow to admit the fact, but became so thoroughly aware of the necessity of change that he was induced to offer a premium, open to general competition, for a plan for the enlargement and re-arrangement of the premises.

That drawn up by Mr. Redwood with minute detail was accepted and so literally adopted that his original sketch formed a key to the alterations.

A new era was now to begin which affected the business, materially influenced the subsequent career of Mr. Redwood, and had an important bearing on pharmacy itself. This was the advent of Mr. Jacob Bell into the historic house. The two names of Bell and Redwood seem to be naturally united: in many respects they had the same tastes; certainly the same pharmaceutical aspirations. They studied together; atteuded the lectures of the Royal Institution; worked in common and were inseparable companions until death dissolved the union.

There was however a sort of interregnum: Mr. Redwood on leaving Oxford Street in 1830 began on his own account in Crawford Street and worked up the concern into a respectable dispensing business.

One can hardly imagine that the new venture was in harmony with his bent of mind, nor was he known to make reference to this period. At the same time he set up a factory on a small scale for the manufacture of chemical and pharmaceutical preparations.

A change was at hand. Mr. Bell made determined efforts towards the establishment of the Pharmaceutical Society, the history of which is too well known to be repeated here. He threw his whole activity into the organization of the new Association—chemists and druggists had to be aroused to a sense of the imperative necessity for union:

Meetings were held devoted to pharmaceutical discussion: and a School with lectures, laboratories, museums, library, and all the appliances of learning was created.

To make known the claims of the Society and to bring the subject of Pharmacy in England into direct public notice, the *Pharmaceutical Journal* was commenced, of which Mr. Bell was both editor and proprietor.

So bold an undertaking and one so novel in construction could scarcely be carried single-handed to a prosperous conclusion. The very person who could best second such a design was at disposal: the hour and the man most opportunely met, and Mr. Redwood at once was selected for the task.

He was thoroughly acquainted with actual druggist's life; with some of its hardships and more of its defects.

He saw clearly that there were possibilities of improvement and that a pharmacist would suffer no trade loss by entering the ranks of educated people.

So the well-known coalition was effected—Mr. Bell took the lion's share of public and political work, while Mr. Redwood became the active promoter of the educational and scientific side of pharmacy.

From the commencement Mr. Redwood was appointed Professor of Pharmacy (in the year 1842) being most brilliantly supported by other eminent professors.

It was fortunate beyond expression that British Pharmacy should have had such exceptionally qualified exponents at the start. The labour involved at the outset was immense. The task which devolved on the new professor was to organize lectures, library, museum and laboratory, and to supply much of the literature connected with pharmaceutical subjects. Success was not achieved by magic, indeed there were more than the usual fluctuations in public opinion as to the desirability of the movement; nor did the youthful portion of the community embrace with undeviating enthusiasm the advantages which were presented.

The end crowns the work and we can look back on these early struggles sometimes with amazement but also with unfeigned satisfaction on the ultimate result. In 1844 Professor Redwood was made Director of the Chemical Laboratories.

Mr. George Fownes, the first appointed professor of chemistry became seriously ill—always in precarious health he was compelled to omit several experiments from his lecture course in consequence of an affection of the breath. As a last resourse he went to Barbadoes from which he derived no material benefit, and on his retirement Professor Redwood was appointed to the amalgamated chair of Chemistry and Pharmacy in 1846.

The distinctive character of the period within these dates was the establishment of the laboratory which the Professor was chosen to superintend. The first attempt in that direction was a room fitted up in the upper part of the Society's house which proved so successful that next year the Council ventured on a larger experiment and commissioned the Director to equip a laboratory which should be both efficient and representative. This was constructed at the basement from his own designs. Adjoining were the Professor's rooms which were for consultation and analysis.

There Professor Redwood pursued his own chemical researches, and to those rooms he retired when he had ceased to lecture. Surprise was evinced that after more than forty years he should still be occupying the same arm-chair in those not very luxurious apartments. "Quite so," he said, "but at all events I can never get lower—that is, never but once." The laboratory just mentioned is believed to be the first of its kind in this country, specially devoted to imparting practical instruction in chemistry and pharmacy. It was opened in 1845 and was publicly inspected by the members present at the October meeting of that year on the invitation of Mr. Morson, who as Vice-President was in the chair. A full description with illustrations of ground-plan, details of arrangement, furnaces, apparatus and various appliances may be found in the January number of the *Pharmaceutical Journal*, Vol. v., page 314.

Dr. Ure, who was a tower of strength at the first evening meetings; a constant speaker as well as a contributor to the Journal, praised the new laboratory and contrasted it in most laudatory terms with similar establishments abroad.

The father of the present writer was shown over the *old* Laboratoire de Pharmaçie in the Rue d'Arba-

lêtre, Paris, by Professor Guibourt, and gave as his opinion that soap and water might be advantageously employed in the venerable structure—a sentiment which his son left prudently untranslated. Events proved subsequently that this pioneer laboratory was inadequate to meet the more modern requirements of pharmacy. Considerable discussion ensued as to the best method of procedure, which issued finally in the construction of the existing laboratory placed in the upper portion of the building. This also was erected according to Professor Redwood's original design.

His official connection with the Chemical Society dates from the year 1852 when he was appointed secretary in conjunction with the late Sir Benjamin Brodie, a post which he held afterwards with Professor Odling, until 1865, when he undertook the duties of Treasurer until 1870.

Retracing our steps a little, we must turn to his public literary career. In 1846, the Cavendish Society was founded, to which he was appointed secretary, a post which he retained during the whole period of its existence.

The duties incident to that position involved much anxiety, of which not the least was the distribution of the Society's publications. Great was his annoyance, when on one occasion a whole delivery was injured by inefficient carriage. Professor Redwood had a share in promoting an honourable understanding between Medicine and Pharmacy, and in paving the way for that recognition of the mutual position of the physician and the pharmacist which of late has been so conspicuously advanced.

The Royal College of Physicians applied to the Council of the Pharmaceutical Society for assistance in remodelling the London Pharmacopœia. A committee was appointed to this end of which Professor Redwood was Honorary Secretary in 1854. In the autumn of 1859 it was transferred and put into the hands of the Medical Council, when not only the London, but the united Pharmacopœia of London, Edinburgh and Dublin was ordered to be produced, called the British Pharmacopœia.

In 1865, Professor Redwood was appointed by the Medical Council to edit a new edition of the British Pharmacopœia, which appeared in 1867; the edition with Addenda which appeared in 1874, and again the edition of 1885.

We possess therefore an official work, issued under joint medical and pharmaceutical authority, simple in its mode of construction and free from the confusion incident to the occurrence of formulæ of varied strength but of identical nomenclature.

In 1840 Professor Redwood was joint editor with Dr. Mohr of Coblentz of a manual of Practical Pharmacy founded on the German text. Considerable additions and alterations were rendered necessary in order to adapt it to the purposes of the English student. It was well illustrated and may still be consulted with advantage. At that date it was a good introduction to practical laboratory work. We distinctly recollect the excitement amongst retail pharmacists when Professor Redwood's modernized edition of Gray's Supplement was announced. There were very few reference books in the market written on strictly pharmaceutical lines, though medical compilations were not scarce. Dr. Garrod states that it had a world-wide reputation as an encyclopædia of materia medica.

The first edition appeared in 1847, the second in 1848, the third and last in 1857. The original was so vigorously revised that the book may be said to have been re-cast, and even the name of the author disappeared.

The wisdom of this arrangement may be questioned, though the sale will be accepted by many as a convincing argument to the contrary. The old edition was invaluable as a reference to terms and formulæ considered obsolete but which for historical purposes should be enshrined somewhere, and might have been in part retained.

In 1872 an abridged edition of Pereira's classical work on Materia Medica was published, to which the Professor contributed the chemical and pharmaceutical portion. He was also editor of several editions of Pereira's admirable little book the Selecta è Præscriptis. Amongst his other literary productions must be mentioned his continuation of the Essay by Jacob Bell, The Historical Sketch of the Progress of Pharmacy in Great Britain.

Perhaps the busiest as well as the happiest period of the Professor's life was while he was in daily contact with his students and was giving active assistance as Sub-editor to the *Pharmaceutical Journal*.

This periodical was "got together" once a month by the Editor in chief, and a small committee of publication.

The matter was arranged at Mr. Bell's private residence in Langham Place. The celebrated collection of paintings which adorned the house have made way for a flourishing school annexed to the Polytechnic Institute under the patronage and financial support of Mr. Quintin Hogg, but the memory of those pleasant social and literary gatherings cannot readily be effaced.

At such meetings Professor Redwood was not only chief adviser, but was inexhaustible in suggestion and information on all matters pharmaceutical.

The pages of the Journal from its commencement down to the period of his retirement form the best commentary on this side of his character.

His labours were rendered lighter by the esteem in which he was held by the students attending his class. He became their companion and was in the habit of introducing them to his domestic circle.

In 1850 he was presented by them with a handsome testimonial consisting of a service of plate, to mark their appreciation of his personal kindness.

Chemistry was then taught by means of diagrams, the equation as representing reactions, not being in vogue. Many of the note books such as students use (one at least) were written by his own hand.

The position which was enjoyed by Professor Redwood brought him in contact with many eminent chemists, with whose investigations he was constantly associated. He was engaged by the Government in 1856 on the subject of fermentation in conjunction with Professor Graham and Professor Hofmann—the determination of the original gravities of fermented liquors and the best means of preparing a spirit which could be used duty free for manufacturing purposes. In this latter, Mr. Samuel Gale, of Oxford Street, rendered him assistance. It must not be forgotten that fifty years ago the chemists and druggists possessed the most elementary knowledge of many subjects which are now familiar to the average student. Professor Redwood was unrivalled in his exposition of chemical and pharmaceutical processes which from time to time demanded explanation.

This made him a power in the pharmaceutical world, and by this he made his mark in the educational progress of the time.

It would be tedious and uninstructive to reproduce a mere catalogue of his various contributions, or even of his more studied lectures.

To do so would be to reprint many columns of this Journal. The lecture on Dialysis, abundantly illustrated by experiment, may serve as a fair example. Also that on Electricity as a source of Light, delivered on March 14, 1849; and the two delivered thirty years after on the same topic, on January 8 and 15, 1879.

Previous to his final retirement, he gave a series of six lectures on galenical subjects, by way of taking

leave of a school with which he had been so long connected.

In 1869 the Professor was appointed delegate from the Pharmaceutical Society to the International Pharmaceutical Congress at Vienna. In 1876, yielding to the energetic persuasion of a colleague, he was President of the British Pharmaceutical Conference which held its meeting at Glasgow; and in the following year he accepted the same honourable post at Plymouth. His last public appearance was on August 18, 1891, at the Conference at Cardiff. He remarked that he considered himself a pharmacist of that town. His ambition was to study pharmacy where it was carried out on a more extensive scale than was possible in the Cardiff of that day, which only had a population of 4000 or 5000, and possessed neither docks nor railways. Therefore he made his way to London where he had spent the remainder of his life. On August 1, 1881, he was President of the International Conference held in London.

On January 28, 1885, Professor Redwood betook himself to the provinces and gave an Inaugural Address before the Midland Counties Chemists' Association to the students who had entered the classes which had been recently formed at Birmingham.

The President, Mr. Thomas Barclay, was in the chair, and the subject was Education and Examination. The chemists of the Midland Counties (it was stated in the editorial summary) appeared to have formed a sound estimate of the position and of what was required, and the action then taken by them in establishing a school, was to be regarded as casting the shadow of coming events.

After having devoted to the lecture room and the interests of the Society, a period of forty years' duration, Professor Redwood intimated his wish to retire from active service, and by an unanimous vote he was appointed by the Council, Emeritus Professor, on July 1, 1885.

The title of Ph.D. was presented to him on the retirement of Professor Liebig, by the University of Giessen; the celebrated chemist wishing to perform a graceful act on quitting a place with which his name is inseparably connected.

At the termination of the Annual Meeting of the Society, held May 18, 1887, a large number of subscribers assembled for the purpose of taking part in the concluding formal ceremony of handing over to the Society a portrait of the Emeritus Professor which the Committee had had painted by Mr. Sydney Hodges to be placed on the walls of the Society's premises. The chair was taken by the President, Mr. Michael Carteighe, and Dr. Garrod was called upon to present the portrait on behalf of the subscribers to the Fund.

The likeness was considered admirable, and did great credit to the artist.

"It represented," the speaker said, "the Professor in his best moments."

This presentation did not, however, form the main object of the Testimonial, its chief intention was to recognize long and valuable services rendered to pharmacy and to the sciences connected therewith by the foundation of a scholarship which should bear the Professor's name and perpetuate his memory.

This was accomplished on March 7, 1888, when the representation of the Committee was presented to the Council meeting.

When the step was originally contemplated, the Professor threw out a suggestion that the means provided for aiding students in the acquirement of the knowledge requisite to make them good and efficient pharmacists, might be in some way made available for extending the time which previously successful students might desire to the further prosecution of their scientific studies. The time which was too frequently allotted by pharmaceutical students to systematic study was in his opinion inadequate to the requirements of a sound and thorough pharmaceutical education.

The idea thus expressed has been carried into execution, and the Redwood Scholarship has been transferred from the School Laboratory in which general and elementary instruction is provided, to the Research Laboratory with the view of conducting original investigations.

Amongst the subscribers to the Testimonial Fund were leading men of science as Sir Frederick Abel and Sir Henry Roscoe; eminent medical men as the late Sir William Gull, Sir Henry Acland, and Dr. Garrod; and many principal pharmacists and the representatives of wholesale firms.

Professor Redwood was married in 1845 to Charlotte Elizabeth, the eldest daughter of Mr. Morson, the well-known chemist of Southampton Row. He had the misfortune to lose his wife in 1868.

He died on Saturday, March 5, 1892, at his residence, Boverton, South Wales, at the age of 86, deeply regretted by the surviving members of his family, and by all who have at heart the advancement of British pharmacy.

JOSEPH INCE.

The following letter has been received by the Secretary to the Pharmaceutical Society:—

"2, Fisher Street, Red Lion Square,
"London, W.C., March 9, 1892."

"Dear Mr. Bremridge,—

"I understood from you that some of my father's old friends at the Pharmaceutical Society contemplate going down into Wales to attend his funeral.

"I know that I am echoing the wish of all members of our family when I say that while we are deeply sensible of the kind feeling which prompts such an intention, we would rather be allowed to take the will for the deed, for the journey is a long one, and the place of interment not easy of access from the station.

"I know that the thoughts of all of you will be of your old friend on that sad occasion.

"Yours truly,
"T. HORNE REDWOOD."

Notice has also been received of the death of the following:—

On the 13th of January, John Arnold, Chemist and Druggist, Brighton. Aged 56 years.

On the 22nd of January, John Lumley Clemishaw, Chemist and Druggist, Bury. Aged 49 years.

On the 19th of February, James Berry, Chemist and Druggist, late of Brighouse, Aged 48 years.

On the 23rd of February, George Samuel Booth, Chemist and Druggist, Heckmondwike. Aged 40 years.

On the 23rd of February, John Davies, Chemist and Druggist, Upper Gornal. Aged 70 years.

On the 23rd of February, Samuel Glover, Chemist and Druggist, Liverpool. Aged 72 years.

On the 24th of February, Michael Scarth, Chemist and Druggist, Southwick, Durham. Aged 52 years.

On the 27th of February, Robert Twaddle, Chemist and Druggist, Glasgow. Aged 45 years.

On the 29th of February, Frank Gaudrion Morgan, Chemist and Druggist, Preston. Aged 71 years.

On the 1st of March, John Armstrong Wright, Chemist and Druggist, Bedford Leigh. Aged 44 years.

On the 2nd of March, William Samuel Potter, Chemist and Druggist, Plaistow. Aged 65 years.

On the 5th of March, John Wilton, Chemist and Druggist, Leeds. Aged 75 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith. Matter intended for publication should be written on one side of the paper only.*

Artificial Human Milk.

Sir,—Mr. Clague, in reply to my letter claiming priority of publication on this subject, disclaims any knowledge of the "Note on the Dilution of Cow's Milk in Infant Feeding," which was published in the *Pharmaceutical Journal* for July 6, 1889, and further attempts to get rid of my claim by stating that "for more than a year previous to that date our firm had been making and selling a milk made by the process described in my article." In order, therefore, to settle definitely the question at issue between us I must ask you to grant me a little space for an examination and comparison of extracts from the two articles in parallel columns:—

Smith, July 6, 1889.	Clague, Feb. 13, 1892.
. . . . "The writer, in September, 1886, had occasion to consider this question in his daughter's case, owing to the mother's deficiency in milk. The food used as a substitute on that occasion has proved so successful in more than one case that it merits recording."	"During the last four years experiments have been made at intervals, the record of which will be of sufficient interest to pharmacists to warrant publication." . . . .
. . . . "The formula is mainly based on a process devised by Professor Frankland in rearing one of his own children (*vide* 'Experimental Researches,' pp. 843, 844)."	. . . . "The literature on the subject was principally found in an article by Professor Frankland (*vide* 'Experimental Researches,' London, 1877, p. 843)." . . . .
. . . . "His process practically consists in a precipitation (by means of rennet) of one-third of the casein from fresh cow's milk, and the addition of one-third more milk-sugar, but this was found by the writer somewhat tedious except to a specially trained person. The process of dilution with water was adopted because it was simpler, and would enable the food to be prepared in a few minutes, whenever it was required."	. . . . "Although very good results could be obtained by this process it had the disadvantage of being wasteful and tedious. A simpler mode of working was therefore thought out and the following plan was adopted:—Water was used in the place of the whey and extra cream separately purchased was used to supply the required extra butter. Milk-sugar was separately added." . . . .

It is worthy of note that my article expressly states that the process of aqueous dilution had been adopted in September, 1886, and it is therefore specially interesting to note that Mr. Clague had been making experiments at intervals from 1888 onwards, on identical lines, without ever seeing this article. But the coincidence does not end here. What I describe as "somewhat tedious" in 1889, Mr. Clague finds is "wasteful and tedious" in 1892. I adopt the process of dilution with water in 1886, "because it was simpler," and Mr. Clague from 1888 onwards is thinking out "a simpler mode of working," and ends by adopting the plan of dilution with water. I make no further comment, but leave Mr. Clague to explain, and unbiassed readers to form their own opinion on this matter.

With reference to Mr. Clague's criticism on the fresh butter and oatmeal which figure in my formula, I adopted them for simplicity. Every one has not the advantage of having "a large and well-managed dairy in the neighbourhood," which supplies cream of "very uniform composition." Few, also, could afford to have periodic analyses of such cream, in order to be sure of its being uniform in composition; and as the food for the first six months of the infant's life has to be made four to six times a day, fresh butter was considered to be by far the simpler way for adding the extra necessary fat. I am perfectly well aware that the starch contained in the small amount of oatmeal recommended, is not correct from a theoretical point of view; but in practice I have actually found it beneficial in helping to emulsify the butter-fat, and also in helping to divide the casein and preventing it from agglutinizing into clots in the stomach. Cow's milk, even when diluted, has a greater tendency to do this than the human variety. The completed product, made according to directions, is taken readily, and does not form at all an inelegant combination.

Finsbury Park, N. George Smith.

Liquor Strychninæ Hydrochloratis.

Sir,—In regard to the insolubility of the strychnine salt in the official formula for this preparation when exposed to a low temperature, I cannot agree with your suggestion to reduce the strength of it to one half, or one part in two hundred, as stated in your editorial note (p. 696) last week, as it is very essential from the prescriber's point of view to have this and the corresponding solutions of an uniform 1 per cent. strength if possible. The difficulty admits of two solutions, either to direct, as is done in the case of the solutions of all the other poisonous alkaloids, a soluble salt rather than the alkaloid itself to be employed for making solution, or to use an acid which would form a more soluble salt than the hydrochloride in the solution. Of the salts of strychnine found in commerce the acid sulphate appears to be the most soluble, as it requires only 36 parts of water to dissolve it, and if used to replace the alkaloid in preparing the solution I find it is, without the further addition of acid, more readily soluble than sugar would be in the same quantity of even cold water ordered in the formula. The addition of the spirit does not interfere with its solubility, as it is held in solution down to freezing point. Of course the strength of the solution would be slightly lessened, and the dose would have to be slightly increased, but in revising the Pharmacopœia these could be taken into consideration. Some might object that it would be multiplying preparations unnecessarily to introduce a salt of strychnine into the Pharmocopœia, but the acid sulphate is found to be very useful for preparing hypodermic injections. The other alternative is to replace the diluted hydrochloric acid by diluted sulphuric acid in the official formula. The strength of the solution would thus still be adhered to, but a gentle heat is necessary to effect the solution in this case, and an increased quantity of diluted sulphuric acid over that of the hydrochloric ordered is necessary. In place of 14 minims to 9 grains of strychnine, at least 22 minims would be theoretically required, or about 2½ fluid parts to 1 part of strychnine. Thus prepared it required a temperature below freezing point to cause crystallization, but exposed during last night the solution so prepared did crystallize, whereas that prepared by using the acid sulphate salt, being a little reduced in strength, did not.

There is an inconsistency in the alternative formula in parts mentioned in the Pharmacopœia, 14 minims being considered equal to 18 grain measures.

10, *New Cavendish Street, W.* Wm. Martindale.

Sir,—The want of success of your correspondents with this preparation seems to me to arise from a wrong interpretation of the very indefinite B.P. directions.

Heating in an open flask over a bare flame, as in the case of liquor arsenicalis, is a sure road to failure.

From the nature and evident intention of formula of liq. strychninæ it is clear that the minimum of heat is meant to be employed in effecting solution, and that loss from evaporation should be guarded against.

A perfect solution not liable to crystallize may be made by the following method, viz.: Put strychnine with acid and quantity of water directed by B.P. in well stoppered bottle, which set in hot water, and shake occasionally. A short time suffices to dissolve, when spirit is added and remainder of water. Lanarkshire.

Sir,—The crystallization of the strychnine hydrochloride from the above preparation has frequently been commented on since 1885. As the matter is once more on the tapis, I will take the opportunity to call attention to one phase of the subject which seems to have escaped notice by the

commentators. The general opinion appears to be that lowering of the temperature during storage is the cause of the mischief. With that I agree, as far as it goes, but consider it is not the only cause. I am inclined to believe that the heating of the solution in course of preparation has often something to do with the evil. I have seen both assistants and principals put the whole crystals of strychnine into the half-ounce of acidulated water ordered in the Pharmacopœia, and boil and boil them till, after a good while, they ultimately consented to dissolve. I have often thought that such a mode of proceeding must dissipate a good deal of the somewhat volatile hydrochloric acid before it has had an opportunity to combine with the bulky crystals. To test this point, I recently boiled 14 minims of ac. hydrochlor. dil. with ½ ounce of aq. dest., and held a piece of blue litmus paper for a few minutes in the steam arising from the flask. The paper soon became red, as expected, proving the loss of some, at least, of the acid. I am aware the B.P. does not direct the mixture to be boiled, only "heated;" still the fact remains that some people do boil it, in the attempt to hasten solution. To such, and indeed to all, I would recommend the following improved process:—Mix the acid with the whole of the water, add a few drops of the mixture to the strychnine, previously ground to fine powder in a mortar; rub to a smooth paste and add the remainder of the mixture, stirring till the alkaloid disappears, which will be in a few minutes; mix in the spirit and allow to stand for half an hour, finally making up to 2 ounces (or whatever quantity may be on hand) with distilled water.

I have frequently made the solution in this way, and have never seen it go wrong, even at 40° F. It has a slightly acid reaction. I have not tested the liquor made by the long-boiling process, but should not be surprised to find the strychnine salt in a slightly basic condition, and therefore perhaps more liable to come out.

If this preparation be properly made, and all reasonable precautions as to storage be observed, there does not seem to be much need to alter its strength to 1 in 200 as proposed. The difficulty of educating prescribers into remembering such an alteration would be considerable; in fact, it would be "jumping out of the frying pan into the fire!" For that and similar reasons I have never quite forgiven the Committee for throwing the 4 grains-to-the-ounce arrangement overboard. However, if we must stick to 1 per cent., the formula suggested (by Mr. McPherson, I think) in the *Pharmaceutical Journal* for December 1, 1888, would be better, from the non-crystallizing point of view, than the present one, as the proportion of alkaloid was directed to be reduced slightly.

WILLIAM JOHNSTON.

Sir,—In reference to the deposit of crystals in the above solution when prepared according to the British Pharmacopœia my experience is similar to that of several of your correspondents in last week's issue. A few weeks ago I prepared eight ounces, part of which was sent to a medical man and the remainder placed in my poison cupboard, which is near a chimney stack, where the temperature probably never reaches below 60° F. After a few days the former was brought back with a large crop of crystals deposited; it had been kept in a cold surgery. On producing my bottle it was found to contain a perfect solution. This proves beyond doubt that as it is at present made the cold temperature is the cause of the mischief. The suggestion of Mr. Farr is, I think, the best way out of the difficulty, and will no doubt meet with general approval, as half the quantity of spirit (which would then leave it about 1 in 8) would be enough to act as a preservative.

JOHN H. SMITH.

Sir,—So far back as 1888 the following sentence appeared on page 256 of the third reprint of the British Pharmacopœia, and in the publishers' gratis list of official "Corrections":—"The solution should not be kept in a cold place."

It is odd that certain of the critics of the Pharmacopœia do not yet perceive that the chief uses of most of its "scarcely anys," "almosts," and "abouts," are to enable pharmacists to provide patients with preparations having a practicable degree of purity, and to save pharmacists from vexatious attacks under the Sale of Food and Drugs Acts.

SPOT.

Sir,—*Apropos* of the correspondence in your columns as to liquor strychninæ depositing some of its strychnine, if allowed to cool below a certain temperature, I notice a leaderette in your issue of February 27 last, containing the suggestion that this defect would be avoided by making the liquor of one-half its present strength. I sincerely trust that this suggestion will not be carried into effect; but that the defect may be remedied by the substitution of a more soluble salt of strychnine for the present one, if any change is considered necessary.

As a physician, I find the uniform strength of the alkaloidal solutions of the utmost convenience in prescribing, and the 1 per cent. strength renders the calculation of the dose peculiarly easy when writing a prescription. I, for one, should find it a matter of confusion if the strength of so commonly used a preparation as liquor strychninæ were changed to ½ per cent.

This point may seem but a trivial one; but engaged, as I am, in the education of medical students, a class of men already overburdened with the task of remembering innumerable details, and seeing, as I do, the difficulties they experience in the calculation of doses when writing prescriptions, I most strongly urge the advisability of adhering to a uniform strength, such as 1 per cent., of all alkaloidal solutions; and, as far as possible, of all solutions containing poisonous active principles.

47, *Weymouth Street, W.* A. P. LUFF, M.D.

TRADE REPRESENTATION.

Sir,—In reply to your article concerning trade representation I consider that the want of union complained of is due to the Pharmaceutical Society itself. And the much needed trade support will never be afforded until what are now termed associates in business are admitted as full members.

When that is done there will be a new and glorious future before the Society.

"Associates in business" is an objectionable name to many, including myself, and we will have none of it.

We do not object to pharmaceutical chemists having a further title; let them be fellows or governors, if they desire, but we will not support a Society of which we are not worthy to be called members.

Brighton. CHEMIST AND DRUGGIST.

NOTICES OF MEETINGS.

Chemists' Assistants' Association.—Thursday, March 17. "Laboratory Notes." by R. H. Davies, F.I.C., F.C.S.

Western Chemists' Association (of London).—Wednesday, March 16. Smoking concert.

Midland Counties Chemists' Association. — Thursday, March 24. Musical and social evening.

Chemical Society.—Thursday, March 17, 8 p.m. "The Conditions which Determine Combination between the Cyanides of Zine and Mercury and the Composition and Properties of the Resulting Double Salt." By Professor Dunstan. "A Lecture Experiment to Illustrate the Phenomena of Coal-Dust Explosions." By Professor Thorpe, F.R.S. "The Ketone Formed by the Action of Dehydrating Agents on Camphor." By Dr. Armstrong and Dr. Kipping. "Platinum Tetrachloride." By F. Pullinger, B.A.

School of Pharmacy Students' Association.—Thursday, March 17, "Notes on the Wild Flowers of March." By Mr. W. F. E. Horrell, and "On a Ginger from Fiji." By Mr. E. H. Gane.

Samuel J. Duncan.—Shore's 'Practical Biology' (Churchill, 6*s.*), or Strasburger's 'Practical Botany' (Sonnenschein, 9*s.*). Apply to the Librarian for a catalogue.

Lewis Ough. — Lee's 'Microtomist's Vade-Mecum' (Churchill, 12*s.* 6*d.*) is the most comprehensive work on stains and reagents for microscopical purposes.

F. March.—The strength you name would be within safe limits, but glycerine is generally preferred to vaseline for the purpose. See Martindale's 'Extra Pharmacopœia.' Consult your bookseller about book.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Chaloner, Norris, Blount, Jones. Druce, Mitchell, Sutherland, Newsholme, Wright, Hill, Andrews, Macfarlan and Co., E. F. Young.

THE DOUBLE CYANIDES OF ZINC AND MERCURY.*

A Study of the Conditions which Determine their Composition and Properties.

BY PROFESSOR DUNSTAN.

[*From the Research Laboratory of the Pharmaceutical Society.*]

When a solution of zinc sulphate is added to a solution of mercuric potassium cyanide ($HgK_2(CN)_4$), or when mercuric chloride is added to a solution of zinc potassium cyanide ($ZnK_2(CN)_4$) a white precipitate is formed, which has been stated, on the authority of Gmelin, to consist of a double cyanide of zinc and mercury of the formula $ZnHg(CN)_4$. This the author has shown is not the case (*Pharm. Journ.*, [3], xx., 653). The precipitate loses a large quantity of mercuric cyanide when it is washed with cold water; some, however, remains attached to the cyanide of zinc. Previous experiments made by the author seemed to point to the conclusion that the mercuric cyanide thus retained is not chemically combined, but in some manner mechanically entangled by the zinc cyanide. This view is, however, disproved by further experiments, of which an account is now given. The precipitate is in many respects a remarkable substance. The most important points which have been established with reference to its properties, composition and mode of formation are as follows.

The amount of mercuric cyanide "retained" by the precipitate is dependent on the amount of water present during precipitation, as well as on the proportion in which the salts react. The maximum quantity retained is 38·5 per cent.; and zinc cyanide having this percentage of mercuric cyanide attached to it in such a form that it cannot be removed by ordinary washing with cold water, is precipitated when cold saturated solutions of the reacting salts are mixed in equi-molecular proportions.

The washed precipitate is quite amorphous. Prolonged contact with cold water leads to the gradual removal of mercuric cyanide. Boiling water dissolves the mercuric salt more rapidly. A cold solution of potassium iodide readily dissolves the mercuric cyanide with the formation of the soluble double salt $Hg(CN)_2,2KI$.

A series of experiments in which the mass of the reacting salts was varied, proved that a true chemical compound of the two cyanides is formed and suffers decomposition to a greater or less extent, depending on the relative amount of water present.

An examination of the curves plotted from these results leads to the inference that the composition of the double salt is expressed by the formula $Zn_4Hg(CN)_{10}$, that is to say, the two cyanides are present in it in the proportion $Zn(CN)_2,\frac{1}{4}Hg(CN)_2$. This salt contains 40·6 per cent. of mercuric cyanide. It cannot be obtained pure, since it is decomposed by water and it can only be produced by precipitation of aqueous solutions. Under the most favourable circumstances, when the quantity of water present is reduced to a minimum, a substance containing 98 per cent. of this double cyanide is obtained, the remaining 2 per cent. consists of zinc cyanide, resulting from the decomposition of some of the double salt by water, the mercuric cyanide being dissolved whilst the insoluble zinc cyanide remains with the double salt. All attempts to prepare this double cyanide by other methods than that of precipitation have failed. Fundamental molecules of zinc cyanide and mercuric cyanide must apparently be present in order that combination may occur. The aggregates of fundamental molecules $(Zn(CN_2)_n$ and $(Hg(CN)_2)_n$, which constitute the solid salts, show no tendency to combine.

No evidence is forthcoming of the existence of any other compound of the two cyanides than that now described.

No similar compound of zinc cyanide with other metallic cyanides than that of mercury could be obtained.

This tetra-zincic mono-mercuric deca-cyanide, mixed with more or less zinc cyanide, has been found by Sir Joseph Lister to be an admirable surgical antiseptic, and at his suggestion this enquiry was undertaken. A full account of the best method of preparing the salt is given in the author's previous paper.

* The substance of a paper communicated to the Chemical Society on Thursday, March 17.

IMPURITY IN CHLOROFORM.

BY D. BROWN, F.C.S.

Statements have been made which ascribe injurious effects to impurities in chloroform, but I am not aware of a single instance where these effects have been traced to their presence. In the absence of reliable information regarding the chemical or physiological action of the substances other than chloroform which are produced with it, such statements can only be based on theory. It cannot, however, be denied that all chloroform is not so free from impurity as it should be, and a recent examination of commercial samples shows that in some cases there is great room for improvement.

The purity of chloroform cannot be determined by any one test; those of the Pharmacopœia enable us to ascertain its purity up to a certain point. but beyond that there has been no attempt made to insist on a purer preparation, or to provide means by which smaller quantities of impurity not recognized by the P.B. tests may be detected and separated.

Before giving a process for recognizing and separating impurities passed over by the P.B. tests, I would like to point out that these impurities have boiling points both above and below that of pure chloroform, that as a rule they possess very strong characteristic odours which even in a very dilute form can be more readily detected by the nose than by any known chemical reagent, and further that if the impurities found in chloroform are dangerous to life, there is a greater likelihood of the more volatile ones doing mischief than the less volatile, seeing that the former will evaporate and be inhaled with the chloroform, while the latter are to a very large extent left behind when the chloroform has evaporated.

At present no process is known by which the total impurity in chloroform can be determined. By careful fractional distillation, however, and dividing the sample under examination into two fractions, one of 10 per cent., the other of 75 per cent., and a residue of 15 per cent., we obtain both

the more and less volatile impurities in a concentrated form. Unfortunately we can only say of the 10 per cent. fraction that it does or does not in a greater or less degree possess the smell peculiar to impurity; we can also say this of the 15 per cent. residue, and in addition collect and weigh the bulk of the non-volatile impurity by slowly evaporating, with precautions to exclude dust, at a temperature of from 80° to 90° F.

I do not claim that the results obtained by this process give the total quantity of impurity present in the sample, but I think they are of considerable comparative value, and enable us to reject inferior chloroform, which at present passes the Pharmacopœia standard.

Seven samples of commercial chloroform, which were found to answer all the P.B. tests, were treated in the manner just described and gave the following results:—

Table I.

No.	10 p.c. fraction.	15 p.c. residue.	Residue at 80°–90° F. Parts by weight.
1.	No bad smell.	No bad smell.	1 pt. in 1,946,100
2.	,, ,,	,, ,,	1 ,, 487,500
3.	,, ,,	,, ,,	1 ,, 487,500
4.	,, ,,	,, ,,	1 ,, 487,500
5.	,, ,,	,, ,,	1 ,, 390,000
6.	,, ,,	,, ,,	1 ,, 121,875
7.	,, ,,	,, ,,	1 ,, 243,750

It is evident from these results that the P.B. tests permit a preparation containing sixteen times more impurity than is found in one, and four times more than we obtain from others, to pass into the market and take its place there on an equality with them. They also—and I consider this a very important point—supply material which proves that chloroform of equal purity can be, and is prepared from other substances than duty paid alcohol, for the second, third, and fourth samples were prepared—not specially, but in the ordinary course of manufacture—from alcohol, acetone, and methylated spirit, and are found to be practically identical.

Six other samples, some said to be of P.B. purity, and others laying claim to chemical purity, were subjected to the same treatment as the preceding seven, and gave results as under:—

Table II.

No.	10 p.c. fraction.	15 p.c. residue.	Residue at 80°-90° F. Parts by weight.
1.	Bad smell	very bad smell	1 part in 57,352
2.	,, ,,	no bad smell	1 ,, 324,999
3.	Very bad smell	very bad smell	1 ,, 243,750
4.	Slight ,,	bad smell	1 ,, 121,875
5.	,, ,,	,, ,,	1 ,, 324,999
6.	,, ,,	,, ,,	1 ,, 390,000

None of the above samples in their original form were found to answer the P.B. tests, but the ordinary consumer would pass the bulk of them as of P.B. purity; he could not fail, however, to detect the bad smell either in the residue or the 10 p.c. fraction, which points, I think, to the absolute necessity for some more exacting test being provided.

This process, which may be considered an extension of the present bad smell and residue test of the P.B., requires about 130 c.c. of the sample, and from two to three days for each experiment, but I have no doubt the time could be shortened.

It is not advisable to raise the standard of purity beyond the possible reach of manufacturers, but I think chloroform intended for anæsthetic purposes should be expected to stand more exacting tests than those of the present Pharmacopœia.

The temperatures at which 85 per cent. of each sample distilled over were noted; the average range of the finer ones was 1·65° C. and that of the less pure 2·04° C., which gives a difference of 0·39° C. in favour of the purer preparations; this is a small difference, and as some of the bad samples distilled over below the average range of the finer ones, I am inclined to think that the boiling point is not of much value for detecting impurity in commercial chloroform.

THE RELATION OF GEOGRAPHY AND MATERIA MEDICA.

BY E. M. HOLMES, F.L.S.,

Curator of the Museum of the Pharmaceutical Society of Great Britain.

During the last few years my attention has been repeatedly drawn to the necessity for a more accurate and more widely spread knowledge of the geographical sources of drugs. The importance of this knowledge is thoroughly recognized by Hanbury and Flückiger in 'Pharmacographia,' where the districts in which drugs are produced are very carefully and precisely laid down. In drug brokers' lists also the port from which a drug arrives and the ship which carries it are usually stated. When a drug in such a list is marked "per land carriage," every wholesale buyer knows that the sample needs careful inspection, and that it may or may not be correctly named. But if a parcel of *Pareira Brava*, instead of being marked "Rio Janeiro" is marked "Bahia," both cities being in Brazil, or if a parcel of cubebs instead of being marked "Java" or "Batavia" is marked "Singapore," the difference of two or three hundred miles in the geographical source of the drug is not allowed sufficient consideration. It does not seem to be generally understood that the flora of one country, or even of one district within a distance of one or two hundred miles or even less, may differ very considerably from another. The result is that drugs constantly find their way into commerce from new districts, differing considerably in properties and value from the official article. These may also pass into use and into retail trade, and it is only when the patient notices a difference in the colour and taste, or the physician observes an unlooked for or defective result, or the chemist finds a difference in the working of the preparation, that the fact of a genuine drug not being used is discovered. This very unsatisfactory state of things requires a remedy. The difficulties which beset the conscientious pharmacist who desires to supply the physician with reliable preparations of a strength as uniform as possible are numerous enough. The period at which a drug is collected, the care which is taken in drying and packing it, the age of the plant itself, and the climate and soil in which it is grown, are all factors which tend to cause variation in strength.

The difficulty of ascertaining the geographical source of a drug is, however, one that might be easily met by the framers of the Pharmacopœia.

In that work the geographical source of the drug

is given in comparatively few cases. With 'Pharmacographia' to fall back upon, there is no reason why the Pharmacopœia should not limit the geographical sources of drugs *intended for use in medicine* by mentioning the countries or districts from which they may be obtained. It would then be possible for chemists to specify by name the drug required, just as it is customary to order Jamaica or Cochin ginger, Bengal or China turmeric, or Natal or St. Vincent arrowroot. The simple use of the letters P.B. after the name of a drug would then in any case be sufficient basis for a legal action if the definition of the Pharmacopœia were not complied with. The way in which the absence of this specification in the Pharmacopœia works out in practice, may be seen in the following instances:—

Coca.—The variation of cocaine in its effects has long been known to physicians, but only within the last two or three years has it been assumed that the poisonous action (*Pharm. Journ.*, [3], xxi., p. 162) may be due to the isatropyl cocaine (*Pharm. Journ.*, [3], xxi., p. 1109), which is said to be contained more especially in the variety *Novo-granatense*, Dyer. It becomes important, therefore, that the district or country from which the best variety of the leaves is obtained, should be stated in the Pharmacopœia, so that the preparations used may thus be rendered as uniform in character as possible.

Cubebs.—For some years past, owing to the scarcity of genuine cubebs, a spurious kind has been frequently offered in commerce. This kind, which is distinguishable by its mace-like odour and taste and by not giving a crimson colour with strong sulphuric acid was found to cause poisonous symptoms. Dr. M. Treub informs me that this spurious cubeb is not produced in Java, which is the chief geographical source of the genuine article. If the locality for genuine cubebs had been given as Java in the Pharmacopœia, this substitution would obviously have been avoidable.

Copaiba.—A few months since an article was imported under this name from West Africa. It was found by Mr. J. C. Umney (*Pharm. Journ.*, [3], xxii., p. 449) to possess in many respects physical and chemical properties similar to those of the genuine drug, but no one who has compared the taste of the two drugs or of the preparations made from them would be likely to consider them identical. Yet the retail chemist who judged the article by the appearance alone, might easily be misled. The Pharmacopœia gives no geographical source for balsam of copaiba, so that in the absence of any evidence to show that it was not produced by "any species of Copaifera," it might be legally admissible, though it might differ in physiological action.

Jaborandi.—When Pernambuco jaborandi was first introduced I pointed out that some of the article in commerce appeared to consist of the leaves of *P. Selloanus*, a native of Southern Brazil. Makers of the alkaloid pilocarpine soon found out that there was a considerable difference in the percentage contained in different samples of the leaves. The weaker drug proved on examination to be derived from *P. Selloanus*, and to be imported from Rio Janeiro. The difference in strength of the leaves of these two plants might easily cause considerable inconvenience, both to patients and medical men, when preparations from different leaves were used in succession. The official article should be limited to the Pernambuco kind.

Nux Vomica.—In the paper by Messrs. Dunstan and Short (*Pharm. Journ.*, [3], xv., p. 157) on nux vomica seed it was shown that considerable variation in alkaloidal strength characterized the seeds obtained from different countries, and that consequently standardization was necessary. In this case a geographical limitation of the source of the seeds to be used in medicine might result in greater uniformity of the preparations made.

Pareira Brava.—The great similarity in general appearance of the roots and stems of Menispermaceous plants favours the substitution of spurious roots for the genuine *Pareira Brava*. A few years ago a root appeared in the London market, bearing a very strong resemblance to the genuine drug, but having narrower concentric rings. On inquiry it was found to have come from the banks of the Congo, in West Africa!

About the end of the year 1890 another spurious variety entered into commerce. This differed from the genuine, not only in the narrower concentric zones, but also in its much lower specific gravity. On tracing its source it was found to have come from Bahia, in the north of Brazil, instead of from Rio Janeiro, much further south, whence the genuine drug is imported. This substitution has formed the subject of an investigation by Messrs. Ringer and Brooke, which has already appeared, and of a microscopical investigation by Mr. W. M. Holmes, which will shortly appear. These show that while similar to the true drug in the alkaloid it contains, it is not identical with it, and is inferior to it in every respect. Such substitutions of one drug for another may lead to the loss of confidence in the genuine drug. It is obvious that in the case of this drug also, an explicit limitation of its geographical source by the Pharmacopœia would be an advantage.

Strophanthus.—The absence of a limited geographical source for this drug in the Additions to the Pharmacopœia has led to the importation of seeds from the Gaboon, Gold Coast, Niger Territory, etc. The use of seeds which are the product of different plants can hardly fail to throw discredit upon a drug which has been proved to possess definite and valuable physiological properties, for the varieties in commerce have not been shown to possess the same strength or even the same active principle as the original drug.

White Hellebore.—The most recent instance that has come before me of the importance of a knowledge of the geographical distribution of plants is that of *Veratrum album*.

A root was offered in considerable quantity as white hellebore, which it was supposed to resemble. The microscopical and physical characters of the root indicated that it belongs to the comparatively harmless natural order *Scitamineæ*, instead of to the poisonous tribe *Colchiceæ* of *Liliaceæ*. The disappointment that would have awaited the agriculturist who might have purchased the powder and the chagrin of the chemist when some analyst had proved that the powder was not white hellebore, may be easily imagined.

In conclusion, I would point out that the arrival of a drug from an hitherto undescribed geographical source should invariably lead to a suspicion

of its genuineness, and a special examination of its properties and quality by those who purchase it. The instances brought forward indicate that in every case limited geographical sources, if mentioned in the Pharmacopœia, would lead to greater uniformity in medicinal preparations.

IN A TROPICAL FOREST.*

BY ALLAN ERIC.

It may not be generally known that the cinchona plantations of the island of Jamaica, in the West Indies, yield bark far superior to the best grown in Ceylon. It is commonly supposed that the Peruvian bark tree in America grows most readily only on the slopes of the Andes, between the equator and ten degrees of north latitude and twenty degrees south latitude. This was once correct; but in the island of Jamaica, several years ago, Peruvian bark trees were found growing on the slopes of the Cuna Cuna mountains, and while not plentiful, the bark was found to be of excellent quality. As both the climate and soil of the mountain slopes in Jamaica were found to exactly suit the Peruvian bark tree, the people, encouraged by the wealthy planters and rich merchants on the coast, have been propagating it, and have planted, within the last ten or fifteen years, large plantations of cinchona, which are now producing bark which is taking a leading place in the markets of the world. Such a plantation I had the pleasure of visiting while on the island a few months since. The Peruvian bark tree, to begin with, belongs to the natural order *Cinchonaceæ*, which yields the bark so much valued in medicine, and otherwise known as Jesuit's bark, quina, quinquina, cinchona, chinchona, etc.; and from which the important alkaloids *quinia* or *quinine*, *cinchonia* or *cinchonine* are obtained. I have seen these trees while riding over the mountain paths in Jamaica, scattered among growths of cocoa, cabbage-palm and pimento, fustic and logwood; but it is most usually found near some spot practically clear of other trees. Some of the cinchona trees are very large; but the best bark comes from smaller ones, which appear as shrubs after the large trees are felled. It must be remembered that cinchonas exist in many varieties, chiefly distinguishable by the different localities in which they grow, but whose quality is essentially and to all practical purposes the same. They are all evergreen trees. They very closely resemble laurels, and the shrubs still more closely resemble the "lamb-kill" of the New England pastures. The cinchona has entire opposite leaves, stipules which soon fall off, and panicles of flowers, which very closely resemble lilac blossoms. The flowers are white, rose-coloured, or purplish, and very fragrant; and I now have some of the flowers, which were given me by a native named Brava, and which I pressed in my note-book which I carried in my saddle-bag while riding through the Jamaica mountains; and even now, pressed and dried, they retain much of their fragrance. The calyx of the flower is small and five-toothed, and the capsule splits from the base upward. This is the true cinchona. There is another of a similar species which I have seen growing in some localities in the tropics; but I noticed that in this, the sub-genus *Cascarilla*, the capsule splits from the top downward. The two look very much alike, but the latter has no commercial value and no trace of the valuable alkaloids is to be found in it. The cutting and peeling of the cinchona trees are carried on by the natives in the dry season. The trees are felled as near the roots as possible, that none of the bark may be lost; and the bark being stripped off, is carefully dried, the quilled form of the inner bark being acquired in drying. The bark is made up into packages of various sizes, but averaging 150 pounds in weight, closely wrapped in woollen cloth and afterward in hides, and conveyed to the points of shipment on the coast, on the backs of mules and burros. These packages are called seroons, or drums.

The soap tree, *Sapindus saponaria*, is another tree that I frequently met with during my journey into the interior; and I frequently saw the native women, stripped to the waist, standing in the swift-running mountain streams washing their scanty clothing, and using the pulp of the soap berry in lieu of the manufactured article; and I am told that so great is the alkaline property of these berries that they are capable of cleansing as much linen as sixty times their weight in soap. The berries each contain, embedded in the pulp, a shining and very hard black seed. The soap tree is found principally growing at the bases of the mountain ranges, being hardly met with at a higher elevation than 3000 feet above sea level.

Before me I have a large glass jar of alcohol, containing a branch from the anotto, or annatto tree, which I gathered at Mt. Diabolo while the black driver of the Royal Mail stage-coach was changing his mules. It has reddish, oblong, hairy capsules about two inches in length, and from the dried samples in a box near by I find that each capsule contains about forty seeds. The leaves are heart-shaped and pointed, and the blossoms, which my specimen does not show, are large and of a peach-blossom colour, and grow in loose clusters at the ends of the branches. The shrub, for such the anotto tree really is, rarely exceeds eight or ten feet in height. The tree is very pretty when the capsules are ripe, the vivid red colour of the clusters of pods or capsules contrasting very beautifully with the rich, dark green leaves. The colour of my preserved specimens has changed somewhat, being now nearer a chocolate brown. The seeds are gathered from the pods, put up in bags and exported in large quantities from Jamaica. In some cases the natives obtain the anotto pure by rubbing off the pulpy pellicle which covers the seed. In this case the pulp is pressed into square cakes and wrapped in the leaves of the tree itself.

While at St. Ann's Bay, my host, Mr. A. D. Jacobs, took me out and showed me, piled up near the water's edge, several cords of logs each about eight inches in thickness and about four feet long. "That," said Mr. Jacobs, "is quassia wood." This tree, known in the West Indies as Picræna, quassia being the name given to it by the Maroons, grows almost everywhere in Jamaica, principally quite near the coast, so cutting it and transporting it to points of shipment are comparatively easy. It is a very lofty tree, and very beautiful as well. This is the species from which the quassia cups and quassia chips, so well known to us, are obtained. Growing up at a higher altitude, and at some distance from the coast, I found another species of quassia. This one is known to botanists as *Simaruba*. It is a shrub ten or fifteen feet high, and bears beautiful bright red flowers. This wood is very bitter and very much stronger than the other; and being scarcer, at a greater distance from the coast, and superior as a drug, it has a greater commercial value.

* From *The New England Druggist*, February.

NEUTRALITY.*

BY A. H. ALLEN.

(*Concluded from page* 754.)

It is interesting to observe that phenolphthalein and Poirrier's blue, which may be used as indicators for very feeble acids, are absolutely insensible to the majority

* Abstracted from a paper read before the Chemists' Assistants' Association.

of the alkaloids and organic bases. Even aniline and pyridine, which have such strongly marked basic characters, are absolutely insensitive to phenolphthalein. The same is true of strychnine, quinine, aconitine, and, with the limitation already mentioned, morphine. Hence the salts of these bases, such as hydrochloride of aniline, sulphate of quinine, and nitrate of aconitine* can be titrated with caustic alkali and phenolphthalein just as if the respective acids were in an uncombined state. A curious exception to the general behaviour of alkaloids is also presented by atropine and its isomers (as also homatropine), which in the free state strongly redden phenolphthalein. This property, however, does not exist in alcoholic solution, a fact which marks a curious distinction between these alkaloids and the mineral alkalies, alcoholic solutions of which react perfectly with phenolphthalein.

According to E. Léger, cicutine and cadeine are exceptions to the general rule of indifference of the alkaloids to phenolphthalein, and according to P. C. Plugge nicotine and conine also exhibit an alkaline reaction.

One inconvenience is attached to the use of phenolphthalein as an indicator, which is that it is gradually decomposed by ammonia, and hence cannot be safely used for titrating that base, or in presence of its salts, but this fact being recognized in practice it causes very little inconvenience. Nevertheless "an indicator possessing the general properties of phenolphthalein, but not possessing this imperfection, is still a desideratum."

But if phenolphthalein and its allies indicate very feeble acids, it is evident that they fail as indicators of the majority of alkaloids, and others of the feebler bases. One cannot have one's cake and eat it too. If we desire an indicator for weak bases we must look for a substance which has a fairly strong affinity for bases, and which shows by a change of colour that it has "met its affinity." Of all indicators of the sort hitherto proposed, the one which best answers the required purposes is the azo-dye known as *helianthin* or *methyl-orange*. This colouring matter is the sodium salt of the sulphonic acid of dimethyl-amido azobenzene. Its solutions have a yellow colour, but the free acid is red. Hence the addition of an acid sufficiently powerful to liberate the "helianthin acid" from its salt results in a change of colour from yellow to red. This change is sufficiently marked, though it does not approach the sensitiveness of phenolphthalein to alkalies, and is not available in a strongly alcoholic liquid. The free acid of methyl-orange, which for convenience may be termed "helianthis acid," is only sparingly soluble, but is none of the weakest in its affinities. Hence feeble acids like boric, carbonic and hydrocyanic are wholly unable to decompose its salts, acetic and oxalic acids do so only imperfectly, while with sulphuric, hydrochloric, nitric and thiosulphuric acids complete decomposition ensues. With phosphoric acid decomposition ceases rigidly with the formation of a compound analogous to Na_2HPO_4, which fact has been utilized by Mr. Hodgkin for the examination of glacial phosphoric acid. The soluble acid calcium phosphate, containing $CaH_4(PO_4)_2$, which is the leading constituent of commercial "superphosphates," is neutral to methyl-orange, and hence any excess of acid can be readily determined. The neutrality of these acid phosphates to methyl-orange is in striking contrast to the behaviour of the sodium phosphates with phenolphthalein, with which indicator Na_2HPO_4 is neutral; while, according to Engel, with Poirrier's soluble blue the compound Na_3PO_4 is approximately indifferent.

* Ordinary nitrate of aconitine is not a neutral salt. It contains $B_2(HNO_3)_3$.

Methyl-orange being totally indifferent to such weak acids as boric, carbonic, sulphydric and arsenious, the alkaline borates, carbonates, sulphides or arsenites behave just like their equivalents of free alkali. With methyl-orange as an indicator, standard acids may be set with sodium carbonate or borax (the latter salts have been actually recommended as giving a solution absolutely permanent and without action on glass), and the "temporary hardness" of water and the "total alkali" of soda-ash may be determined in a few minutes. All the alkaloids and organic bases the behaviour of which has hitherto been examined, except urea (and aniline?) may be titrated with methyl-orange and a standard mineral acid, and with much greater facility than when litmus is used (phenolphthalein, as already stated, is inapplicable).

An indicator which in every respect (except its non-destruction by nitrous acid) behaves like methyl-orange is the colouring matter inappropriately named *lacmoid*. In the form of paper especially, this is a very useful indicator, which may be used in cases where the deep colour of the solution prohibits the employment of helianthin.

I may say here that there appear to be good and bad kinds of methyl-orange in commerce, some giving very unsatisfactory results. I have previously given the characters of a good article. In this connection I may mention that the colouring matter known as orange II. (helianthin being orange III.), or beta-naphthol orange behaves in exactly the opposite manner to methyl orange, becoming yellow in acid solutions and red in alkaline. Further, I have found it almost insensitive to ammonia. Unfortunately its reaction even with caustic soda is not sufficiently sharp to render it of practical value, or we should be in possession of a valuable indicator, which would permit us to titrate caustic soda in presence of ammonia. Some valuable applications of such an indicator, if sufficiently delicate, at once suggest themselves.

Dimethylazobenzene itself, the colouring matter of which methyl-orange is the sodium sulphonate, has been recommended as an indicator by Fischer and Philipp, but R. M. Thomson considers in no way superior to helianthin, the behaviour of which it in every way simulates.

Congo-red, another indicator of the same class, is distinctly inferior to methyl-orange.

Quite recently Mylius and Forster have suggested a method of titration in which iodeosin is employed. This colouring matter, though chemically related to phenolphthalein as an indicator, behaves like methyl-orange. That is to say, it is a tolerably strong acid itself, and hence is not displaced from its compounds by very weak acids. Iodeosin presents no advantage when substituted for methyl-orange in ordinary titrations, but Mylius and Forester employ it in ethereal solution. Immediately there is the least excess of alkali the sodium salt is formed, and the colouring matter passes from the ethereal to the aqueous layer. With special care and the use of water distilled in platinum any minute traces of alkali can be determined in this way.

The explanation of the different behaviour of various indicators has received help from the thermo-chemical researches of Berthelot; who has pointed out that an acid which can be titrated accurately with methyl-orange is one, the heat formation of the solid potassium salt of which exceeds 10·2 calorics. Phenolphthalein, on the other hand, enables us to titrate any acid, the heat-formation of the potassium salt of which exceeds 6 to 7 calorics. With Poirrier's soluble blue still feebler acids can be titrated; but the lower limit of its applicability has not been ascertained.

Mr. R. M. Thomson, of Glasgow, has investigated the behaviour of different indicators of neutrality in a remarkably complete and able manner, and his re-

searches form in themselves a most valuable guide to the subject. I am indebted to Mr. Thomson's work for many of the facts respecting indicators mentioned in this paper. Mr. Thomson arranges the various indicators in these groups, to which Poirrier's soluble blue will form a fourth; thus:

Methyl-orange group.	Litmus group.	Phenolphthalein group.	Poirrier's soluble blue.
Methyl-orange	litmus	phenolphthalein	soluble blue C_4B.
Cochineal	rosolic acid	turmeric	
Congo-red	phenacetolin		
Lacenoid			
Iodeosin			
Dimethylamidoazobenzene			

In the following table, which, with the exception of the last column, is due to Mr. Thomson (*Journ. Soc. Chem. Ind.*, vi., 198), the figures represent the number of atoms of hydrogen displaced by sodium or potassium in the form of caustic alkali, when a compound is formed, having a neutral reaction to the indicator in question. Thus, when methyl-orange is used in the titration of sulphurous acid, the neutral point is reached when alkali has been added in quantity sufficient to form the compound $NaHSO_3$; but when phenolphthalein is used, the point of neutrality corresponds to the salt Na_2SO_3. By a combined use of the two indicators, valuable volumetric determinations can be effected.

Table showing the basicity of acids with different indicators when titrated in aqueous solution with fixed caustic alkali.

Acids.		Methyl-orange.	Phenolphthalein.		Litmus.		Poirrier's soluble blue C_4B.
Name.	Formula.	Cold.	Cold.	Boiling.	Cold.	Boiling.	Cold.
Sulphuric. .	H_2SO_4	2	2	2	2	2	2
Hydrochloric	HCl	1	1	1	1	1	1
Nitric . . .	HNO_3	1	1	1	1	1	1
Thiosulphuric	$H_2S_2O_3$	2	2	2	2	2	?
Carbonic . .	H_2CO_3	0	1 dilute	0	-	0	2
Sulphurous .	H_2SO_3	1	2	-	-	-	2
Hydrosulphuric	H_2S	0	1 dilute	0	-	0	?
Phosphoric .	H_3PO_4	1	2	-	-	-	3
Arsenic . .	H_3AsO_4	1	2	-	-	-	3
Arsenious .	H_3AsO_3	0	-	-	0	0	3
Nitrous . .	HNO_2	Indicator destroyed	1	-	1	0	?
Silicic . . .	H_4SiO_4	0	-	-	0	0	?
Boric . . .	H_3BO_3	0	-	-	-	-	1
Chromic . .	H_2CrO_4	1	2	2	-	-	?
Oxalic . . .	$H_2C_2O_4$	-	2	2	2	2	2
Acetic . . .	$HC_2H_3O_2$	-	1	-	1	-	1
Butyric . .	$HC_4H_7O_2$	-	1	-	1 nearly	-	1
Succinic . .	$H_2C_4H_4O_4$	-	2	-	1 nearly	-	1
Lactic . . .	$HC_3H_5O_3$	-	1	-	1	-	1
Tartaric . .	$H_2C_4H_4O_6$	-	2	-	2	-	2
Citric . . .	$H_3C_6H_5O_7$	-	3	-	-	-	3

The behaviour of the alkaloids and organic bases with indicators has been very imperfectly studied. In the text-books it is frequently stated that such and such an alkaloid is distinctly alkaline (presumably to litmus), but it is only rarely and of recent years that chemists appear to have attempted to estimate alkaloids by titration with standard. When this is desired phenolphthalein is quite inapplicable, as already stated. Litmus answers in some cases, but by no means invariably, while with methyl-orange in nearly all the cases hitherto tried an accurate determination and sharp end reaction is obtainable.

In titrating an alkaloid with methyl-orange it is rarely convenient to employ an aqueous solution of the base. A solution in proof spirit can be employed, but the indicator is much less sensitive under such conditions. I have found it preferable, especially when the alkaloid is much coloured, as is frequently the case in assaying bases directly extracted from their sources, to dissolve the alkaloid in a little ether, chloroform, amylic alcohol or other suitable immiscible solvent. The solution is placed in a small stoppered cylinder (or, in its absence, a two ounce phial or test-tube furnished with a sound cork) together with a few centimeters of water, coloured with a drop of methyl-orange solution. On then gradually dropping in the standard acid and agitating thoroughly after each addition it is easy to observe the end of the reaction, as the colouring matter remains in the immiscible layer and presents a marked contrast to the red colours of the aqueous liquid. By using ether as a solvent for the alkaloid and titrating with $\frac{n}{50}$ hydrochloric acid, I have obtained very satisfactory determinations of aconitine and its allies, even when working on as little as 0·030 gramme. This means the titration of the alkaloids from as little as three or four ounces of the tincture or less than half an ounce of aconite root.

In the following table I have compiled all the available information on the subject of the titration of alkaloids. The behaviour of numerous alkaloids can be guessed at, but I have desired to omit speculative statements. In the column headed methyl-orange, accurate titrations can be made where the word alkaline is printed in italics. Where blanks are left the exact behaviour of the alkaloid is unknown.

It is evident that much remains to be done in this direction, and if some of the members of the Society will take the trouble to fill some of the gaps they will be doing a good work, and one which will be generally appreciated.

Substance.	Formula.	Methyl-orange.	Phenolphthalein.	Litmus.
Methylamine. .	C_5H_5N	*alkaline*	—	alkaline
Trimethylamine .	C_3H_9N	*alkaline*	—	alkaline
Aniline. .	C_6H_7N	*alkaline*	neutral	neutral
Pyridine .	C_5H_5N	*alkaline*	neutral	alkaline
Quinoline .	C_9H_7N	*alkaline*	—	—
Antipyrine	$C_{11}H_{12}N_2O$	*alkaline*	neutral	neutral
Conine . .	$C_8H_{17}N$	*alkaline*	alkaline	alkaline
Nicotine .	$C_{10}H_{14}N_2$	*alkaline*	alkaline	alkaline
Aconitine .	$C_{33}H_{45}NO_{12}$	*alkaline*	neutral	alkaline
Atropine .	$C_{17}H_{23}NO_3$	*alkaline*	alkaline	alkaline
Cocaine .	$C_{17}H_{21}NO_4$	*alkaline*	neutral	alkaline
Morphine .	$C_{17}H_{19}NO_3$	*alkaline*	faintly acid	alkaline
Codeine .	$C_{18}H_{21}NO_3$	*alkaline*	alkaline	alkaline
Narcotine .	$C_{22}H_{27}NO_7$	—	—	—
Strychnine	$C_{21}H_{22}N_2N_2$	*alkaline*	neutral	alkaline
Brucine .	$C_{23}H_{26}N_2O_4$	*alkaline*	neutral	alkaline
Cinchona bases . .	—	—	—	alkaline
Caffeine .	$C_8H_{10}N_4O_2$	—	—	—
Urea . .	CH_4N_2O	neutral	neutral	neutral

HOW TO LEARN WITH THE MICROSCOPE.*

BY G. A. GRIERSON, F.L.S.

In order to learn in its only true sense anything whatsoever, it is first necessary to feel some interest in that thing, some desire to know something about it. Numbers of people of an inquisitive, not to say, philosophic turn of mind, are deterred from the study of chemistry by the necessity which they conceive to exist, of mastering strings of long names and confusing symbols. The same may be said to be true of botany, zoology, astronomy, geology. For an ordinary matter of fact work-a-day individual to take up Fowne's 'Chemistry' or Hooker's 'Flora,' and expect that they would fan into flame the spark of curiosity which has been kindled by a popular lecture or a newspaper paragraph, would be to court failure at the outset. The real secret of learning natural science of any kind is first to have a bent in that direction, or, in other words, a curiosity to learn all about that class of thing. If that curiosity be not sustained and kept healthy by a judicious course of reading, all true learning is at an end. Let us take an example. An ordinary individual such as I have described, has an inborn desire to know something about the numerous objects which he notices in the course of a country walk; his bent may be in the direction of plants, of bugs and beetles, or even rocks. He is told that in order to learn something about these things, he must first learn all about the microscope. He therefore proceeds to buy or borrow a treatise on the microscope, and straightway finds himself in the toils of the laws of refraction. When he gets to the polarization of light, he gives the whole up as a bad job, and resolves never to dabble in science again. This method of trying to learn might be likened to taking a course of Johnson's 'Dictionary' as a prelude to the study of the beauties of Shakespeare, Scott or Kingsley.

The lecturer then dwelt at length on the more rational method of using the microscope as an instrument of learning. He recommended beginners to choose an instrument as simple and free from mechanical contrivances as possible, to begin with the study of simple every day things, such as cotton and linen, or the leaves and flowers to be met with in a country walk, showing how from curiosity about details they would be led on to the study of general principles. He insisted on the need for sifting everything to the bottom and bringing all difficulties to the meetings of the Microscopical Society, when common sense or the aid of a popular book failed to solve them. Examples of flowers to be found even at the present season were referred to and full description of their structure given.

The inexhaustible fund of information contained in a drop of pond water was referred to, and the lecture concluded by the following hints to beginners in the study of life through a microscope.

"If you have in you the 'bent' of a naturalist you will be led on from these popular books on pond life to books of a more exact and detailed nature, and as your knowledge increases you will be more and more impressed with the fact how little you knew before you started, how little you know now, and how little you are ever likely to know. This will lead you to make up your mind that if ever you are to do any real and useful scientific work you must confine yourself to one department, even of that branch of science which is called 'natural.' If you ever atttain to this frame of mind by paths, such as I have briefly sketched, I think that the microscope may safely claim to have shown you how to learn."

* Paper read before the Sheffield Microscopical Society, February 26.

THE FLÜCKIGER TESTIMONIAL.

In accordance with the announcement in last week's Journal we now publish the following list of subscribers to the fund being raised for the purpose of establishing a permanent memorial of the labours with which Professor Flückiger's life has been occupied. In the letter received from Mr. Thomas Hanbury a graceful tribute is paid to the value of those labours, and the liberal contribution with which it is accompanied proves the esteem entertained by him for his brother collaborateur.

Preliminary List of Subscriptions.

	£	s.	d.
Attfield, Professor	2	2	0
Bentley, Professor	1	1	0
Bottle, Alexander	1	1	0
Bourdas, Isaiah	1	1	0
Bowen, J. W.	0	10	6
Bremridge, Richard	0	10	6
Carteighe, M. (*President of the Pharmaceutical Society of Great Britain*)	2	2	0
Davies, R. H.	0	10	6
Dunstan, Professor	1	1	0
Ewing, James L.	1	1	0
Gale, Samuel	1	1	0
Gerrard, A. W.	1	1	0
Gostling, T. P.	1	1	0
Green, Professor	1	1	0
Greenish, Henry G.	1	1	0
Greenish, Thomas	1	1	0
Greenish, T. E.	1	1	0
Hanbury, Cornelius	2	2	0
Hanbury, F. J.	2	2	0
Hampson, Robert	1	1	0
Hills, Walter	1	1	0
Holmes, E. M.	1	1	0
Kerr, Charles	1	1	0
Nichol, Anthony	1	1	0
Paul, Dr. B. H.	1	1	0
Ransom, Francis	1	1	0
Reynolds, Richard	1	1	0
Stanford, E. C. C. (*President of the British Pharmaceutical Conference*)	2	2	0
Umney, Charles	1	1	0
Young, J. Robertson	1	1	0

La Mortola, Ventimiglia, Italy.
March 7, 1892.

"Dear Mr. Carteighe,—It is indeed rare to find any one with the indefatigable industry, ability and conscientious exactness that so characterises Professor Flückiger. Pharmaceutists and other men of science do well to honour so distinguished a man, and I am delighted that the testimony is to be so wide-spread and international.

"In response to your circular I have the pleasure to enclose £100.

"Yours sincerely,
(Signed) "THOMAS HANBURY."

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, MARCH 19, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

PHARMACY LAW.

THE differences of opinion expressed in the course of the discussion which followed the reading of Mr. HART'S paper on pharmacy law at the meeting of the Manchester Pharmaceutical Association is in itself sufficient evidence that there is much need for devoting greater attention to the legislative enactments by which the practice of pharmacy and the trade in drugs are more or less affected. Regarding the matter from that point of view Mr. HART is justly entitled to the thanks of chemists for having specially brought the subject of pharmacy law under notice, and we shall be glad to see his example followed by the members of other provincial associations. But at the same time, while agreeing with much that was said by Mr. HART, we cannot altogether agree with the opinions he expressed, and in this respect must partake with others in the disagreement that was evident from the remarks of the several speakers at the meeting referred to. We do not, however, pretend to do so in any authoritative sense, but rather for the sake of stimulating the consideration and discussion of a subject that is of great importance. In regard to the statement made by Mr. HART that the provisions of the Pharmacy Act relating to the sale of poisons are, to a very large extent, practically set at naught throughout the country we will not attempt to differ from him. It would not, indeed, be possible to do so in view of the facts which are patent to all engaged in the business and also to members of the medical profession throughout the country. In considering the subject of pharmacy law, however, it seems to be desirable to confine attention at the present to the provisions of the existing law, and to inquire how far they can be made available for repressing practices which are not only objectionable in themselves as involving danger to the public, but are also distinctly illegal. Though Mr. HART put forward his proposition very generally and in somewhat sweeping terms, we do not suppose that he intended to convey the idea that within the ranks of those who are legally authorized to deal in articles which are poisons within the meaning of the Pharmacy Act, there is any voluntary disregard of the various provisions by which that Act seeks to provide means of protecting the public from danger. Since registered chemists are as a class constituted by that Act the custodians of public safety in respect to poisons, and since it is conducive to their own interest to maintain that position, it may be reasonably inferred that it is only outside the ranks of that body we must look for instances of the practical mischief to which Mr. HART refers.

If we are correct in taking this view of the matter, it must be evident that in regard to the irregular sale of articles which are poisons within the meaning of the Pharmacy Act, there is a remedy in existence by which the malpractice referred to by Mr. HART and the mischief resulting from it may be dealt with. So far, therefore, it does not appear to be requisite to seek for amendment of the present Act or for further legislation, but rather that it is desirable to secure a more stringent enforcement of the existing law. The steps which have recently been taken by the Council of the Pharmaceutical Society in regard to the promiscuous sale of arsenical preparations as weed killers, and the successful result of the prosecutions which have been instituted, furnish ample evidence that the provisions of the law are sufficient for the purpose of punishing offenders and of putting a stop to irregular and open sales of articles that are now poisons within the meaning of the Act. But in order to arrive at such results it is essential that the actual fact of a breach of the law should be clearly established, in such a manner that it can be dealt with in a court of law. From the position in which chemists are placed by the Pharmacy Act it is incumbent upon them individually not only to observe its provisions in their own practice, but also to be zealous in detecting and making known, in the proper quarter, any deviation from those provisions that may take place in their respective localities. That is the only mode by which the administration of the Pharmacy Act can be made more effectual in repressing irregular sales of poison which are in contravention of the Act. For dealing with offences under the Act, in regard to which the Pharmaceutical Society is specially empowered to take the position of prosecutor, it is only by means of local action in that way, on the part of chemists, that a basis can be furnished for the Society to put the Act in operation. We venture to think that if assistance of this kind were more freely rendered, the result would be in every way beneficial. A foundation might thus be laid for advancing in the direction pointed to by Mr. HART in his suggestion that all dangerous drugs and compounds should be supplied only by those who have been

specially trained to perform such duties. It is not by putting pressure upon the Council of the Society to ask for such a legislative provision for the advantage of chemists, that its attainment can be hoped for; but by producing evidence that the strict observance of the provisions of the existing law by chemists is attended with benefit to the public and that they have, with that object, collectively assisted its strict enforcement. That is the only ground upon which it is likely that the very desirable extension of the provisions of the present Pharmacy Act to all dangerous drugs and to the dispensing of medicine can be hoped for.

Before leaving this subject it will be proper to refer to the cases in which under existing conditions an involuntary breach of the provisions of the Pharmacy Act may be committed even by registered chemists. Such cases were no doubt in the mind of Mr. HART when he spoke of the dangers attending the sale of dangerous drugs and compounds. And in the resolution which was passed at the meeting such cases are still more distinctly referred to. Medical authorities have for years past been calling attention to the mischief caused by the sale of secret remedies, and more especially those which contain potent narcotics or other poisons. Coroners and their juries have repeatedly pointed out the necessity for making the sale of these preparations subject to the precautions and restrictions of the Pharmacy Act. But the practice of interpreting the Act as providing for the exemption of these preparations as patent medicines, has hitherto led to their being sold without any warning of their dangerous nature, and indiscriminately by all classes of traders. In the sale of these preparations registered chemists, as well as other vendors of them, are involuntarily offenders against the Pharmacy Act, for though the presence of poison is known by common repute, it is not known so as to justify any one in attaching a poison label to any of these preparations. Moreover, they are sold in such a form that this could not be done by the retailer. However, a new aspect has been put upon the case through the recent expression of opinion by legal authorities that these preparations do not come within the term "patent medicine," and from the fact that in a prosecution instituted by the Treasury for the sale of such a preparation without a "poison" label the intention was announced that whenever similar occasion arose the view of the illegality of the practice would be pressed to the uttermost. No steps have yet been taken in that direction by the Treasury, though it has been stated in the *British Medical Journal* that the matter is under consideration. There are difficulties in establishing the fact that these preparations contain poison, since they are sold in such a way that this is concealed. Whenever the fact is established so that the question of law can be raised by a police prosecution of a seller under the 17th section of the Pharmacy Act, and a judicial interpretation of the law is obtained in the sense above indicated, it will be possible to deal with this serious evil. The objection to the sale of these preparations, entertained by the medical profession and by coroners, from the point of view of the public interest, is that they are sold without being properly labelled, and it is not until after they have been proved to be subject to that precaution, that any further steps can be taken to regulate their sale.

BRITISH PHARMACEUTICAL CONFERENCE MEETING IN EDINBURGH.

WE understand that active preparations are already being made at Edinburgh for the meeting of the British Pharmaceutical Conference, which will take place there next August. A circular has just been issued calling the attention of chemists in Scotland to this fact and pointing out the importance of the occasion. This has been done by the Honorary Local Secretary appointed last August, together with the office bearers who form the nucleus of the local committee, and a meeting was held in Edinburgh last Wednesday for the election of members of the Executive Committee, by which the actual work of making arrangements for the reception of the Conference will be done (see report, p. 785). As a customary feature of the Conference meeting it is attended by very many of the most representative pharmacists from all parts of Great Britain and Ireland; but it may be expected that the approaching meeting in Edinburgh will offer unusual attractions, not only from the position occupied by that city in connection with pharmacy and science, but also on account of the repute of its University and other educational institutions, the natural advantages of the city itself and the varied interest attaching to the locality.

CHICAGO EXHIBITION, 1893.

NOTICE has been issued to intending exhibitors in the British section that applications for space must now be made immediately, as the allotment will be proceeded with very shortly. Forms for applications can be obtained from the Secretary of the Commissioners at their offices, Society of Arts, John Street, Adelphi.

We learn with much regret that M. Ferrand died at the age of 59 on the 14th inst. Our readers will remember that on the occasion of the International Congress of pharmacists in London in 1881, M. Ferrand was a delegate from the Association Générale des Pharmaciens de France.

* * *

We also regret to announce the death of Professor Tidy, which took place on the 15th inst. Dr. Tidy has been for several years official analyst to the Home Office, and he was Medical Officer for Islington. The *Times* mentions that his opinion upon water and sanitary questions was valued very highly.

Proceedings of Societies in London.

SOCIETY OF ARTS.

Burning Oils for Lighthouses and Lightships.

BY E. PRICE EDWARDS.

(*Concluded from p.* 685.)

For those to whom the terms paraffin and petroleum are confusing, let me say that paraffin oil is extracted from bituminous shale, as I have before described, while petroleum exists in the earth as a crude oil, and is drawn therefrom in a liquid state. Speaking generally, it may be said that the crude oil resulting from the destructive distillation of shale is somewhat similar in character to the crude petroleum oil. There are, of course, many differences in detail among all mineral oils, but taking them as crude oils from which burning oils have to be obtained, we may consider the question of how a safe oil for lighthouse purposes can be and is produced. These crude oils are subjected to somewhat similar processes for their refinement. It has been stated that the section of the distillate devoted to burning oils consists of a mixture of hydrocarbons of varying volatility; the early portion of the distillate is therefore more volatile than the last portion, the former having required less heat to vaporize it than the latter. Suppose then the section of burning oils has been obtained by the application of heat from 300° F. to 600° F., this section may be cut up into further divisions, the first part of which would consist of light oils, with a specific gravity of from ·790° to ·810 and a flashing point, as regards paraffin, of from 90° F. to 105° F., and as regards ordinary petroleum, from 73° to 90° F. Such light oils as these are mostly used by the general public for ordinary burning purposes, and are retailed in this and other countries.

In refining crude petroleum a very large fraction of the burning oil section consists of this light oil, and the refiners are naturally desirous of disposing profitably of this oil, which might, if not available for illuminating purposes, remain on their hands as more or less a waste product. The trade in American petroleum is now a large and important one, but was young and undeveloped when the Petroleum Acts of 1862, 1868, 1871 and 1879 were passed, and the framers of those Acts may have thought it desirable to so far encourage this trade by lessening to a minimum the restrictions upon those light oils being brought into and freely distributed throughout the country. In these Acts the oil indicated as dangerous, and as requiring to be specially restricted as regards its transport and storage in this country, is that which gives off inflammable vapour at a temperature below 73°F. (Abel test), while all oils flashing at or above that temperature are not regarded as dangerous by Act of Parliament. The consequence is, this country is practically flooded with American oil, of which a very large proproportion gives off inflammable vapours at temperatures between 73° and 80° F., which oils, in my humble judgment, are essentially dangerous, no matter in what improved or safety lamps they may be used. Temperatures of 73° to 80° F. are frequently experienced in summer weather, and then these oils evolve their vapour. Again, in a lamp burning with this light oil, the conduction of heat from the burning point to the oil receptacle may quite possibly raise the metal, or other material enclosing the oil, to a temperature above 73°; and this heat, communicated to the oil, would cause it to vaporize, and the space above the surface of the oil, if ignited there, would cause an explosion, and if the lamp were upset, the oil would most probably immediately inflame, on coming into contact with the burning wick. From the point of view of danger, I venture to think too much reliance is placed upon special safety lamps, and too little consideration is given to the inherently dangerous nature of the oil used. I fear many, if not the majority, of the accidents which have happened with mineral oil lamps have been due to the fact that large quantities of low-flashing oil are sent unrestricted into the markets of this country, and distributed for sale to all the retail shops in the United Kingdom. Oils of the character here referred to would never be used in lighthouse or lightships, on account of the serious risk which would be incurred of accidental conflagration.

In the majority of cases of refining petroleum no such section as above referred to is cut off, the whole of the fractions of burning oils, from light to heavy, being mixed together. But, in the case of paraffin manufacture, after the light oils are cut off, then what is known as lighthouse oil—of specific gravity ·810 to ·820 and minimum flashing point 145° F.—is cut off. This is the kind of mineral oil which has been in use by the British lighthouse authorities for the past eighteen years; and the several firms who annually tender for the supply of this oil are fully aware of the requirements. It does not appear to have been considered by the American petroleum firms worth their while to compete with the Scotch companies for this special business, although tenders are invariably invited by public advertisement. It does not seem that there should be any very great difficulty in supplying American petroleum to meet the requirements of the lighthouse Boards, but they probably are not disposed to cut out of their distillates the limited fractions of the burning oils section which would be necessary. Probably the same reasons apply in some measure tc the refiners of Russian oil. Several samples have been sent for testing, but the flashing point in each case was below the specified limit, and in the test lamps at the Trinity-house the flame was inclined to be a little smoky and fell off after seven hours' burning. But it may be hoped that the Baku managers will send another sample taken from a narrower cut out of the best portion of their burning oil distillate.

The paraffin referred to is quite safe to use in lighthouses, and with burners of six and eight wicks. In these large burners the oil in the wick cases is maintained by regulated pressure at a constant level about three inches below the burner tips, where it is found that the heat of 120° F. is not reached. Just above the position where it is necessary to maintain the constant level, the wick cases are drilled with small holes, so as to enable the oil to overflow if it should rise above the proper level. As a matter of fact, the pressure causes the oil to have a constant tendency to rise, thus a constant overflow is established, whereby cool oil is continually supplied to the wicks, and prevents the metal at that point from becoming unduly heated. I took the temperature of the overflow oil of a ten-wick burner last week, and found it was 108° F. The lamp was being worked with only a little oil, and the overflow oil was flowing back to the reservoir, the temperature of oil in the reservoir being 94° F. At neither of these temperatures could inflammable vapour be given off, and therefore the oil was as safe as it could be. Oil is quite safe until it begins to evolve vapour. Prevent vapour forming in your lamp, except at the burning point, and you have nothing to fear. This you can achieve by using oil which will not vaporise until it reaches a temperature of say, 120° F. During the eighteen years paraffin has been in use in English lighthouses only one serious accident has happened, and that was due to mismanagement on the part of a keeper.

For lighthouses on isolated rocks at sea, and on board lightships, even the paraffin with flashing point of 145° has not been regarded as suitable. The consequences of an accidental firing of the oil in a rock

lighthouse might be very disastrous, and the Trinity-house Corporation with their engineer have not been willing to encourage the possibility of this risk. On board a lightship, where there is a number of swinging lamps in the lantern at the masthead, which in bad weather, as the vessel rolls and labours in the sea, are subject to violent oscillations and jerks whereby the oil is frequently spilled, and in very severe weather sometimes thrown about the lantern, it has not been considered desirable to use the Scotch paraffin; although in French lightships an oil of that character has been burned for some years.

But in the year 1885 an oil was brought to the notice of the Trinity-house, with a flashing point of 250° F. (Abel test). This was an American petroleum, and probably consisted of a portion cut out of the burning oil section rather late in the process of distillation of the crude oil. The promise of this oil was so favourable that careful trials were made with it, and excellent results as regards illuminating power were obtained from it. Its capillarity was a little less than paraffin in use, and to burn it in the large burners necessitated a raising of the constant level, and a little better adjustment in the burners. Sir James Douglass quickly recognized the value of this oil, and after a practical trial had been made of it in the lamps on board the Goodwin Light vessel, it was resolved to proceed further. Colza was still the illuminant at rock lighthouses and on board lightships; the new oil could be supplied at one-fourth the price paid for colza, could be burned more easily in the adjusted lamps. was liked by the lamp-trimmers as being cleaner and more easily managed, and could not become dangerous until heated to 250° Fahr. With all these recommendations, it is not surprising that the Trinity House, with the concurrence of the Board of Trade, arranged that this oil should be used at all lighthouse and lightship stations where colza was then in use.

On further inquiry, it was found that if there were a demand for such oil, there would soon be a supply to meet it. The Thompson and Bedford Company, of New York, were the first to put the oil into the market, but other companies have proved since that no firm has a monopoly of the supply of this oil. The Broxburn Oil Company sell paraffin oil of similar character, and other Scotch companies are prepared to supply it if required. The Trinity House at once proceeded to adapt all the remaining colza burners for burning this new oil, and have progressed so much that, instead of taking a contract for 300 tons of colza, as used to be the case, the quantity to be taken this year will probably not exceed 10,000 gallons, if any is taken at all. Such mineral oil as this is, indeed, safe; and ought to commend itself to the public at large. It has been stated that oil of this character develops more heat in burning than the low test oil. If this were really the case, there would still be such a large margin of safety in the oil that it could not be of material consequence. But, from trials made by myself and others, it does not appear that there is a greater development of heat with the high-test oil as compared with low flashing oils.

I made a trial, a few days ago, of five mineral oils burning in domestic lamps of similar construction, and took the temperature of the oil in the reservoir of each after five hours' burning, the bulb of the thermometer being kept in the oil the whole period. The results are shown in this Table:—

Oil used.	Flashing point. (Abel Test.) Deg.	Temperature of oil after 5 hrs. burning. Deg.
1. High-Test Petroleum . .	248	86
2. Paraffin Lighthouse . . .	154	86
3. Water-white Petroleum. .	114	87
4. Russian Petroleum . . .	86	85
5. Standard-white Petroleum	76	88

I then applied a flame to the filling hole of each successively, and from the first three there was no indication of vapour, although the flame was put completely into the reservoir. On applying the flame to the fourth, there was a slight indication of disturbance; but on applying it to the fifth, an explosion immediately took place, a tongue of flame shooting up from the filling hole about a foot long, and the flame of the burner was forced up the chimney by the pressure of the exploding gas in the oil in the reservoir. This proves that, with No. 5 oil, having a flashing point of 76° F., the oil in the reservoir was heated to 88°, and a large quantity of inflammable vapour had formed, which was stored in the reservoir, and which inflamed violently on applying a lighted taper.

This is a result which deserves the careful consideration of all users of mineral oils. Suppose, while this storage of oil vapour exists in the lamp, the oil in the reservoir requires replenishing. The filling hole will perhaps be opened and the inflammable vapour liberated; it might then ascend to the flame through the air holes, or a lighted taper or match brought near, to show much oil to be poured in; in either case the consequences might be very serious.

Other experiments, carried out in greater detail, have been made in this direction, from which similar results were obtained. The three oils which gave off no vapour show that safe mineral illuminants are obtainable either of petroleum or paraffin, and that the lighthouse authorities are enabled to use it without risk and without difficulty. The introduction of this oil has enabled Sir James Douglass to perfect his burners of all classes; and the Trinity Board have arranged that the modified burners which have been displacing the colza lamps ashore and afloat, shall be in every case more powerful; and the result is that, while the lights shown for the mariner's benefit have been vastly improved, the cost of producing these lights has been considerably decreased as compared with the colza lights: while the element of safety has been preserved by the adoption of oils which may be consumed in the largest burners without risk.

It may be interesting to note that by the change to mineral oil the illuminants for sea lights have successively been obtained from animal, vegetable, and mineral sources, and that the cost per gallon has descended in the three stages from about 6*s.* to 3*s.*, and to 1*s.* 4*d.* At the present time paraffin of the quality required and high test petroleum can be obtained at about 6*d.* per gallon. With this great decrease in cost, the question of the relative consumption of colza and mineral oil is practically unimportant, but, as a matter of fact, it is found that in similar burners there is rather less mineral oil consumed to maintain a maximum flame than with colza. The increased power of lights necessarily involves an increased consumption of oil; but the cheapness of the oil makes the additional expenditure a matter of small account.

It may be freely admitted that those who have striven with so much zeal and success to make gas lighting available for lighthouses, have by their efforts greatly stimulated the development of oil burners; and this development has been favoured, in a marked degree, by the introduction of the safe mineral oils to which I have referred. It was thought a great advance when the four-wicked burner was enlarged by two additional concentric wicks; but, since that was accomplished, burners of 8 and 10 wicks have been perfected by Sir James Douglass.

Eight-wick burners, consuming paraffin or high-test petroleum, are now installed at the lighthouses of Coquet, Whitby, and Bishop Rock, Scilly; and ten-wick burners are established at the lighthouses on the Casquets in the Channel Islands, and Round Island, Scilly.

In clear weather seven of the inner wicks of the

10-ring burner and five of the 8-ring burner are suppressed, the full power of each being employed only when the atmosphere is thickened by fog, mist or snow. The candle-powers of the unassisted flames of each burner with mineral oil are as follows :—

	Candles.
Trinity-house Douglass single-wicked burner	20
,, ,, two ,, ,,	60
,, ,, three ,, ,,	180
,, ,, four ,, ,,	350
,, ,, six ,, ,,	835
,, ,, eight ,, ,,	1,500
,, ,, ten ,, ,,	2,215

The old four-wicked Fresnel burner, with colza oil, gave 230 candles.

In connection with the oil burners I must not omit to refer to the very important question of the cotton wicks employed as a vehicle for carrying the oil up to the burning point. With sperm and colza oils a rather hard, closely woven wick was in use, and as nearly the whole of the wick was steeped in oil, only about three-eighths of an inch being above the constant level, its texture and suitability for promoting capillary action were not of great consequence. But when paraffin was introduced, the nature of the oil rendered it necessary to alter the mode of burning. Being so much more volatile than the animal and vegetable oils, it would have been dangerous to bring the constant level of the paraffin very near to the flame, and the oil would not have been consumed satisfactorily. It was, however, fortunately discovered that this oil had great capillarity or creeping power (a peculiarity which is sufficient to explain what has often been called the sweating of metal and glass receptacles of this oil), and that if the wick were immersed up to a point two or three inches below the top the oil would rise in it by capillary action up to the burning point. To facilitate this action it was necessary to displace the old closely woven wick for one of looser texture and of a spongy character. In the investigation of this particular branch of the subject, Sir James Douglass informs me that a great deal of the success attained is due to Mr. Henry Defries, who expended a large amount of time and made many experiments in his efforts to produce a satisfactory wick. His perseverance and intelligent perception of the requirements were ultimately rewarded, and a wick was produced in every way suitable for mineral oil consumption. The theory of using a wick is that it should not be burned; it should act merely as a vehicle for bringing up oil to be converted into vapour, and this vapour only should be burned. That is the theory, but the practice falls short of it. Most wicks get burned and carbonized more or less. And what is the consequence? With carbonized wicks the tendency is for the gas-making action to be arrested, because the charred and cindered part of the wick offers a decided obstruction to the upward passage of the oil to the flame. If the oil cannot get past this obstruction the flame cannot be maintained, it gradually diminishes, and before long goes out. Moreover, the burning of the wick itself communicates heat to the metal of the wick case, and with a volatile oil this would introduce a rather serious element of danger.

In this connection I may, perhaps, conveniently call your attention to what appears to be an important departure taken by the Broxburn Oil Company. Out of the burning oils section of their distillate from crude paraffin they cut a narrow fraction of oil of a very homogeneous character, with a very limited range of boiling points, but flashing at 100° F. This oil, it is found, lends itself to more perfect combustion than any mineral oil yet known. The processes of creeping up the wick, of forming and burning the oil vapour, are so perfectly effected that the wick itself is not carbonized, and only requires renewing at very long intervals. The lamp you see burning here was lighted on Thursday last, at 12 o'clock, and has not been put out since that time. Every morning the oil cistern has been replenished, but neither the wick nor the light are materially affected.

On June 30 last an Argand burner with this oil was lighted at 8 a.m. and burned day and night continuously until July 22, when it was put out for want of oil. It burned 532 hours continuously, and at the end the wick, which is now on the table, was clean with very little char upon it.

In certain conditions this may be a very valuable kind of oil for lighthouses, but its flashing point is low for such service. For domestic lamps it may possibly be applied very usefully, for many would consider it a great advantage to keep one wick in a lamp for weeks together without trimming or renewing it. Here is a domestic lamp which Mr. Love, the manager of the Broxburn Oil Company, to whom I am indebted for much useful information, has had under trial for three weeks; the wick has not been changed, the lamp has been lighted every morning and burned for about seven hours, the reservoir being filled daily. Sir James Douglass is sanguine that he can successfully use this oil for illuminating a new lighthouse shortly to be placed at the entrance of the River Usk in Monmouthshire. This light will not be under the constant attendance of a keeper, and the supply of oil to the burner will be automatic, a reducing valve being introduced between the oil reservoir and the burner to render the flow uniform. A further project Sir James has in view is to use this oil for the illumination of buoys at sea, instead of storing in them compressed gas as now. The project, is, however, at present only in the region of experiment.

This leads me to mention another kind of mineral oil light, which has proved very serviceable on the Swedish and Norwegian coasts, which has also been adopted for lighting the Danube entrances, and in several instances in Scotland, at Stoneness in the River Thames. This light burns automatically without a wick at all, and is alight all day as well as all night. The light is produced by the combustion of very volatile petroleum spirit, which gives off vapour at all temperatures. The burner is fed automatically from a reservoir containing a sufficient quantity of spirit to last until it is replenished—perhaps once a fortnight. This light is visited occasionally, only to see that there is a sufficient stock of spirit in the reservoir, and that the automatic action is perfect.

Soft paraffin wax has also recently been submitted for trial as to its suitability for lighthouse purposes. It is now being used in what are known as the Cera lamps on board ships, and, to a limited extent, for domestic purposes. It has many advantages. When carefully freed from oil it requires less air for its combustion than other oils, and is therefore less liable to smoke under unfavourable conditions of burning. It gives more light than colza and other oils, is absolutely safe at a flashing point of 348° F. But it requires special arrangements to keep it fluid, and trouble in melting it in the first instance. For lighthouses purposes, it is not obvious that it can compete with the mineral oils, as now used, especially as regards price and facility of employing it; but the lighthouse authorities will no doubt await further developments of the application of this material with interest.

From time to time oils of various character have been submitted for trial, with a view to their being used for lighthouse purposes; but the paraffin and high-test petroleum have not been excelled, as regards efficiency and suitability, while, in respect of economy, they cannot be beaten. It will, doubtless, be observed that the Russian oils do not appear to have been brought seriously into competition with the paraffin and

high-test American petroleum. Possibly it has not been considered worth while to cut out of the burning oils produced the comparatively small quantity of special oil adapted for lighthouse and lightship requirements: but there can be no doubt that the Trinity-house Corporation, and other lighthouse authorities, will gladly welcome any further competitor to supply their requirements; and I trust that the explanation of such requirements which I have offered to you this evening may be of service in making more widely known the special needs of the service, and in possibly stimulating the production of still more efficient and economical illuminating agents.

The supply of crude petroleum all over the world is very large, and as the demand increases, the supply appears to be maintained; but should there come a time when the liquid petroleum resources show signs of exhaustion, the manufacture of paraffin can be continued, so as to supply the wants of the world for practically an unlimited period, seeing that bituminous shales exist in all parts of the globe in great abundance. It is much to be hoped that legislation will not do anything to cripple these important trades, but will allow full and free facilities for the transport and storage of all mineral oils which are admittedly safe for general use; but will, at the same time, in the interests of the general public, put such restrictions on the traffic in, and the use of, oils which give off dangerous vapours at temperatures below 100° F. (Abel test) as will prevent such oils being distributed all over the country for general use. In the Inflammable Liquids Bill of last Session, the distinction drawn between dangerous and safe oils did not appear to be so clear as it might be, and that the safe lighthouse oils as now used would have been subjected to the restrictions applying to really dangerous oils. It might perhaps be desirable to enact that every retailer of mineral oil should inform the buyer of the flashing point of the oil, for that is, without question, the one simple and intelligible test of its safety or otherwise. At the present time no one really knows what is sold over the counter as mineral oil.

It may be of interest to state that the samples of all oils submitted to the lighthouse authorities with tenders are subjected to severe tests to ensure only the very best quality of oil being supplied. The burning test lasts sixteen hours without break, and no trimming of the wicks is allowed during that period. While the burning test is going on, photometrical observations are made after four, eight, twelve, and sixteen hours, the mean of all being taken to indicate the real value of the illuminating power of the oil as burned in the test lamps. Of mineral oils the specific gravity and flashing point are carefully ascertained, and each oil is subjected to fractional distillation to show the range of temperature at which the whole is distilled over, and the proportions distilling in uniform fractions between those limits. For paraffin the specified range is between 302° and 572° F.; for the heavy mineral oil a much narrower range is specified, viz., between 530° and 660° F. Further tests are made as to the oil remaining liquid at a low temperature; as to the effect of the sixteen hours' burning on the wicks; as to the relative consumption, and a comparison with the sample of the oil accepted in the preceding year. When a contract is made for the oil supply every delivery under such contract is carefully tested to determine that oil supplied is in all respects equal to the sample upon which the contract was taken, and no oil is accepted which does not in all respects come up to the contract sample. When very high-priced mineral or vegetable oils were the illuminating agents for lighthouses, it was necessary to keep a strict watch on the expenditure. On the one hand it was requisite to ensure that a proper quantity of oil was used each night to maintain an efficient light; and on the other it was necessary to prevent waste, or possibly fradulent dealing with so costly a commodity. Therefore a very elaborate system of accounting for every gill sent to the lighthouse was introduced, and is kept up to this day, although the value involved is very small now as compared with former days. The maintenance of a never failing supply of oil at each station is one of the most important obligations of the officers of the Lighthouse Boards, and to the credit of the service it may be stated that there is no instance on record of a lighthouse or a lightship having been unable to show lights at night through want of oil.

In the majority of cases the mineral oil is kept at the stations in tin-lined iron cisterns, but Sir James Douglass has in some recent instances recommended underground tanks built with rubble and cement, and lined with sheet lead. Such tanks are designed to contain at least twelve months' oil, and where they are constructed have given much satisfaction.

The annual deliveries of oil to the stations on the English coast are made by the attendant steamers. One in particular is detailed for the mineral oil business. Consignments of varying quantities are made to be taken on board this vessel at different ports, and the small steamer takes to each lighthouse its annual supply. The work of delivering the oil is often delayed or made hazardous by the weather, and at the best of times is attended with much labour and difficulty.

In concluding my paper, I beg to say that the advantageous position now occupied by the authorities in respect to lighthouse oils is due mainly to the development of the mineral oil industry, through the enterprise of Mr. James Young, and those who encouraged and helped him in his early efforts; to the subsequent endeavours of those concerned in the mineral oil trade to meet the requirements for lighthouses, etc.; and to the desire of the lighthouse authorities, with their officers, to avail themselves at all times of new methods and improvements for the benefit of the important service over which they have control.

I must now thank you sincerely for your patience in hearing me, and ask you to forgive my many shortcomings. I have endeavoured to present the matter to you in a non-technical manner, and simply from the practical point of view, as affecting the service with which I am connected.

SOCIETY OF CHEMICAL INDUSTRY.

(London Section.)

A meeting of the London section of this Society was held on Monday last, Mr. T. Tyrer presiding. A paper on the "Dangers of the Manufacture of Explosives" was contributed by Mr. Oscar Guttmann. The author, first dealing with the question of the general properties of explosives, said that an explosion might be defined as a sudden decomposition under vibratory influence. Thus iodide of nitrogen, which ignites at 212° F., was not exploded when placed on the body of a violin of which the E string was vibrating; explosion, however, occurred when the G string was struck. The nature of the vibration was therefore of great importance. Of all materials which might cause the detonation of an explosive, steel struck against steel was the most likely to bring it about, and wood against wood the most harmless, although a glancing blow struck by a broomstick on a wooden floor sometimes proved sufficient even in the case of tolerably stable explosives. The author then described the methods of manufacture of the more ordinary explosives, such as gunpowder, gun cotton, nitro-glycerine and smokeless powder. It was a curious fact that the manufacture of the first-named was probably more

dangerous than that of any of the others. Some risk was encountered in grinding the sulphur, as it became strongly electrified; a good suggestion seemed to be to put the grinding mill to earth by means of a suitable conducting wire. The use of brass and even wooden tools did not afford perfect security. The roof of the building in which the manufacture was carried on should be as light as possible, so that it might lift readily if an explosion occurred. The danger of explosion during thunder storms was considerable, and in one case the victim of an accident stated before he died that the pile of ebonite plates and powder which were undergoing the process of pressing, yielded a spark four inches long just before the accident occurred.

One of the worst features of the manufacture of gun cotton was the large quantity of fine dust to which it gave rise, which deposited itself all over the building devoted to drying, and was the source of grave risk. The sulphuric acid, nitric acid, and glycerine used in making nitro-glycerine for preparing dynamite, had to be stringently examined for purity. Some manufacturers stipulated that the nitric acid supplied them should contain less than 1 per cent. of nitrous acid; others allowed 4 per cent., and it was noteworthy that those who made their own nitric acid were less exacting than those who bought it. In the author's opinion a reasonable percentage of nitrous acid was permissible, for although more heat was generated during the reaction, it could be controlled by running in the glycerine more slowly. The sulphuric acid should not contain more than 0·1 per cent. of arsenic, and should of course be of full commercial strength. The glycerine should be free from chlorides and from certain organic impurities, the nature of which have not been well ascertained, which caused the nitro-glycerine made from it to contain a certain amount of flocculent material. Much care was needed in running in the glycerine, as if it became at any time in excess, there was a tendency to form mono- and di-nitrate, which were soluble in the acid liquor and were not therefore removed when the finished nitro-glycerine was separated. If by mischance decomposition began at any one part of the mixing tank, it could usually be controlled by thorough cooling and stirring, if the workman retained sufficient coolness and presence of mind. Smokeless powder usually consisted chiefly of a nitrated carbohydrate made into a sheet and then cut into suitable sized grains or strips. At present nitrated starch was rather a favourite with inventors, and acetone was largely used to convert it into a gelatinous mass.

In the discussion which followed, Mr. Otto Hehner said there was a scientific aspect to the question of the impurities in glycerine, as some which gave trouble were present in distilled glycerine, and yet were not volatile. The risk of splashing during distillation was too small to account for this, and it seemed possible that they might be polymerized glycerines of low volatility.

Two other papers were down for reading, one by Messrs. Evans and Wirtz and the other by Messrs. Cross and Bevan, on the "Alleged Presence of Sulphuric Acid in Drawing Paper." As the evening was far advanced Mr. Bevan gave the gist of both. Professor W. N. Hartley, in a communication to the Chemical Society, had recently stated that he had detected free sulphuric acid in drawing papers made by well-known firms. The experiments of Mr. Bevan and his colleagues on this point went to show that although sulphate was present in drawing paper of the same make as that examined by Professor Hartley, yet the total amount of soluble mineral matter in the paper, contained an excess of base over acid, and indicated that the source of the sulphate was the sulphate of alumina used as an antiseptic addition to the size. Any free sulphuric acid that might remain after "souring," would be neutralized by the hard chalk water employed in subsequent washing.

In the discussion, Mr. William Thorp pointed out that paper fibre had an extraordinary tendency to retain traces of soluble substances; an instance of the kind was afforded by the well-known difficulty of freeing filter paper from ammonia when it was necessary to filter a sample of water previous to analysis.

The meeting was then adjourned until the first Monday in April.

Provincial Transactions.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

The fifth ordinary meeting of this Association was held in the Rooms of the Chemical Club, Victoria Hotel, on Wednesday the 9th inst., when the chair was taken by Mr. George S. Woolley, the President, who announced that Mr. Charles Turner had presented to the Association a set of microscopical slides of starches. This collection was shown in an adjoining room, and was most interesting.

Notwithstanding the severity of the weather a large number of members were present to listen to a paper by Mr. James Hart, on "Pharmacy Law."

In the course of this paper Mr. Hart dealt with the principal clauses of the Pharmacy Act, more especially with those relating to the sale of poisons. These he contended were practically set at naught throughout the country. The facility with which deadly poisons could be purchased, and the conditions under which they were supplied in any kind of vessel whatever made it necessary that for the safety of the public the existing law should be more strictly enforced. It was in his opinion desirable to seek an amendment of the present Act, or better still to replace the Act of 1868 by one which would fully meet the requirements of the present age. It was absolutely essential that all dangerous drugs or compounds should be dispensed only by those who have been specially trained in their properties, and he trusted that pressure may be brought to bear upon the Council of the Pharmaceutical Society to this end. He wished at the same time to impress upon the trade the absolute necessity of every individual member doing his best to strengthen the hands of the Society with this end in view.

Mr. Lane pointed out that in the case of a death by taking chlorodyne which had recently occurred at Woodford, the jury had said when giving their verdict that it was really necessary that greater restrictions should be placed upon the sale of chlorodyne. They (the jury) were informed that Mr. Ernest Hart had the matter in hand, and did not intend to let it rest in its present state. The members of the Association might expect that something with respect to these poisonous medicines would shortly be done.

Mr. Wilkinson remarked that the police or any private individual, in the event of being supplied with a poisonous medicine not labelled with the name and address of the seller, could institute proceedings at once against the seller, and in his opinion it would not be wise to harass the authorities or urge them to enforce the law in this direction.

Mr. Kemp said he would like to draw the attention of members to what he considered an important matter, namely, the storage of benzine on unlicensed premises. As they were doubtless aware benzine could only be kept in bottles containing one pint or less, and yet he had frequently seen in pharmacies winchester quarts of this inflammable fluid from which small quantities were retailed. With respect to sign-

ing the poison book upon every sale, although the law was so decisive on this point, yet it was not carried out. He had a short time back proved that a person was supplied on several occasions with a scheduled poison, and had signed the poison book at the first sale only. He had not had any difficulty in obtaining the old sort of methylated spirit. Those members who were now privileged to use it must remember that it must be kept only in the place licensed for it, must not at any time be brought into the retail shop, and preparations into which it entered must be made in that room in which it was allowed to be stored.

Mr. William Kirkby said he hoped their deliberations would have some practical outcome. The Pharmaceutical Society had a great deal to contend with, and one thing was the fear of offending its constituent members. If they could do something to dispel the fear they would do some service. Instead of embarrassing them and putting difficulties in their way, as had been suggested, they would be doing the Society a favour. It was quite certain now that Mr. Ernest Hart had taken the matter up, that we had not heard the last of it, and it was certain that regulations would be made which would embarrass chemists more than at present. The Pharmacy Act, as they had heard it and as they knew, had not been efficiently carried out. If they could do something to help the Pharmaceutical Council to carry out the Act they would benefit themselves and show the medical world that they were willing to make some small sacrifice for the benefit of the public. For these reasons, if Mr. Hart would move some resolution such as he had indicated he would be glad to second it.

Mr. Hart said that to put the matter in order he would move:—

"That this meeting is of opinion that the law affecting the sale of poisons and poisonous compounds, whether sold as proprietary articles or otherwise, be more strictly enforced."

The motion was seconded by Mr. Kirkby.

Mr. H. Kemp said he heartily supported the resolution, and for this reason. The Pharmaceutical Society had on several occasions complained of the apparent apathy of the trade, and if all the provincial societies took no more action in the matter than the Manchester Society had done hitherto, the Pharmaceutical Council would have nothing to indicate that they were not still apathetic, and he took it that they were not. That was why he supported the resolution.

Mr. Baden Benger, in response to an invitation from the chair, said he did not know that he could say anything that would serve to elucidate the matter. He would only say, although it seemed rather late in the day to say it, that they did not yet know for certain that the Pharmacy Act was all they wanted, and they might find within the next few months that it was not all they wanted. It was only a question of whether in the resolution they should urge the need of fresh legislation, or whether they should not satisfy themselves or be satisfied by the British Medical Association that the present Act was sufficient.

Mr. W. Arrandale expressed the opinion that the present Act was strict enough if it was strictly enforced; but there could be no doubt there were chemists who evaded it, and people of course went to the shops where they could get the things they wanted most easily.

The motion was then put to the meeting and unanimously adopted.

Mr. Kemp said that before the meeting broke up there was one matter to which he might refer, for the information of some who were present. In every fire insurance policy which was issued to a chemist there was a clause, to the effect that he should not have on his premises certain petroleum products either for lighting or lubricating purposes, otherwise the policy became null and void. As matters stood at present, it was safe to say that ninety out of every hundred chemists were daily rendering their fire insurance policies null and void, by having on their premises those things which they were forbidden to have; and if a fire occurred through anything of the kind they would certainly lose all claim on the insurance companies. Some time ago he had a difficulty with an insurance company, and when he drew their attention to the clause, they haggled about it for a considerable time. He threatened to change his office, and rather than have him do that, they cut out the words, and he had had no trouble since then. Some of them who have not hitherto noticed the matter might benefit by looking into it.

The Chairman inquired what articles Mr. Kemp had in his mind.

Mr. Kemp: Benzine, for instance, and even vaseline; because it says "any product of petroleum used for either burning or lubricating purposes."

Mr. Hart thought the words referred to by Mr. Kemp only referred to the extra rate which would have to be paid if such things were kept.

Mr. Kemp: No; they would not insure them at any price whatever.

Mr. Hart said he knew some offices that would.

Mr. Kemp said he was referring to the ordinary run of offices. It was put down on the front of the policy that these risks were not to be included. Another thing equally important was that nearly all insurances of chemists excluded the rights of making ointments on the premises by heat. He would like to know if there was a chemist present who did not make ointments by heat every day of his life.

Mr. Kirkby said that with regard to pharmacy law in general he would like to add one word. There was one truth they might take away with them from the meeting, and it was that pharmacists needed educating in pharmacy law. If chemists were so ignorant of what was legal and what was illegal, it was time they started to read up these matters. As some of them knew, continental pharmacists had to pass an examination in pharmacy laws; and he thought that the time had come when we should have included in our examinations an examination in pharmacy law. A short course of legal training should be given.

Mr. Benger said he thought the subject was included in the new regulations. In his presidential address to the Conference he suggested that it should be included, because he found it was used in Germany, Austria, Russia, Denmark and Sweden as part of the pharmaceutical examination. He was glad to see, therefore, that it was included in the new regulations.

On the motion of Mr. C. Turner, seconded by Mr. W. Wilkinson, the thanks of the meeting were accorded to Mr. Hart for his paper, and the meeting shortly afterwards closed.

At the suggestion of the Secretary, it has been decided to hold a smoking concert, to close the session, and a committee has been formed to carry this out.

GLASGOW CHEMISTS ASSISTANTS' ASSOCIATION.

Pharmacy, Rural and Urban.

On the 2nd inst. a paper on "Pharmacy, Rural and Urban," was read before the members of the Glasgow Chemists' and Druggists' Association, by Mr. Thomas Robinson. Mr. James Robb, the President of the Association, was in the chair.

The author began by stating that his model of a rural pharmacy was one located in an agricultural market town, of from 3000 to 30,000 inhabitants; which, though it may possess local industries, is yet

not a seaside or fashionable resort, as the conditions there vary so much as not to admit of classification under either head; while his urban should be a city in population. To the man ambitious of local glory, or of becoming a shining light in topical politics, the country offers, he said, a far more *facile ascensus* than the city; for as a member of the latter variety he runs the risk of being classed as a mere "shopkeeper," at sight of whom the "people in the trade," the merchant princes, the artists, litterateurs and "somethings in an office," pass gingerly bye on the other side. On the other hand, where the available callings of the "toon" comprise but the draper, grocer, shoemaker, publican among trades, the druggist—in probably all but the West of Scotland towns—is permitted to revel in the exalted company of the doctor, writer, and professional man. But while this may be a popular localisation of the genus *pharmacien du pays*, are his censors willing to accept a mere vendor of drugs as a compeer? If, the author went on, he be content with the mercatorial rôle of a mere pharmacist, *pur et sempli*, I trow not. Is he a linguist, an amateur-graphist, an entomologist, or faddist outside the ruts of his own bread-and-butter making, then he may be permitted to associate occasionally *pari passu* with them, but not on state occasions. On the other hand, his more fortunate equivalent of the city (if smart, perhaps) may be smuggled into good society by virtue of his compulsorily acquired fair education or sociable instincts, his everyday calling not being called in question. Let me say that the nett result of my observations has been that stricter pharmacy obtains in the country than in the town. In a town, the exigencies of staving off the landlord and sheriff court weigh more oppressively, their demands being heavier than in the country. The consequent necessity for scooping in the shekels more quickly, irrespective of whether you will turn out a perfect pharmaceutical product or not, is *primâ facie* condonation of lax pharmacy. True, in the town there are classes of pharmacists to which a rural population affords no adequate scope. The chemist pharmaceutical, whose main object is to maintain a dignified repute as the first house in the trade; the chemist consulting, whose object in life seems to be to ascertain how far he can trespass on the physician's preserves, without being hauled up; the chemist homœopathic; the chemist photographic, whose Lares and Penates are hypo and hyro; the chemist and dentist, surely a professional man this; the chemist analytical, whose alpha and omega are assay balances and ometers; all men whose souls are above their calling, and on whom the title pharmacist hangs like a cog, to let and hinder them in ascending to that serener sphere, where the subtleties of counter serving are forgotten and the pestle mortar is unknown. Ranged likewise under the banner pharmaceutic throng another group, the chemist auctioneer, whom nothing but his vending abilities save from commercial mediocrity; the chemist quack who figures six feet high with his A.P.S. as a sure and certain sign of ability to produce a certain specific for "all the ills that life is heir to," though it contain a triplet of incompatibles or therapeutic nugatories. Add to them the chemist grocer who tacks on specialities in tea, lamps or what not; and, in Glasgow, æons of fathoms more contemptible than all these, the chemist doctor lacking in his *esprit de corps* to scorn contamination with a calling, however honorable, always second to his proper *rôle*, is not above grasping the crumbs of bread from the legitimate pharmacist. To these men the chemist and druggist degree is as a life-buoy to keep their heads above the waters of commercial degradation, an ægis from companionship with the butcher, baker, and candlestick-maker, and the one thing that keeps them from sinking below the body pharmaceutical. The country chemist gains in our estimation when we take all these drawbacks to a city trade into account. Certainly he has a wider profit bearing area from which to draw the living waters of £ s. d., but in each of the departments he has competitors who keep the flow from any one particular section within bounds, be they seed merchants, oil and colourmen, the grocer, tea dealer, soda waterman, the wool sorter, or vet., and though none of them can afford to make his turnover in their particular line unremunerative, the small community he has to cater to makes his total quantity disposed of limited. With him, though expenses are small, amounts are obtained likewise. The rural population, with more leisure for perusing advertisements, more largely demand proprietary patent medicines, on which at the best he has but a fraction, and the cute city chemist can more readily divert the 1*s.* 3*d.* out of a 1*s.* 6*d.* preparation of his own into his coffers than the country chemist. And again, time to all men is money, and though miserliness is no less common a-field than a-street, the man of the country has time and inclination to test the purity and standardicity of all galenical and pharmaceutical products, where in a city business this is crowded out; while the gentlemen of the cities are content to trust to the wholesale house for their daily drugs—take them as they send them and are thankful. This, too, is responsible for another evil. The manufacture of pills (a most essential part of a young pharmacist's education) drifts, from pressure of time, first on the doctor, who flies to printed formula, and then by reflex action on the chemist into the machine-maker's hands, much more largely in the town than in the country. As to finish or style in which work emanating from the two classes of pharmacists goes, all depends on the personal peculiarities of the principal. The proportionately less per cent. of dispensing in the country, and the more jealous care necessitated by a not too confident patient, disposes me to the opinion that more neatly trimmed labels, better capping and wrapping, are the rule more in the country than in the city. That better pharmaceutical experience can be procured in the country than in the town, I believe, as the "doctors and their druggists" connection is not merely a figment of correspondence, and many chemists, except in very large houses, seldom see a ℞ outside their own patron and saints, whereas the rural gentlemen clients, discontented with their local man, run off to this or that town practitioner of repute, and thus brings the product of various minds in comparing different drugs, and the uses of novel drugs or chemical derivatives. The financial side must also be viewed. We have seen that expenses are heavier in the town, but *per contra* the amount of help necessary from assistants and apprentices is less in town than in a rural or agricultural district. From all this it will be seen that wherever the prosecution of pharmacy offers more advantages on the one hand, on the other the drawbacks are equally momentous. Balance or overweigh them in the attempt to estimate the comparative chances of success in country with town businesses, and it will still behove each one for himself to appraise his own natural adaptability or social environment in deciding on whether a life pharmaco-rural or urban suits him best.

An interesting discussion followed the reading of the paper, and Mr. Robinson was afterwards awarded a hearty vote of thanks for his contribution.

LIVERPOOL PHARMACEUTICAL STUDENTS' SOCIETY.

The usual fortnightly meeting of this Society was held on Thursday, the 3rd inst., Mr. H. Wyatt, jun., President, in the chair.

Mr. Mitchell called attention to the following prescription :—

℞. Tinct. Benzoin Co.

As much as can be got into a 60 gr. pessary with Ol. Theobrom.

By melting 50 grains ol. theobrom., and, while fairly warm, adding 30 minims of the tincture, and stirring till globules of spirit are no longer visible a very good pessary may be obtained. Evaporation of the tincture produces a sticky mass of resin which is difficult to combine with the oil and is, on the whole, unsatisfactory.

The Chairman then called upon Mr. J. S. Ward to deliver his lecture on—

Some Micro-Chemical Reactions in Practical Botany.

Mr. Ward observed that the microscope is now only just beginning to be recognized in the curriculum of pharmaceutical education, and, consequently, pharmaceutical students and pharmacists generally are not so well acquainted with the microscope, its mode of application, and its capacity as could be desired. The object of the paper was to render it comparatively easy for the student to analyse the field presented to him and discover what it is he sees, and the beginner was advised to proceed much in the same way as in learning ordinary chemical analysis, viz., to perform reactions on known substances first, and become familiar with the effects before attempting to operate upon unknown substances.

Mr. Ward described several tests for cellulose, lignin, corky and mucilaginous cell walls, suggesting cotton, tow, cork, and linseed respectively as suitable to experiment with. Protoplasm and the nucleus were next treated of, the pulp of the apple being recommended as suitable material; the aleurone grains, crystalloids, and other proteids give similar reactions to protoplasm, and sections of the castor oil seeds with the various reagents should be compared with those of the apple. Tests were also described for starch, glucose, cane sugar, and other carbohydrates, fats, tannin, resins, and mineral matter, including raphides, cystoliths, globoids, and silica.

Mr. T. H. Wardleworth suggested that with Mr. Ward's consent the lecture be printed and distributed to the members of the Society, as the concise analytical charts which the lecturer had shown would prove of great value to students. Mr. Ward cordially agreed to assist in carrying out this proposal.

A hearty vote of thanks, proposed by Mr. Shacklady and seconded by Mr. Woolliscroft, brought the meeting to a close.

LEICESTER AND LEICESTERSHIRE CHEMISTS' AND ASSISTANTS' ASSOCIATION.

The annual meeting of the above Association was held at the Old Town Hall on Thursday, March 3. A fair number of chemists and assistants were present, among whom were Messrs. Woolley, Butler, Rowe, Burford, T. H. Lloyd, W. H. Lloyd, Ough, Daniells, Ward and Wathes.

Mr. Butler presided. The annual report was presented and passed. The main point of the evening was then discussed, viz.:—The desirability of continuing the Association on the present educational lines. The question was well discussed, and it was finally decided that the Association should be carried on as in the past.

Mr. Woolley suggested that a Committee should be formed to look after trade interests in the town.

It was proposed and seconded that the thanks of the Association should be forwarded to Mr. Richardson for his services in the past, and regret was expressed that he should sever his connection with the Association.

The following were elected on the Council for the ensuing year:—Messrs. T. H. Lloyd, Butler, Woolley, Rowe, Burford, Ough, Ward, Daniells and Wathes.

The usual votes of thanks to the Treasurer, Secretary and teachers were then passed and the meeting terminated.

The newly-elected Council then held a meeting to elect its officers. Mr. T. Howard Lloyd was elected President, in place of Mr. Richardson, resigned; Mr. Woolley and Mr. Butler, Vice-Presidents, Mr. Rowe re-elected Treasurer, and Mr. Geo. Ward Honorary Secretary.

BRITISH PHARMACEUTICAL CONFERENCE.

An important meeting of chemists, resident in Edinburgh and district, was held on Wednesday, in the Society's House, York Place, to appoint the Executive Committee to carry out the arrangements for the forthcoming conference of pharmacists, now fixed for August 23. As is now well known, a local meeting was held in August last, at which a committee, composed of the following gentlemen, was formed to make the preliminary arrangements:—Mr. James R. Young, J.P., Chairman of Local Committee; Mr. J. Laidlaw Ewing, Vice-Chairman of Local Committee; Mr. Thomas Thompson, Treasurer; Mr. Peter Boa, Local Secretary; Mr. Claude F. Henry to be associated with Mr. Boa in the secretarial duties. A small consulting committee was thereafter appointed, consisting of Messrs. J. B. Stephenson, Robert Aitken, Richard Clark, George D. Mackay, John Nesbit and Mr. Garvie Leith; and they prepared a circular, which was recently issued to all in the district interested in the success of the Conference. In it they stated that "the Conference is regularly attended by the most representative pharmacists from all parts of Great Britain and Ireland and many eminent members of the medical profession. The occasion of a meeting is therefore one of great interest to those in the locality in which it is held. The time has now arrived for making arrangements for the reception of the Conference. It is desirable that all chemists, and others interested, in Edinburgh, and what may be called the Edinburgh district, should co-operate and be included in the Local Committee. The position which Edinburgh occupies in the pharmaceutical and scientific world, the reputation of its University and other educational institutions, and the natural advantages of the city itself, are such as will probably attract an unusually large number of visitors. The expenses of the meeting will therefore necessarily be considerable."

In accordance with a request appended to this circular a meeting of an influential character was held as stated on Wednesday. Mr. Young, of Messrs. Macfarlane and Co., took the chair, and Mr. Peter Boa, the Secretary, read the minutes of the consulting Committee, which were approved.

The Chairman then said their meeting that day was for the purpose of electing an executive committee to carry out the work in connection with the Conference. Mr. Thompson, the Treasurer, might give them some idea of the guarantee fund necessary to ensure the success of the gathering.

The Treasurer here intimated that of the £200 required he had already received intimation of sums which were very satisfactory. A number of those to whom circulars had been addressed had, however, not yet replied.

The meeting then proceeded to the election of the Executive, and in addition to the office bearers and consulting committee a large number of gentlemen were appointed, power being given to them to add to their number.

Mr. J. Laidlaw Ewing suggested that the Committee should be sub-divided into four sections, viz., one for finance, another to make the necessary hall arrangements, a third to superintend the excursion, and a fourth to look after the reception. This was agreed to.

In concluding the business, which was of an entirely formal character, the Chairman said there had been many successful Conferences held in Edinburgh, and he had no doubt the one to be held in August would be like its predecessors. They had a fine city to show to their friends who were coming, and he trusted they would do all they could to give them a hearty welcome.

On the motion of Mr. Ewing a vote of thanks was awarded Mr. Young for presiding.

Reviews and Notices of Books.

DICTIONARY OF MATERIA MEDICA AND THERAPEUTICS. By C. H. LEONARD, A.M., and THOMAS CHRISTY, F.L.S.*

The design of the authors of this work has been to produce a veritable *multum in parvo*, and it is undoubtedly a distinct novelty in works upon materia medica. Especially rich in descriptive references to non-official drugs, it is likely to be of use to progressive medical practitioners and working pharmacists whose college days are past. The American element predominates somewhat too largely, whilst information concerning the official materia medica is often scanty, and we find no references to guaiacol and vanilla, which are surely of sufficient importance to be worth mentioning. The index is a unique production to be found in connection with a dictionary. It is well-arranged with cross references, and a substance mentioned in the book may be sought under its botanical name, Latin synonym and common or native name. French and German synonyms are also given, together with particulars regarding habitats, properties, doses, etc.; and italic letters follow each name, to indicate the genitive or prescription case-ending of the term. The idea upon which the work is based is a distinctly useful one; and, if future editions be dealt with more from the British standpoint, the authors may look for a fair measure of support.

PRACTICAL DISPENSING FOR STUDENTS, Pharmaceutical and Medical. By C. J. S. THOMPSON. Second Edition.†

Commencing with an introduction covering general principles, the book deals with weighing and measuring, prescription reading, counter arrangements, general posology, mixtures, incompatibles, draughts, emulsions, pill-coating, cachets, pastils, hypodermic injections, pigments, oleates, plasters, suppositories and the numerous other forms in which medicines are administered. The subjects are treated with considerable fullness of detail, and in an appendix are found numerous formulæ, with working instructions for preparing poultices (various) and nutritive dietary for invalids. The work is likely to be of much use to students when associated with practical work at the dispensing counter.

PHARMACOPŒIA OF THE UNIVERSITY COLLEGE HOSPITAL, 1891. Edited by A. W. GERRARD, Dispenser and Teacher of Pharmacy to the Hospital.‡

A revision of the edition of 1879 has been rendered necessary by the fact of several old formulæ becoming obsolete, whilst new ones were being prescribed. Amongst some forty of the latter we note Balneum Acidi Borici, Collodium Salicylicum, Enema Nutriens, various Guttæ, Injectiones, Lotiones, Nebulæ (spraying solutions), Pasta Zinci Oxidi (Unna's Paste) and Suppositorium Nutriens. In the formulæ for mixtures, the ingredients have been reduced to the measure of one fluid ounce, the general adult dose. Opposite each formula, too, the approximate equivalents of the quantities ordered are given in the metric system.

LESSONS FROM FIELDS AND LANES. By G. A. GRIERSON, F.L.S.*

The articles appearing in our pages under the above title now come before us in a new guise. That this book should be published is evidence that plant life still has its students amidst the ranks of pharmacists. The author is an enthusiast on this subject, and happily combines the spirit of scientific enquiry with a love of natural beauty. It should be needless to say that we recommend every student to make use of it.

THE BOOK OF PRESCRIPTIONS. By HENRY BEASLEY. Seventh Edition.†

When a small unobtrusive work like the present reaches a seventh edition it would appear to supply a want. The author appears to have revised it in accordance with the Pharmacopœia of 1885, eliminated remedies of old date, and altered the nomenclature to agree with present day science. The fresh matter includes prescriptions based on remedies of recent introduction and descriptions of fresh vehicles, etc. Altogether the book is likely to keep up its old reputation.

* London: Baillière, Tindall and Cox. Crown 8vo. Pp. 387.

† London: Offices of the *British and Colonial Druggist*. Crown 8vo. Pp. 95. 1*s*. 6*d*.

‡ London: Jas. Truscott and Son. Pp. 64. 1*s*.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith. Matter intended for publication should be written on one side of the paper only.*

CHEMISTS AND PHYSICIANS' PRESCRIPTIONS.

Sir,—There is but little doubt that most, if not all, chemists make it a principle to sustain and support the reputation and authority of the medical profession in all matters relating to prescriptions which they are called upon to dispense, and I am sure (as others of your correspondents have been) that if the prescriber were but present at many of the cross-examinations we are subjected to it would but tend to cement the friendly relations which at present exist between the prescriber and dispenser.

Whether we make it equally a principle to suggest to the patient a re-consultation of the prescriber in every case is doubtful, and this is the matter referred to in such courteous terms by Dr. Startin. To do so always, or even in the majority of instances, when called upon to dispense a repetition of medicine is not possible.

Our opinion is not asked, and to show much hesitation about supplying a further quantity of medicine would provoke a host of questions and cause unnecessary alarm to the patient. Again, many people prefer seeing a consulting physician for the very reason that he gives them a prescription which they can take for a considerable time without paying another visit.

Of course there are many general practitioners who, as Mr. Sangster says, feel unable to write prescriptions because to do so would, in many cases, sever their connection with the patients too soon, and they are unable to obtain such fees as would warrant them in so doing.

In such cases an arrangement between chemist and doctor on the following plan works very satisfactorily. The doctor sends his prescriptions to chemist by messenger or otherwise. They are retained by chemists till dispensed and copied, then returned to doctor. Prescriptions are

* York: Wm. Bleasdale and Co. Crown 8vo. Pp. 126. 1*s*.

† London: J. and A. Churchill. 18 mo., pp. 599. 6*s*. 6*d*.

repeated as often as doctor requires. If patients come to chemist and ask for repetitions the chemist shall supply them and intimate such repetition to the doctor by charging for such medicines in the weekly or daily list he renders to the doctor. It is understood that the chemist shall not supply medicines from these prescriptions and charge them to the patients unless by consent of medical man.

Would it not be much better to employ the latent dispensing talent of many of our pharmacies in dispensing at such rates rather than in the retailing many of the undesirable adjuncts to a chemist's business as at present?

In cases where the object has been merely to prevent harm to a patient by strong medicine I have known (as will many of your readers) the prescriber to mark a prescription "not to be dispensed more than one, two, or three times." Such a note I am convinced would always be faithfully respected by every chemist.

The remedy suggested by Mr. Sangster seems rather drastic, although doubtless much good would be accomplished by a conference, such as he suggests, even if it did result in an Act of Parliament. For the present if chemists, whenever consulted as to the advisability of repeating an old prescription, make it a rule to suggest a re-consultation of the prescriber, I feel sure that some, if not a large number of our clients, will be brought into renewed contact with their medical advisers with mutual benefit to them both. E. F. Young.

Sir,—In this matter there is no difficulty between doctors and chemists as to repetitions; the difficulty, if any, lies in moulding public opinion. Any medical man in touch with the pharmaceutical community knows how faithfully his every intention is carried out by the dispensing chemist, and therefore when he desires limitation as to the repetition of a prescription can order accordingly, provided the patient has no voice in the matter. The patient, however, does have a voice in the matter, the question of repetition resting largely with the public, who are patrons alike of physician and pharmacist, and, whether rightly or wrongly, are accustomed to treat prescriptions as their own property, and would probably resent any material innovation in this direction. Conference, therefore, between medical and pharmaceutical bodies (as suggested last week) without considering their patrons would hardly be beneficial, for would it not partake of the nature of trades unionism, a by no means desirable object to go to parliament with. I think a more practical suggestion to the dispensing doctor would be this, since at present a prescription is considered to belong to the person who pays for its being dispensed—either patient or prescriber, as the case may be—let the medical man who desires to discontinue dispensing without losing "visits" or running counter to public opinion, charter the services of a neighbouring chemist as his dispenser, and himself pay for those services; his prescriptions then remaining his own property need not be given to the patient at all, and are consequently not repeated without orders. By such an equitable arrangement as this all three parties to the transaction take their proper share in the benefits accruing therefrom.

St. John's Wood. J. J. Chapman.

The Benevolent Fund.

Sir,—It is only through your columns that individual subscribers to the Benevolent Fund can express their opinions, and as such I venture to do so, the more so as all my fellow-tradesmen in this place are subscribers too. The recent action of the Council in increasing the amount of the annuities seems to me hasty and ill-considered, and I for one agree with Mr. Hills "that there is something more to be said, especially with regard to the distinction of age." Indeed, I think age alone need not have been taken into account. If an annuity of £40 be fixed as the limit to a single person, I think that is a reasonable and very respectable sum, beyond which I would not go, no matter what the age. But if the applicant has say, a sickly wife or child, and is unable to do anything towards their maintenance, then I think is the opportunity to give the extra £10, or even £20, and on the death of either husband or wife reduce to £40. Differences in need there must and will be, and it seems to me the applicants should be classified by the Committee before (or after) election. Rather than go beyond these amounts I should certainly prefer to increase the number of annuitants, that is under present circumstances.

Ashbourne. Edwin S. Bradley.

Artificial Human Milk.

Sir,—In reply to Mr. Smith's letter in your last issue I have only to say that the process described in my article was in actual use in our laboratory for twelve months previous to the publication of his article, and, if he desires it, I will give him proof thereof. To the rest of your readers my statement will be sufficient.

Newcastle-on-Tyne. T. Maltby Clague.

Liq. Strychninæ Hydrochlor.

Sir,—Although several of your numerous correspondents have written *re* liq. strychninæ hydrochlor., no one seems to have replied satisfactorily to the query. What is the best preventive of the crystallization, the official strength still being maintained.

I cannot at all agree with Mr. Lingford's method of using acetic acid, that being an unwarrantable alteration of the Pharmacopœia, giving, as it does, a solution of acetate instead of hydrochlorate of strychnine. Hypophosphorous acid, too, is, of course, not allowable.

My experience has been that the separation of crystals is much more liable to take place in dealing with large quantities; a pint or a quart may be made strictly B.P. without showing any signs of crystallizing, but if four or six gallons be prepared, following the same details, crystallization almost invariably takes place.

Mr. J. C. Umney's precautions might prevent the inconvenience, but keeping the solution at 60° F. is altogether impracticable, as no store room of either doctor or retail chemist would have this constant temperature.

I have not yet tried Mr. E. H. Farr's suggestion of less spirit, but do not think it altogether satisfactory, for if it answers why Mr. Umney's extra caution.

With regard to the suggestion in your editorial article of making the solution 1 in 200 I am afraid doctors would take some time to get used to this alteration, and I think, again, returning to the Pharmacopœia of 1867 would be the best solution of the difficulty.

Mr. J. C. Hyslop's three causes of the uncertainty in the formula of liq. strych. hydroch. are not important, as I take it we are quite at liberty to deviate from the Pharmacopœia in the manipulation, provided the resulting preparation has the official composition.

Leicester. Lewis Ough.

Sir,—Having been interested in the correspondence about "Liquor Strychninæ," I beg to send you my experience. I cannot recollect of ever having any deposition of strychniæ, and our *modus operandi* is to put all the ingredients into the bottle and place it in hot water, shaking it now and then until dissolved, which it does before long. I may say our shop has a north-east aspect and is not by any means a warm one, and in winter, I might say, a cold one; but neither in the shop nor the warehouse, where we keep our stock bottle, does it precipitate or crystallize out. I should like to know the experience of my brethren in the craft in connection with "Easton's Syrup," and how it is that it frequently goes quite thick and sometimes almost solid. I find that when it has gone thick and is melted again by placing the bottle in hot water it is not so liable to go again thick. I was making some two or three weeks ago and added the phosphate of quinine to the syrup of phosphate of iron without dissolving it first by heating it with the phosphoric acid as recommended, and I think it kept better, but as I have only once prepared it in this way, I cannot give any definite opinion as to its keeping qualities. When we prepared it by the old method, *i.e.*, by precipitating the phosphate of iron and dissolving it in the phosphoric acid with the strychnine and quinine previously dissolved in it, it kept much better. It is not of much consequence its going thick if it is ordered to be dispensed mixed with water before it is sent out, but when (as it often is) it is prescribed by itself and it turns thick in the patient's hands, it is a source of annoyance.

52, *Castle Street, Carlisle.* John Hallaway.

Syr. Ferri. Quiniæ et Strych. Phosph.

Sir,—In making this syrup according to the formula of the B.P.C.U.F. about two years ago, I found so much difficulty in obtaining a satisfactory syrup (using a good deal, it was very annoying as batch after batch was spoiled) that I gave up making and purchased it.

Recently I have had another attempt at making it, and having spoiled three distinct pints, I should be glad to know if others have met with the same difficulty, and to be made aquainted with the reason of the phenomenon that occurs, which is, that within twenty-four or forty-eight hours the syrup becomes very thick, and eventually a perfect magma.

Martindale in his extra Pharmacopœia gives the following formula :—

Strychnine	8 grs.
Acid Phosh. 1·5	℥ij.
Aq. Dest.	℥vj.

Dissolve and add

Quiniæ Phosph. 256 grs.

Dissolve and add

Aq. Dest. to 2 ozs.

Take ½ drachm of this and syr. ferri. phosph. to make 1 ounce Easton's Syrup.

I find no difficulty in making the solution, but in the course of an hour or two it solidifies, even when diluted with twice the quantity of water mentioned. It dissolves perfectly on the application of heat, but solidifies again on cooling. The syrup made from this solution is as thick as that from B.P.C. formula. I then made another batch by dissolving the phosphate of quinine in the phosphate of iron syrup, and in place of the alkaloid, adding an equivalent quantity of liquor strychnine P.B., in less than two days the result was as bad as any gone before.

The solution of phosphate of quinine on the phosphate of iron syrup keeps perfectly bright and leaves nothing to be desired. The mischief seems to come on the addition of the strychnia. Why?

I should be glad also to know if others have observed the very offensive smell that is sometimes developed in syrup. hypo. co., B.P.C.U.F., the solution of hypophosphite of iron used being carefully prepared and quite odourless. Jno. Ingham.

Miscible Liquid Ext. Cascara.

Sir,—I notice you have published a note from Mr. J. Moss on the above subject. May I suggest the following formula, as answering all the requirements mentioned by Mr. Moss, but saving a considerable amount of trouble. I have used it and supplied it to medical men, who agree that it is "the best they have had."

Cascara sagrada, in coarse powder . .	1 pound.
Cold water	1 gallon.
Carbonate of ammonia	1 ounce.

Dissolve the carb. ammonia in the water and digest the cascara in it for three days. Transfer to a percolator, and after the liquid has ceased dropping percolate, with 2 pints more water to exhaust. Evaporate down to 12 ounces, and when cold add spirit to 16 ounces and filter.

In the process of evaporation the carb. ammonia becomes dissipated, and the result is a fluid extract, perfectly miscible with water, of full activity, and not so nauseous as that of B.P.

It is just possible a little of the carb. ammonia combines with the resinous principle of the cascara, but that is rather an advantage than otherwise; as all aperients are increased in activity by the addition of a small amount of ammonia.

I find chloroform either as sp. chlorof. ℥j, in the place of the s.v.r. in the B.P. extract, or better still as tr. chlorof. et morphinæ, covers up all nauseousness, and renders this most useful of medicines one of the most palatable in the Pharmacopœia. Some such compound extract would be a boon to many.

I also think the "ammonia process" might be of service in making extracts of other drugs containing resinous principles. Geo. Spencer.

Glacialine.

Sir,—I have very good reason to suspect the use of glacialine (boracic acid) for the preservation of milk is responsible for an affection of the skin, due, I believe, to defective nutrition of the tissues. Whether it is produced *per se* or by arresting the process of digestion, making it, in fact, more costly to the system I do not know. As far as I have been able to trace its effects beyond the disfiguration and probable use of arsenic as a remedy, the disease does not seem dangerous. What the constitution may do later on in life is another matter; the skin does not generally "take on the job" readily; it means a good deal behind it when it does.

My object in writing is to call the attention of the faculty to this peculiar skin trouble, and to animal chemists, whose number, I rejoice to see, is increasing, judging from some able remarks I have seen in this Journal.

It would help the active men (I, alas! no longer belong to them) in their investigations if they examined the effect on calves and other young animals who depend for their nourishment almost entirely on milk. If I am right in my suspicion we should get with calves "scouring," on young pigs something sharper still. I regret we can only trace trouble in this way to actual experiment on living organisms. That is most unwarrantable in most cases, and in this, perhaps, even for the ultimate benefit of piggy.

I have hesitated, although years ago I sent a letter to the *Lancet* on the subject, which, I believe, was not published, to open this matter, because sour milk is not wholesome or pleasant, and the milk trade an enormous one. We know that the continued use of tea, ardent spirits, or tobacco, and even excess of common salt is innocuous to the many; moreover in the case of the first named many persons derive a certain amount of material comfort, solace, or satisfaction, which mitigates any possible, but not probable, injury. They go into it with free knowledge and exercise their undoubted rights. With babies and young children it is different; they depend on the wisdom and fostering care of their elders for their chance and prospects of life.

What knowledge or experience have we to warrant the feeding of infants on boron—is it in any way a food or condiment? Is boron an appreciable natural constituent of the human body? If not, what right have we to dose or feed the young with boron in the dark?

Few experiments out of the body avail. Magnetism plays such an important part in animal functions. As old Dr. Prout said in days long ago, possibly before the marvellous magnetic arrangement of the whole body was felt as it is now, "Remember you have an acid stomach and alkaline bowels, and that is the battery of digestion; you students of medicine must always remember that."

I place boron on its trial; if the jury of careful investigators acquit it, for the great milk industry I shall indeed be glad, for to preserve milk by any harmless process is a great boon. The simplest test is to place the suspected milk in a warm place for three days, the chemical test is almost as easy. George Mee.

Formula Wanted.

Sir,—I should feel obliged if some reader would furnish me with a formula for harness blacking or composition similar to Harris's. I have tried those from several different sources and none seem to answer; they are either too hard or else they do not give a polish. P. H. G.

NOTICES OF MEETINGS.

Midland Counties Chemists' Association. — Thursday, March 24. Social evening.

Chemists' Assistants' Association.—Thursday, March 24. Paper: "The Chemistry of the Liver," by A. P. Luff, M.D.

Brighton Junior Association of Pharmacy.— Thursday, March 24. Musical and social evening.

Erratum.—Page 758, column 2, line 3 from top, for *azometric* read *asymmetric*.

Res.—A considerable amount of heat is generated on adding strong sulphuric acid to water, but we doubt whether this or any other combination will effect what you suggest.

J. C.—We understand from Messrs. Longmans that they hope to publish the third volume of Thorpe's 'Dictionary of Applied Chemistry' this spring.

Communications, Letters, etc., have been received from Messrs. Hill, Wright, Connor, Alcock, Ward, Blackburn, Cripps and Stead.

BOTANICAL NOMENCLATURE, WITH ESPECIAL REFERENCE TO 'PHARMACOGRAPHIA.'

BY G. CLARIDGE DRUCE, M.A., F.L.S.

(*Continued from page* 750.)

Again, Linnæus uses a small letter for the specific names of plants, which he must have known were formerly genera; for instance *Verbascum lychnitis*, *Scandix odorata*, *Pimpinella saxifraga*, *Salvia verbenaca*, *Circœa lutetiana*, *Caucaulis daucoides*, *Scabiosa columbaria*, *Melittis melissophyllum*, etc.

But he is not consistent even in his own works. In 'Flora Suecica' we find *Euphorbia Helioscopia*, but his citation is *Tithymalus Helioscopius*. In the 'Species Plantarum' it is *E. helioscopia*. We find also *Stellaria Holostea*, the citation being *Caryophyllus holosteus arvensis, flore majore*, Bauhin. This shows how perplexing and involved is the whole subject. What are we to do? One way is to ignore these pre-existing generic names and to write all the specific names derived from them with a small letter, as Dr. Günther Ritter Beck does in his 'Flora von Nieder-Osterreich.' Another is to scrupulously follow Linnæus' example.

As referring to this I may quote the opinion of the editor of the *Journal of Botany*, when I sent him a note on *Anemone nemorosa*, in which I pointed out that it would be more correct to write *A. Nemorosa*, since Ruppius, in 'Flora Jenensis,' described it as *Nemorosa flore roseo albo expanso*. He states in a foot-note that as Linnæus did not cite Ruppius or base his plant upon anything Ruppius had written, but upon *Anemone nemorosa, flore majore* of Bauhin, we should not depart from the ordinary custom of writing it with a small letter.

How much support for this contention can be adduced from the custom of Linnæus may be gathered from the foregoing remarks. But if we did follow the exact spelling of Linnæus, which of his works shall be our standard? Which of the various editions of the 'Species Plantarum,' of the 'Flora Lapponica,' of the 'Flora Suecica,' or the 'Systemæ?' We have seen how these vary and are not consistent with each other, or with any rule. Following the 'Flora Suecica,' for instance, as our guide, we should have to write *Stellaria Cerastoides, Erysimum Cheiranthoides, Atriplex Portucaloides, Cichorium intybus, Andromeda polifolia, Potentilla anserina*, etc., exactly opposite to the plan followed elsewhere.

In the case of *Anemone Nemorosa* we shall find that *Nemorosa* was used in a generic sense for the wood anemone (and for the yellow anemone) not only by Ruppius, but long before by Lobelius in the 'Icones,' No. 674, where it is called *Nemorosa Ranunculus*. Linnæus in the 3rd edition of 'Species Plantarum,' misspells it *nemerosa*.

Is it not, however, possible to formulate a uniform rule? That is: *To write all the specific names which have been derived from appellatives, genera, or persons with a capital letter*. We should thus treat the inconsistencies of Linnæus merely as typographical blunders and be carrying out his intention,* but which pressure of work and more important considerations probably prevented him from paying strict attention to during the writing of his MS., or on revision for the press.

At the same time the historical sequence of botanical names would be retained.

Leaving for a time the other laws passed by the Congress, let us consider what shall be the starting point of the binominal system. Momentous results hang upon this decision. So far as the initial date for the species is concerned, there can be little controversy. Botanists of the palæontological type may possibly argue for the advantages of freedom of choice, but the majority of botanists have undoubtedly fixed upon the first edition of the 'Species Plantarum,' 1753, as the date when the binominal nomenclature was first consistently applied to plants. As Asa Gray* says: "There is substantial agreement among botanists as to the point of departure," and the fact that the specific phrase of earlier authors is occasionally a substantive, does not militate against it. *Galega vulgaris*, *Lappa major*, and *Trifolium agrarium* of the old herbalists were in good binominal form, but the adjectives are phrases, not specific names."

The initial date for the citation of genera is, however, the battle-ground on which fierce contests have been fought, nor has the struggle yet ceased. Unfortunately, the Paris Congress did not fix it, nor do our authorities yet agree. Mr. Daydon Jackson, one of the greatest authorities upon the subject, when writing a prefatory announcement respecting the compilation of the enormous work (the 'Index of Plant Names,' on which he has long been engaged, and of which the first numbers are now going through the press), distinctly states "that the starting point for citation of generic names will be the 'Systema Naturæ' edition, 1735. Where Linnæus ascribes the genus to an earlier author, we say 'Tourn. ex. Linn.,' etc. Where Linnæus' names, as given in his earlier works, were not followed in the 'Species Plantarum,' we follow the 'Species Plantarum.'"

Other botanists take the first edition of the 'Genera Plantarum,' 1737. See De Candolle and also *Journ. Bot.*, p. 53, 1892, and 'Bulletin Torrey Club,' Feb., 1892.

Sir Joseph Hooker, in the 'Students' Flora,' adds to several genera the name of Tournefort. Linnæus himself says, "Tournefortius primus characteres genericos ex lege artis condidit," also "Ipsi non immerito inventionis gloriam circa genera concedere debeam." Others, again, will quote Rivinus, while a school of American botanists go into remote antiquity and write after certain plant names Catullus, Virgil, Pliny, or Dioscorides. Solomon has yet, I believe, to be cited as the author of Hyssop [us]! In passing, I may say that it must not be assumed because Mr. Daydon Jackson dates the citation of genera from 1735 that he would give priority of these older genera over later generic names to which species were added in the first edition of the 'Species Plantarum.'

One of the latest additions to the literature of the subject is the very exhaustive *Revisio Generum Plantarum vascularium omnium atque cellularium multarum secundum leges nomenclaturæ internationales*, etc. (Dr. Otto Kuntze, 2 vols. octavo, 1891 (pp. 1011), which, without going so far back as the classic

* This is supported by his own copy of the 1st edition of the 'Species Plantarum,' where *Galium mollugo* is printed. In ink Linnæus has altered this to *G. Mollugo*.

* 'Scientific Papers,' vol. i., 363.

writers mentioned above, shows how much can be done by carrying out in a fearlessly logical manner the laws of strict priority if the date 1735 be sanctioned for the citation of genera which may have species placed under them. Kuntze suggests that about 30,000 names of plants should be changed. In many instances this not only means a change of names, but also the transference of the well-known name of a genus to another and distinct genus; for instance, our water-cress, *Nasturtium*, is to be called *Cardamine*, while the garden-cress, *Lepidium*, is to be called *Nasturtium*. The heather, *Calluna*, becomes *Erica*, while the heath, *Erica*, is to be called *Ericodes* (sic.). In fact, such a chaos of change is suggested, that the really good work of Kuntze is seriously prejudiced by the vast and in many cases (as I hold) unnecessary change of names he suggests. Most interesting are his chapters on the works of Linnæus and his treatment of contemporary botanists. Kuntze shows that in the case of opponents to his system, Linnæus was not always just. Very valuable are the criticisms on the imperfections to be found in Durand's 'Index Generum Phanerogamorum.' So too is the chapter on the 'Nomenclator of Steudel' and his additions to Pritzel's 'Thesaurus of Botanical Literature.' Instructive too are his denunciations of the faults of Boissier and Robert Brown, and his more gentle treatment of the deficiencies in synonymy shown by the authors of the 'Genera Plantarum.'

To English botanists "who often know only one language" he gives a chapter on Modern English Nomenclature, in which he points out certain defects which he considers will be present in the 'Kew Index of Plant Names,' or suggestions by which that work might be improved. Regarding nomenclature he says, "Most English botanists think 'in our country we like do so.' Then they are not yet fit for international science. . . . . Their superiority. . . is surely to be acknowledged sometimes; but I cannot see a superiority in cases where English do not adopt the scientifical progress or necessary facilities to science of other nations, if they refuse to take up the Centigrade thermometer, the decimal system of measurement and weight, [and] the international laws of nomenclature. Somebody may say, nomenclature is no science; it is but a formality thereto. That would not be quite correct. Botanical nomenclature . . . . includes the research towards a department of history of botany, and as a study for finding truth it is a scientifical one; all science is only the study to find truth."

Kuntze is anything but an admirer of the 'Jordanist' school of botanists with their love of 'microspecies,' but he asks boldly for more than most British botanists would be prepared lightly to grant. For instance, he would unite under one species *Cerastium aquaticum*, *Stellaria nemorum* and *S. media*. This conclusion he arrives at after a somewhat precise study of examples from various parts of the globe. He would also group under another single species *Stellaria graminea*, *S. glauca* [*S. palustris*], and *S. uliginosa*. So far as the former two are concerned, there may be something to say, but with regard to *S. uliginosa* I have yet to be convinced that it is identical with both *S. glauca* and *S. graminea* or either. Have book characters rather than living materials been the deciding factors with Herr Kuntze in arriving at his conclusions? The genus *Brassica* he would still further enlarge by admitting *Diplotaxis* and *Erucago*. Under *Hesperis*, L. 1735, he would include *Sisymbrium*, *Malcolmia* [*Malcomia*], *Matthiola*, [*Mathiola*], *Aubrietia*, and *Braya*, but space would fail in enumerating all his proposed changes in the genera. Very exhaustive and interesting are his additions to the laws of nomenclature and his rules for writing botanical names. The coining of the latter, in order to prevent homonyms, leads to curious and not always consistent results; *Sirmuellera* and *Sirhookera* at any rate are not likely to clash with any names already existing, or likely to be made by anyone else in the future. The names *Hemsleya*, *Jamesbrittenia*, *Brittonamra*, *Jacksonago* are perhaps intended as "sops." Personal predilections may be seen in *Mosenthinia*, which is unjustifiably substituted for *Glaucium* on the very weak ground that *Glaucium* is really equivalent to *Glaux*. Also indefensible in my opinion is the licence he gives himself to alter the spelling of names which he deems faulty. For instance, the Tonquin bean he calls *Cumaruna*; but Aublet wrote Coumarouna [cf. Coumarin].

Most valuable is the chapter on the dates of publication of botanical authors. This in itself should ensure the presence of the work on the reference shelves of every scientific library.

A more detailed account of his proposed alterations in the names of medicinal plants shall follow. From the following remarks it will be seen what a serious danger threatens our nomenclature if Kuntze's work shall be taken as the standard.

Mr. Daydon Jackson has adversely criticized it in the 'Journal of Botany.' Mr. Hemsley, in 'Nature,' writing as the mouthpiece of Kew botanists, has treated it in a contemptuous manner. Drude, in 'Berichte der Deutschen Botanischen Gesellschaft' for December, 1891, has met it with a decided negative, and avows himself as one with Kew in belonging to the school of "*use*" rather than "*justice*." In fact, Drude goes farther; he would cite as the author of a species or genus not the giver of the name, but the botanist who gave the best definition of it. Would this plan ensure uniformity or stability?

So far as regards stability, any future botanist might discover additional characters for a species or genus; he might then either be cited as its author or have a free hand to rename the species. This rule of convenience would lead us still further into confusion and indefinitely increase our synonymy. In fact, Drude here rather appears to have mixed up two different things, *i.e.*, the name and the description. In art. 15 of the 'Leges' De Candolle points out that "Each natural group of plants can bear in science but one valid designation, the most ancient, whether adopted or given by Linnæus or since Linnæus, provided it be consistent with the essential rules of nomenclature." To this De Candolle subsequently adds an article, 15 *bis*, which is purely explanatory. It is, "The designation of any group, by one or more names, has not for its object the enunciation of its characters or history; it gives merely the name by which we are to call it." He comments upon the tendency which is often shown to mix up the question of name with other considerations. As Asa Gray says, "Before Linnæus introduced the binominal system, the names of species were at the same time names and charac-

ters. In separating these two things Linnæus rendered a great service, and we should be careful to preserve this advantage." De Candolle says, "A name is a name; characters are characters; the succession of names is synonymy. To mingle such different ideas leads to confusion." Many of Linnæus' definitions of genera and species are avowedly incomplete and faulty, but his names are good and valid. Other names of his cover more than we understand by them in these times. De Candolle has treated of this in art. 49. He rules that, "An alteration of the constituent characters or of the circumscription of a group does not warrant the quotation of another author than the one that first published the name. . . . . When the alteration is considerable, the words 'mutatis char.,' or 'pro parte,' or 'excl. syn.,' 'excl. sp.,' etc., are added." This, as Asa Gray says, "would have been better worded 'does not warrant the quotation of another author in place of the one that first published the name.' It appears that R. Brown began in an oblique way the practice objected, and for which there is often a plausible excuse; and the elder De Candolle sometimes followed it. It was only when the practice was systematically carried out by one or two authors that the consequences became apparent; for few genera or species have now the Linnean limits or signification, and the new rule was practically proved to be a necessity." An example may be given. Linnæus gave the name *Euonymus europæus* to the spindle tree, with two varieties, *i.e.*, var. *vulgaris* and var. *latifolia*. Drude would probably consider that these which are considered to be specifically distinct should be respectively called *E. latifolia*, Scop., and *E. vulgaris*, Scop., because Scopoli raised them to specific rank. The international plan is to write *E. europæus*, L., as that was the remaining plant after Scopoli had separated and raised to a species the var. *E. latifolia*.

In the same way we retain the name *Fraxinus Ornus*, L., for the manna ash, notwithstanding we now by that name express more than it originally meant, that is the specific differences which at one time were considered to be sufficient to separate another species, *F. rotundifolia*, are now found to be insufficient, but we do not cite any other botanist as the author of the species, although its limits now are wider than when he gave the name.

This plan we follow when Linnæus gave a name to a species which subsequent workers find to consist of more than one species. The name is that given by Linnæus; him we quote; any elucidator of his specific characters we do not quote, as by quoting one only we should do injustice to others, without corresponding advantage. As I have said before, in special cases (where great doubt arises) we may quote after an author the name of the commentator in inverted commas. Where extreme doubt or a want of positive knowledge exists we had better use the oldest name which was certainly employed for the species in question.

Few botanists would apply in a restrictive sense the name of *Rubus fruticosus*, L., but we must not too lightly give up these Linnean names because confusion has existed with regard to their proper use.

(*To be continued.*)

THE INFLUENZA BACILLUS.

In view of the fact that the specific micro-organism of the disease that has played such havoc during recent years has in all probability been identified and isolated, it appeared likely that a summary of recent researches into its nature, together with the results so far arrived at, might be of value to pharmacists, as being naturally interested in all pertaining to the progress of medical science.

In the beginning of 1890 Babes published the results of his experiments on guinea-pigs and rabbits. Pneumonia was induced in these animals by inoculation with the nasal secretion from influenza patients and from the organs and blood of those that died it was found possible to cultivate bacteria. These were from 0·2 to 0·4 micron in diameter, occurred in chains or masses, and varied considerably in shape and size.

They were with difficulty distinguished from the nutrient medium surrounding them, since they were almost unaffected by the aniline dyes generally used as stains, nor were they coloured by Gram's solution.*

It was possible, however, to ascertain that they could multiply in the absence of oxygen, and it was noticed that they were immobile and formed transparent drops upon the surface of agar-agar.†

In the same year Kovalsky, of Vienna, detected, in the sputum from cases of influenza, chains of bacteria arranged in pairs (*diplococci*). These *streptococci* did not grow upon gelatine but formed transparent colonies upon agar-agar at the temperature of the body.

These observers failed to isolate and definitely identify the organism, and it remained for Pfeiffer, together with Kitasato and Canon (*Deutsch. med. Wochensch.*, 1892, No. 2 and 3), to place the matter upon a surer foundation. The first-named observer reported on the examination of thirty-one cases, in all of which a bacillus of a definite species was found in the characteristic purulent bronchial secretion. Where the cases were not complicated, absolutely pure cultures were found. If phthisis or other bronchial affection existed, other micro-organisms were also present. The specific bacilli were found only in cases of influenza, their presence kept equal pace with the course of the disease, and disappeared as the bronchial secretion was checked. They appeared as very tiny rodlets as thick as the bacilli of mouse septicæmia‡ but only half as long. Three or four might often be seen forming a chain. Basic aniline dyes stained them with some difficulty, dilute Ziehl's solution and hot Loeffler's methylene blue making better preparations, whilst Gram's method had no effect. The two ends of the bacilli stained more intensely than the rest, so that the organisms almost

* Gram's solution.—Iodine, 1 gramme; iodide of potassium, 2 grammes; distilled water, 300 c.c. The preparations are first stained with Weigert's saturated alcoholic solution of methyl violet or gentian violet in 100 parts of aniline water and 10 parts of absolute alcohol, then washed in water and placed in the above solution for two or three minutes; they are again washed in water, dehydrated with solution of yellow fluorescine in absolute alcohol (1 gramme in 50 c.c.) and mounted.

† Agar-agar.—A kind of isinglass prepared in Singapore from several algæ.

‡ This organism is non-motile, about 1μ in length, and from ·1 to ·2μ in thickness.

seemed to be double. This doubtless explains how former observers were misled, and described them as *diplococci* or *streptococci*. In hanging drops they were immobile. It was possible to obtain pure cultures, the colonies on agar-agar appearing as minute droplets, clear as water. Apes and rabbits were the only animals successfully inoculated.

Kitasato was unable to cultivate the bacillus in a pure state successfully, until he adopted a method, as yet not published, devised by Koch in his researches on tuberculosis. The colonies when formed agreed with Pfeiffer's description, and a remarkable point about them is that they always remain separate from each other, thus differing from all other known species of bacteria, in which the colonies join together and form a continuous row. Pure cultures were obtained and carried to the tenth generation. After long study with the microscope and by culture of the sputa of tuberculosis, pneumonia, bronchitis, etc., in respect to all the micro-organisms occurring therein, Dr. Kitasato finds the present bacillus to be new in his experience.

Canon's work has been to examine the blood of influenza patients. He invariably found one and the same micro-organism present. Preparations were stained with Czenzynke's solution,* and the bacillus was found in those where the red blood corpuscles were red and the white ones blue. The bacillus also was stained blue and sometimes appeared as a small *diplococcus*, but when more deeply stained as a short bacillus.

Inoculation and experiments with cultivations on animals yielded negative results. Canon is of opinion that this micro-organism occurs in the blood of all persons suffering from influenza (at least, whenever fever is present), and as it is not found in the blood of other persons, and is a form hitherto unknown, he believes that it stands in direct relation to influenza. Koch, having examined some of the preparations, declared the micro-organism to be identical with the bacterium found by Pfeiffer.

Since the publication of the above results Klein (*Brit. Med. Journ.*, Jan. 23, 1892, p. 170) has supplied details of cases investigated by him fifteen months ago. Examination of blood from infected patients showed the presence of bacilli comparing completely as regards thickness, length and polar staining with those described by Pfeiffer and Canon, but some were quite as long as those of the mouse septicæmia. Cultures were made from sputum, and colonies developed like those described by Kitasato. Sub-cultures on agar and on broth soon lost their vitality. All the organisms stained well in rubin (2 per cent. aqueous solution) and in methyl blue or gentian violet anilin water. With a moderately high power the filaments were indistinguishable from *streptococci* made up of *diplococci*, but under an oil immersion lens their bacillary character was manifest, each *diplococcus* being really a short bacillus with a stained granule at each end. The growth in broth is entirely made up of filaments. Inoculation of mice and guinea pigs produced no result.

Cornil and Chantemesse (*Sem-Méd.*, February 10, 1892, through *Brit. Med. Journ.*) have inoculated a rabbit with blood taken from a child suffering from influenza and next day detected microbes, resembling those described by Bates and Pfeiffer in the blood of the rabbit. They were shorter than those of rabbit septicæmia and stained with methylene blue and fuchsin in Zeihl's solution. Their length was about one-twentieth of the diameter of a red blood corpuscle.

A monkey was inoculated from the rabbit and suffered acutely. All experiments confirmed those of previous observers, and tend to show that influenza is an infectious disease caused by a bacterium peculiar in its shape, in its reaction to staining agents and in its method of culture. It can be cultivated slowly in gelose and sugared bouillon at a temperature of 37° C., but it is not easily passed through a series of cultures in artificial media.

C. Bareggi (*Gazz. Med. Lomb.*, Jan. 16, 1892) confirms Pfeiffer's results, and A. Bruschettini (*Rif. Med.*, Jan. 29, 1892) confirms the observations of Canon, stating also that pure cultures of the bacillus may be obtained directly from the blood, which never contains other micro-organisms at the same time.

* Concentrated aqueous solution of methylene blue, 40 grammes; ½ per cent. eosin solution (70 per cent. alcohol), 20 grammes; distilled water, 40 grammes.

A SIMPLE PHOTO-MICROGRAPHIC CAMERA.

Photographic processes are now being so extensively employed for reproducing permanently the magnified images of minute objects as projected by the microscope that it seems desirable to give a description of a simple and inexpensive form of apparatus that may be used without moving the microscope from its *vertical* working position. It has been devised by Dr. van Heurck, of Antwerp, and is preferred by him to any of the more elaborate cameras in use. An amateur accustomed to the use of tools, or any intelligent joiner could make it at a trifling cost. The apparatus consists simply of a rectangular wooden, box, 25 centimetres wide and 50 centimetres long resting firmly on four feet of such length that when in use the tube of the microscope will project some 5 to 10 centimetres into the box through a hole in its lower end. Light-tight connection is made here by means of a short sleeve of black stuff, preferably velvet, attached to the box and slipping over the microscope tube. At the upper end of the camera there is the usual ground glass focussing screen, which is readily replaced by the dark slide containing the sensitive plate. The box is carefully painted dead-black inside and the front opens on hinges, as a door; this is the main distinction from other forms of camera as it is thus possible for the operator, by putting his head inside the dark chamber, to shut off from his eyes all light except that passing through the tube of the microscope, and then focus the image accurately in the usual manner. This done the ordinary ocular is replaced by the projection eyepiece, the door securely closed, and the image focussed upon the glass screen.

If it should be desired to vary the distance of the sensitive plate from the microscope, this may be accomplished by having racks on the inner walls of the dark chamber, into which the focussing screen and dark slide will fit. But Van Heurck finds that for all practical purposes one invariable position for the plates is best. He works with the new apochromatic objectives and compensation oculars, and, by arranging these in various combinations, obtains a series of magnifications up to 3000 diameters. His critical work on diatoms and other minute organisms has all been permanently recorded by means of this camera. The apparatus in a complete form may be obtained from Messrs. Watson and Sons, High Holborn, W.C.

ZANZIBAR AND ITS PRODUCTS.*

The island of Zanzibar is roughly divided into two parts by a range of low hills running from N.N.W. to S.S.E. along its whole length. This natural barrier divides the fertile regions from the stony part of the island. The northern and western portions are extremely fertile, being covered with clove plantations and cocoa-nut palms, whilst the east coast and southern end are quite the reverse, bare summits of sandstone rocks being exposed and having their crevices filled with sharp coral. In this inhospitable region, however, most of the chillies are grown, and it is thought the ground might prove suitable for the cultivation of aloes. The chillies grow plentifully all over the southern and eastern parts of the island and form an important article of export. About half of what are produced are sent to London and the remainder to New York and Marseilles. Cloves, of which four-fifths of the world's crop is produced in Zanzibar and Pemba, yet form the staple item upon which the country may be said to depend. The cultivation has been so remunerative that almost every available acre of ground is devoted to them. But the average price has now (1892) gradually declined to about one-third of what it was, the market is overstocked, and the demand fails to keep pace with the supply. Rather more than half the crop reaches Bombay and New York, whilst London, Hamburg, Marseilles, etc., take the rest. Clove-stems are also exported in quantity as they contain a little oil and are used to adulterate the buds.

Wherever the ground is not cleared for cloves it is usually overrun by a luxuriant growth of aloes and common pine-apples. The leaf of the latter contains a fibre of great strength and fineness which is useful to mix with silk. The *San Severio* aloe also contains a fibre of some value. Vanilla has grown well and freely wherever it has been planted. The priests of the French mission at Bagamayo, on the opposite coast, cultivate it extensively and reap a handsome profit. Copra, the interior portion of cocoa-nuts, is crushed for the oil it contains. Marseilles possesses a practical monopoly of this trade.

Oranges grow in profusion, but are for the greater part wasted. Sago does well, but is not cultivated on a large scale. Cassava or manioc constitutes the main article of native food and is very plentiful, but there has not yet been any attempt to manufacture tapioca from the roots. Some coffee plants were imported and appeared to thrive, but they are now found to be afflicted with the same disease that devastated the plantations of Ceylon.

NORTHERN SENEGA.†

BY L. E. SAYRE.

The geographical distribution of senega has been a subject of a good deal of interest to the members of the pharmaceutical profession and the drug trade for a number of years. Chief among the contributors to our present knowledge of the drug in this particular have been Professor J. M. Maisch and Professor J. U. Lloyd, as will be seen by glancing over the back numbers of the *American Journal of Pharmacy*, 'The Proceedings of the American Pharmaceutical Association,' and other pharmaceutical publications.

Reference has been made to senega growing in Wisconsin and Minnesota, but there has not been very definite information given, I believe, as to its collection or the exact district of country from which it is collected in these States. "Northern Senega" has been a current term meaning a variety of senega having certain physical characteristics very unlike the original Polygala senega. Professor Lloyd ('Proc. Amer. Pharm. Asso.,' 1881), describing this variety—which he says is derived from the North-west from the States of Wisconsin and Minnesota—says it is very large and fleshy, sometimes white, again rather dark brown, the knotty crown measuring often from two to three inches in diameter, even of the dried plant. The root just below the knotty head is (when dry) from the size of the little finger to that of the thumb of a man; six to ten inches in length and generally destitute of keel; not so contorted and branched as the "Southern" senega.

L. L. Dyche, Professor of Zoology and Taxidermy, of the University of Kansas, some months ago made an extensive hunting tour in the North-west, the main point of his operations being in that country lying near the Lake of the Woods. During this hunting expedition he had an excellent opportunity of studying the country, its products and its people. On his return he handed me a root which he thought might be of some interest to me. He said it was collected in very large quantities and seemed to be one of the staples of that country. The natives depending upon its collection as one of the means of subsistence have made this quite an industry among them. There the squaws and the children dig the root, while the "braves" hunt the valuable fur-producing animals. Professor Dyche says that he saw at the different trading posts in Marshall and Kittson counties, in the storehouses, as much as a thousand pounds stacked up in one heap. At a little town, Rocksted, near Thief River Falls, the Indians come in from long tramps of forty miles or more and bring in the fur, skins and this snakeroot. Here they had an immense stock on hand. Since his return, Professor Dyche has received a letter from a trader at Jadis, Kittson County, stating that he has on hand a thousand pounds bagged up, waiting for a fair market price.

The root referred to is undoubtedly a good sample of senega. In length it varies from 4 to 8 inches; in diameter from $\frac{1}{16}$ to $\frac{1}{2}$ inch. Surrounding the root is a dark scar-covered head, having a diameter of from $\frac{1}{4}$ to $\frac{1}{2}$ inch. This head in the case of younger roots is covered with immature pinkish leaf-covered stems. The characteristic keel of southern senega is rarely present, and the contour of the root is much less contorted. The colour ranges from the light yellow of young roots to the dark brown of the older ones.

Near the head prominent annulations are present. These continue with enlarging intervals of space for some distance down the root. Lengthwise the whole root is deeply wrinkled, while frequent warty enlargements occur. The branches are not numerous. In considerable quantities the odour of gaultheria is quite prominent, as it is also in a cold aqueous infusion. The taste is very acrid.

Under the microscope the wood is found to be cylindrical, and the ingrowth of the inner bark on one side which produces the keel of the southern variety is not apparent in a majority of cases. The wood is whitish, ligneous, and occupies about $\frac{1}{3}$ of the diameter of the root.

A sample of the drug was handed to Mr. McClung, one of the senior students, for the estimation of the polygalic acid. He used Quevenne's process, and obtained of the pure acid 3·5 per cent. Methyl salicylate was abundant, as shown by the ferric chloride test.

It would seem from the above that this specimen handed to me by Professor Dyche represented a good sample of senega; its quality, equal to the average root of the market.

I have planted some of the roots, which seem to be full of vigour, and hope to be able at some future time to classify the plant.

---

* Abstract from Consular Report by Mr. G. H. Portal.

† From the *American Journal of Pharmacy*, March.

SYMBIOSIS AND SYMBIOTIC FERMENTATIONS.*

BY PROFESSOR MARSHALL WARD, SC.D., F.R.S.

Mr. President, members of the Institute—In commencing a subject like this, I think, perhaps, the best thing to do is to at once state the facts, and say what I have to say of a more general nature at the end of the lecture. I have, if I can get through it all, a great deal to show you, and perhaps a good deal to say; which is another good reason for occupying no time in introductory remarks.

The idea of symbiosis is not, probably, new to any of you. I may remind you that it means, as a word, and as an idea, simply the living together of living beings. It need not really commit us to any theory as to what these living beings are doing for themselves, or towards one another; but as I go on in the exposition of the subject to-night, I shall show you that the idea of symbiosis has a special and more narrow meaning, as well as a general one, and that it eventually does commit us to some very definite ideas as to the mutual relations between the organisms concerned. Symbiosis, or the living together of, let us say for simplicity's sake, two organisms, may be either temporary, or it may be of a more permanent nature; and in such cases the general result may be for the good of one, or for the good of both. As a matter of fact, the idea of symbiosis is closely associated with the idea of parasitism; and parasitism has become of late years so well known that I need scarcely stop to define it, except to remind you that a parasite is an organism which lives on another organism, or in it; and secondly, that it takes from that organism on, or in, which it lives, certain materials for its own purposes; in fact—there is no getting over the notion—it lives upon the living substance of the host.

We must carefully distinguish a parasite, however, on the one hand from a mere epiphyte, which is receiving mechanical support from this host, such as ivy, mosses, lichens and such like plants; and again, at the other extreme, from a saprophyte, which, it is true, is dependent upon the remains of other organisms for its food, but these remains are dead remains. A saprophyte—a rot organism—at once involves the idea of organic material derived from some other organism, but not the taking of this directly from the living host. Saprophytes at once suggests the antithesis, independent organisms, and in the particular cases that we are concerned with, that of green plants. But here, again, we must be careful of hard-and-fast lines. It is not, strictly speaking, a fact that any green plant is wholly independent. It is perfectly true that the tissues of a plant which is green, so far as they contain the material which gives the green colour (that is chlorophyll), are in a curious way independent of all other organisms. But how about the cells which lie deeper down? Now very often it is not sufficiently clearly pointed out that, so far as these cells which lie below the chlorophyll tissues are concerned, the processes of digestion, the processes of life, and especially the nutritive processes on which life depends, are not at all similar to those special and additional processes by which the plant takes in materials for building up food substances, but are like those which prevail in an animal; it is only that the functions of the green cells have given to the plant, as a whole, a certain independence, upon which we are apt to lay a great deal too much stress, and not that the true digestive and nutritive processes in vegetables differ fundamentally from those of an animal. In a certain sense, therefore, we may put it in this way; those parts of a green plant which do not contain the green colouring matter are parasitic on those parts which do contain it; and more than that—the analogy is perfectly true—they are dependent in the same way on these green cells as a parasite is dependent upon a green plant on which it is parasitic, or as an animal is dependent on food prepared for it by green plants. In the next place I want to remind you that there is every possible stage of parasitism, and it is one of the most remarkable of the modern developments of physiology to find that we are in the difficulty of not being able to draw a sharp line between a parasite on the one hand, and a non-parasite, we will say, on the other. Now parasites may obviously be either animals or plants, and we may have animals parasitic on plants, or plants parasitic on animals, or either parasitic on organisms of like character.

I need not dwell upon all the possible cases, but I may just remind you of such simple instances of animal parasitism as the following. There are some very well-known parasites in the animal kingdom, such as worms in flies, ticks and fleas, tape-worms, land-leeches, etc., on or in vertebrates, and so forth. A curious instance, which perhaps none of you have heard of, I thought of when jotting down these notes. My attention was directed to it by a naturalist in Ceylon. It is that of the existence of parasitic worms in certain house flies, which are often found flitting about the room in a very dazed condition. On examining the proboscis and other parts of these dazed flies, you find certain small worms in them—I only mention the case in passing. To those, however, who want more instances of this kind, I might recommend the works of Van Beneden and other naturalists, which will give you plenty.

As instances of symbiotic parasitism between animals and plants, I should just like to mention one or two curious cases a little more in detail. In certain tortoises there are found green algæ between the flakes of tortoise-shell. In the cases of many crabs, algæ are found to attach themselves to the crabs, and there can be little doubt that the algæ have a certain protective use to the crab, therefore they are allowed to take up this curious position. That is a very simple case of symbiosis in a wide, and rather loose sense. Better still, perhaps, is the curious one of sloths which have algæ parasitic on the hairs with which they are covered. I think there is possibly something in the idea that these green-coloured hairs, grayish-green hairs, do help the animal, at any rate do not hinder it in its instinct for hiding itself, so as to look like a log of a tree. Even if that particular case is not true, there are certainly plenty of cases which would be no less strange. Far more remarkable cases, however, are such as that which was described by Metchnikoff of a parasitic yeast (of all things in the world), a curious yeast which he finds parasitic in the bodies of certain Daphniæ or water fleas. This yeast—I am not going to press its claims as a true yeast—he calls Monospora. Its single spore has a very sharp point, by means of which this curious organism penetrates into the muscles of the daphniæ, and by the mere contraction of the animal's muscles is forced through, and therefore into the body; in the body cavity of the daphniæ it multiplies, certainly in a very yeast-like form, by budding, and it is claimed as a new genus of yeast. This is a case of pronounced parasitism.

Probably by far the most remarkable cases of parasitism, and even of symbiotic parasitism, are those of the bacteria.

First of all I want to emphasize one point. The researches of late years have made it as certain as such a point can be made certain, that bacteria are degraded Algæ. Nay, we can really connect some of the typical ones directly with Algæ; and with plants which would certainly be claimed by every botanist as Algæ; and moreover, there are states linking the two

* Read at a meeting of the Institute of Brewing, January 8. From the 'Transactions of the Institute of Brewing.'

sets of organisms which render it in the minds of modern biologists as decidedly proved as it can be that they are connected. It is rather important to bear in mind the algal nature of typical bacteria, because I shall have occasion later on to draw inferences from it, on which to base another conclusion.

The first remarkable thing about these extremely minute plants—Bacteria—is the variation in their simple forms. I do not dwell upon this, more than just to remind you, that these forms, about which so much has been said within the last two decades, have come of late years to have less and less importance. I am very sorry to say that the fact is undoubted that the mere forms of these small Cryptogams help us so little that we are ceasing to believe in the difference between a rod which is several times longer than it is broad, and a rod which is only twice as long as it is broad, and other morphological differences which fifteen years ago were regarded as important distinctions. Most of these species are perfectly harmless forms, such as are found almost anywhere in nature. There are other differences, however, which tempt us to lay stress upon them: though even these differences are sometimes of very little help to us. Another set of changes which help us in discriminating between these forms is their behaviour in large cultures, where we find in addition to the shapes and colours of the colonies so grown, that there are certain other points to be noticed—*e.g.*, as to whether they liquefy the gelatine on which they are growing or not. These characters, combined with a number of facts about temperature, help us immensely. But the only decisive method for the identification of a bacterium (and I should like to lay stress upon this) is the cultivation of it under the microscope, and continuously under the eye of the observer. When a colony, on gelatine or some suitable solid medium, of a certain small size has been obtained, it is possible to transfer from that a pure culture which may then be made to grow in the mass. Only on such evidence as the above can one really rely.

Apart from such extreme cases of parasitism of plants in animals as illustrated by the bacteria, to which I shall have to return later, the parasitism of animals on plants leads to some very curious instances of symbiosis. Let us turn for a moment to some of the higher plants. For instance, we might have a case like that of the phylloxera, or of certain gall-insects. These I shall not dwell upon at great length. I might remind you, however, of the whole category of cases depending on the relations between insects and flowers, examples of which are well known to everybody; but I only just select one or two examples, because they are too interesting to pass over.

One is described by Kerner. There are certain composite plants the inflorescences of which in the bud stage, before the flowers are open, are remarkably succulent. The head, on which the flowers stand, may be compared to that of an artichoke. Now, the tips of the bracts which protect the young flowers at this particular period, and at no other, secrete large quantities of honey. This honey is so tempting to beetles, and to some particular kinds of ants, that they fly to or climb on these heads, and Kerner states that the ants will fight to the last moment to prevent the settling of one of these beetles on the flower-heads; and not only will they attack the winged enemy, but they will squirt formic acid on to the beetles. As soon, however, as the budding period is over, and the flowers are safely opened, the tissues are already too tough for the beetle to care for them at all; the bracts then cease to secrete the honey, down climb the ants, and the plant goes on flowering. This, it seems to me, is a case of temporary symbiosis of an instructive kind.

There is another case, one even more remarkable. You all of you know the yucca, or lily-like flower; at any rate, I need not describe it in detail. Now Riley, an entomologist of remarkable energy in America, has made out a very curious story about this yucca. In England we do not obtain seeds of this plant as they do in America; but in their native land the seed vessels containing the ripe seeds invariably have their walls pierced with holes. There is a certain small night-flying insect, *Pronuba yuccasella*, which has a habit of carrying pollen from the yucca, and it has under its proboscis certain of its mouth parts changed into a curious prehensile organ. This prehensile organ is used to carry the pollen. The insect passes to these flowers, steals pollen from the anthers, and then goes and plants the pollen on the sticky stigma. It is a most extraordinary case indeed, and one does not see any meaning for it at first. But it is found that the insect pierces the ovary, and lays one or two of its own eggs inside the young ovary. Those eggs hatch out larvæ; these larvæ destroy, out of 200 ovules in the ovary, a few—say 16 to 20—and use them as food. The life of the insect is shown by Riley to be most beautifully balanced with the period of the opening of these flowers; and there can be no doubt that in return for laying on it this pollen, the yucca easily sacrifices a certain number of these potential seeds, on the condition, as it were, that many of the remainder shall be ripened by changes ensuing on the advent of that pollen. There seems to be no doubt of this, and you must admit that it is a curious case.

I daresay all of you know that in fig-growing countries they have two different stocks of figs, one which bears the main crops, and one which is barren and of which they employ as few as possible. Now, of these barren figs, which they call *Caprificus*, they take branches and hang them among the fertile fig trees, in the belief that the crop really depends on some effect which the barren figs exerts on the others. If we examine the structure of the fig, we shall notice that these female flowers below ripen long before the male flowers above; in fact, the pollen does not come out of the male flowers until the female flowers have finished their growth and life-work, and are developing the true fruits—the minute seed-like bodies in the ripe fig. A certain small insect, a wasp as a matter of fact, makes its way through this aperture at the top of the young fig, and leaves its egg in the ovary of a female flower. The ovary in which it lays its egg has a very short style, much shorter, as you see, than that one. The wasp can easily lay its egg there, and the irritation set up results in the development of a very curious little gall, which now has a young wasp in the interior. There are some specimens where all these female flowers are sacrificed in this way to the attacks of these insects; these are the barren figs—the *Caprificus*. When the proper time has elapsed, the newly-escaped insect creeps out through the top; but by this time the pollen is ready, and as the insect creeps out through this nook it covers itself with pollen. By this time the true figs are ready to receive the insect, and the insect creeps into these. Well, you would possibly expect that it would lay its eggs in the ovaries and produce the same mischief in the same way. This particular variety of fig—the fertile or true fig—however, has a long style which is bent like a hook, and actually prevents the insect from putting its eggs exactly in the right spot, and very few of these eggs are successfully or properly laid. The consequence is that the insect dabbles pollen all over the styles of the female flowers in this fig, but does not cause them to develope into galls. You see where the compensation comes in and how the fig gains in the struggle for existence, by constantly having a large number of its flowers cross-pollinated, in return for the sacrifice of a comparatively small number of certain kinds of figs, and how in the main it is best for

the stock. That is again a case of symbiosis between animals and plants.

Now I will pass from the case illustrated by these examples to just one more, as a final example of symbiosis between animals and plants, and it will show you how very careful we have to be in investigating these cases. There are in certain parts of the world some curious epiphytic plants with tuber-like swellings, as was discovered long ago by Rumphius, by Forbes, and others, and which are filled with galleries, and these galleries were found by the earlier travellers to be filled with living ants. For many years observations kept increasing, which showed that ants really were living in these galleries, and that these tunnelled swellings were in appearance veritable ants' nests. The ants, moreover, seemed to protect the plant; if you came anywhere near it, they simply swarmed out of the galleries until you left it alone. On going very closely into the matter, however, it was found that in the young condition of the plant the galleries were not occupied by the ants at all. The ants had nothing whatever to do with the formation of the galleries; for, on germinating the seeds in countries where there were no ants at all, these tunnelled tubers were still formed. Quite recently the story has become clearer. It appears that these plants form the tubers on their own account, and that the galleries are filled with water, and in reality, so far as the primary wants of the plant are concerned, the ants merely invade old water-chambers. The ants, however, take the ground, and we are at present not quite sufficiently informed as to whether ants really are doing anything in return for these plants or not. I would not have mentioned this debatable point, but I do so because I think you are almost sure to have heard of these myrmecophilous plants. Curiously enough they are not confined to one natural order, but they are found in several different groups of plants; and even if the ant is not doing anything in return for the shelter that it is enjoying, it looks very much as if it ought to. Whilst a few years ago I have no doubt from the information which was then to hand, I should have boldly said that these ants had established symbiotic relations with the plants; at present I should like to be a little more cautious in putting forth any theory as to the origin and meaning of these galleries.

The foregoing cases are sufficiently clear to establish, I think, the general fact of symbiosis at some time between animals and plants. An instance which illustrates very clearly the parasitic and symbiotic dependence of certain parts of a plant on certain other parts of the same plant, is the following: a bud of a gourd was allowed to pass into a dark box, and to grow there, a box in which no light could enter. After a time, in this particular instance, the bud at the end of the shoot was allowed to come out to the light again, and then the contrast could be at once seen between the part of the plant grown in the dark and that growing in the light. Flowers form in the dark on such a plant as that, and provided it is still attached to these green leaves, and provided you remove the pollen from the stamens of one of the flowers to the stigma of another, you can get ripe fruit. If, however, you arrange this experiment so that those parts of the plant in the dark are not in connection with the green leaves in the light, that experiment will fail, however much care is taken. The shoot in the dark is thus, although part of the same plant, parasitic on the parts in the light, and if it were not part of the same plant we could say it was symbiotically connected with these green parts.

In other cases, such as the germination of seedlings of higher plants, and still more, the germination of what corresponds to seedlings in certain lower plants (especially ferns and their allies), it is brought out still more clearly, that the individual, which will become the next plant, is attached to portions still alive of the parent plant, and is parasitic upon such portions. In all these cases the same thing comes out, and it is particularly well shown in the germination of the mangrove. In this case we have candle-like seedlings, or embryos hanging from the branches, which are really embryos growing in mid-air, still attached by their absorbing ends to the endosperm of the plant: and after a certain time this long root-portion, with its short stem-bud, separates from the fruit and seed, and plunges down like an arrow into the mud of the lagoon, in which the mangrove is growing. For weeks, nay, as far as I know, for months—it is attached in this way to the endosperm of the parent plant, just as the young fern-plant is nursed by its prothallus. It is living as a parasitic plant, as it were, on its own parent. These cases, I think, will do to illustrate that point.

Now take the next one. In a very large number of cases in the vegetable kingdom, we find that plants which have long been thought to be independent are not really so; but that if you carefully dig down among the roots, and lay the roots bare, you find that these plants have their roots attached to the roots of plants around them. For a long time this connexion was thought to be more or less of the nature of an accident; but on going more carefully into the matter it was found to be certainly not an accident. The root of the plant I am speaking of grows partially round this root of its neighbour as a sort of swelling, and if you cut a careful transverse section of this root, at the point where the swelling is, you will find that there is absolute continuity between the tissues. The plant is, as a matter of fact, partially parasitic on the plants around it, and robs them of certain of their acquired materials. There is no necessity for detailed description of these plants, many of which are allied to the Scrophulariæ, the case is so common; a few years ago I should have had to say it was more or less exceptional; but of late years it has been found to occur very frequently. These root parasites, as I may call them, vary in detail very much indeed, but this illustration will do for the general case.

The well-known mistletoe is another illustration of symbiotic parasitism. As a case in point, the mistletoe is spread, by means of the berries, by birds. The young mistletoe plant grows symbiotically attached to the maple, poplar, and various other plants. Although the leaves of the mistletoe are green, it is perfectly certain, from the anatomical continuity of the tissues and other facts, that some materials pass from the host plant into it. Notwithstanding this, the mistletoe does not necessarily kill the plant; but this is what it does. A swelling, which is an expression of the effect produced by the abnormal condition due to this case of parasitism, takes place at the point of attachment: all such cases show (and also similar results in the animal kingdom, by the way) that this part of the host is acting as a centre of attraction of food materials, and the consequence is that the tissues at this spot are so well supplied with nutritious substances that these parts become unusually corpulent, and Bonnier has just shown experimentally that such is the case; but he has also shown that during part of the year the mistletoe actually supplies food materials back to its host. If we take a section through a part of a stem showing the connection between the mistletoe and its host plant, we shall find the mistletoe sending out its roots underneath the cortex of its host, which has been stripped off. These still younger rootlets are developed year by year as the branch grows thicker. Here is an exquisite case of fairly well-balanced symbiosis between the mistletoe and its host plant. Moreover, if you compare the cases of other plants of the group to which the mistletoe belongs, you find stages of intensity of the parasitism.

But this is much the better one to illustrate symbiosis, because the actual damage done to the host plant for the time being is slight, and in a certain sense the local swelling produced on the branch may be looked upon as for the temporary benefit of the tissues of the host; only it may not be for its final good, it is only for its temporary enjoyment, as it were. I will pass on to another set of cases, which bring before us symbiosis in its most exquisite and its real sense, as the centre on which the whole doctrine is founded.

It is unnecessary to do more than remind you that on rocks, and on the soil and trunks of trees in woodlands, and so forth, you may see lichens of various shapes, very often brightly coloured, but nearly always with some green about them, of which some of the most beautiful examples are found in tropical forests. There are also many epiphyllous tropical lichens, which grow on leaves. Apart from other questions, we might very fairly raise one as to whether the coating of lichens on the upper parts of these leaves may not be of some indirect use for softening the light, and affecting the exposure of the leaf to intense solar rays.

Now, if you cut into one of these lichens and examine its structure, you will find in it certain clusters of green cells, which are so remarkably like certain algæ that you could not possibly overlook the resemblance, and these green cells are embraced by networks of delicate filaments, resembling fungus. If you rummage about in spring, especially on old palings, or brick walls, you will nearly always find a quantity of powdery substance, some brown, some blue, or red, and you will find they consist of a number of green algæ with fungus filaments entangled amongst them. Some years ago, about 1858, De Bary suggested that in certain cases, at any rate, these were incipient conditions of lichens, and were really nothing less than fungi establishing symbiotic unions with distinct and specific algæ. Schwendener, who was much bolder, not to say more rash, jumped to the conclusion that lichens were really all of this nature. He was thought to be in too great a hurry, but subsequent events proved that on the whole he was right. The fact of the matter is that since that time Bornet and a number of other observers have shown that if you take lichen for lichen, and examine their structure and biological properties of the green cells, and of the colourless filaments surrounding them, it is possible to recognize the algæ and fungi composing the lichen. But that is not all. Starting with certain definite algæ, Bornet has actually synthesized lichens by sowing them in company with certain fungi—has actually biologically synthesized the lichen again. That, I think, is sufficient to establish my point—namely, that you have here a remarkable case of symbiosis between algæ on the one hand and fungi on the other. The algal cells provide materials which the fungus undoubtedly needs; the fungus again spreads out the algæ in a thin moist layer, well sheltered and equally exposed to the light, and thus exposes the algæ to circumstances favourable to assimilation. There is now no doubt whatever in the minds of scientific botanists that this is a right view of the matter. Moreover, it is permanent symbiosis of the best possible kind. In a sense, you may say the evidence points to parasitism; but bear in mind that is not a case of mere parasitism. The beauty of it is that when the algal cells are attacked by the investing fungi, they form larger, finer, and greener cells. On the other hand, with some of the fungi, at any rate, we cannot grow them to anything like perfection, unless they are thus attached to these algæ. This case, then, which is one of the most interesting cases I know of, may be considered as established.

(*To be continued.*)

A SIMPLE METHOD OF DRAWING MICROSCOPICAL PREPARATIONS.*

BY A. HOPEWELL SMITH, M.R.C.S., L.R.C.P., L.D.S.

There has always been a certain amount of difficulty attending the use of the camera lucida, or Beale's neutral tint reflector for the above purpose. The twisting of the head into an uncomfortable position, the great fatigue to the eyes, and the by no means easy task of viewing both image and pencil at the same time, add to the troubles of making a faithful likeness of the object on paper.

To those especially who do not possess a camera lucida, or Beale's instrument, and to microscopists generally, I recommend the following arrangement of ordinary apparatus:—The microscope body is placed in a horizontal position, and the mirror removed from its substage attachment. The microscope slide having been placed on the stage, the illuminant (lamplight for choice) is "condensed" on the slide by means of a "bull's eye" in the same way as for photo-micrography. Care must be taken to "centre" the light. The concave mirror is then attached to the front of the eye-piece of the microscope by a piece of thin wood or a spring, and has its surface at an angle of about 45° with the plane of the anterior glass of the ocular. The image is thus projected on to the paper beneath. No distortion will occur if the outer ring of light is *perfectly* circular. A dark cloth, such as photographers use, is thrown over the draughtsman's head, and also the body of the microscope, and all light excluded save that through the microscope lenses. Any section can thus be easily, rapidly, and comfortably drawn, and accurate representations of objects magnified up to 500–600 diameters can be obtained.

DISPENSING LIQUIDS IN CAPSULES.†

BY C. CARROLL MEYER, PH.G.

The appliances necessary are a minim measure, a pipette, a camel-hair pencil, and an empty shallow straw or cardboard box, a tooth-brush box for instance, to make a holder in which to place the capsules. First punch holes in the box, the exact size of the capsule to be used, from half to one inch apart. If of a mechanical turn of mind the pharmacist can also utilize a cigar box. If minims be ordered, drop in the capsule carefully from minim measure. If the prescription calls for drops use a pipette, being careful in all instances to get the liquid *inside* of the capsule and not on the outside. Then take the top or cover of the capsule, moisten this slightly inside with warm water, using a camel-hair pencil, place the cover or top on the filled capsule, roll slightly with top up between thumb and first finger for several seconds, press gently but firmly together. Place the capsule in the holder to dry and set the holder in a cool place until the joints are tight. In my experience I find that volatile oils, etc., work better if mixed with an equal quantity of a bland fixed oil, *i.e.*, refined cotton-seed oil, or the so-called olive oil.

Points to be observed: Care must be taken to keep the liquid from the outside of the capsules. If the liquid gets on the outside, throw the capsule away and take a new one. Measure the volumetric capacity of your capsules and always *use a capsule that holds an amount in slight excess* of that required. As far as possible, a minim measure should be used.

---

* From the *Journal of the British Dental Association*, February 15.

† From the *American Journal of Pharmacy*.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, MARCH 26, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

CORONERS AND THE PHARMACY ACT.

AN inquest held last week at Salcombe, of which a report appears at page 806, furnishes striking proof of the need for a better acquaintance with pharmacy law on the part of those who are specially subject to its provisions. From that as well as another inquest reported at page 806 it will also be seen that coroners and their juries sometimes stand equally in need of a better knowledge of the law. It may be taken for granted that the death of the person who was the subject of the inquest was mainly due to the effects of poison ; but so far as can be gathered from the evidence given at the inquest we are unable to perceive that the poison causing the death was obtained under conditions that would be more censurable than the sale of a razor or a pistol, supposing the death had been caused by those weapons. In fact it was not even an ordinary case of sale, by which the poison was obtained; for it was obtained in the form of medicine prepared according to the prescription of a practitioner said to be well known in the locality. We may therefore leave out of consideration altogether the provisions of the Pharmacy Act as to the precautions to be observed in the ordinary sale of articles that are poisons within the meaning of the Act, inasmuch as those provisions have nothing to do with the case now referred to. In the supply of medicine according to prescription, which constitutes the special business of a registered chemist, there is no doubt in one sense a sale of all the ingredients contained in the medicine, but having regard to the circumstances under which that kind of sale takes place, the Act provides that in such cases the precaution of the "poison" label required in ordinary sales shall be omitted. It is unnecessary now to inquire into the reasons for this exception. They are sufficiently obvious, and it is sufficient for our present purpose that they are recognized by the law. But it appears that the person upon whom the inquest was held had been for some length of time taking the medicine in question, and that three bottles of it were supplied to her on the Monday preceding her death. As to the propriety of this there may be differences of opinion ; but the point to which we would direct attention is the fact that there is not, in the Pharmacy Act, any provision relating to such a proceeding. As a matter of fact, the vigilance exercised by chemists is often in excess of what the law demands, and it sometimes happens that medical men complain of its exercise. The correspondence which has lately appeared in this Journal and in medical journals illustrates the difficulty in which chemists may be placed in regard to satisfying the demands of their customers, and the popular opinion, favoured by medical authorities, that a prescription is the property of the person to whom it is given, considerably increases that difficulty.

From this point of view a prescription is a medical authority for the supply of whatever may be ordered in it, whether that be poison within the meaning of the Pharmacy Act or not, and if the owner of the prescription demands to be supplied with three bottles of the medicine at once it is difficult to say how far the chemist would be justified in refusing to comply with the demand. In the case now referred to the demand was complied with, and in all probability the subsequent misuse of the medicine led to a fatal result. So far as the Pharmacy Act is concerned there was not, however, any ground for censuring the chemist who supplied the medicine. The assumption of the coroner that because the medicine contained laudanum it should therefore have been labelled "poison" is a totally erroneous one, and it is evidence of a want of acquaintance with the provisions of the Act which, in a coroner of all persons, is scarcely conceivable, especially in regard to an Act of Parliament that was passed mainly in the interests of the public. But according to the report of the case that was the position taken by the coroner, and it was upon that untenable ground he censured the chemist. We cannot refrain from expressing the opinion that this was a great injustice, and it may be added that if Mr. STEWART had been himself better acquainted with the Pharmacy Act he would have been able to show that he was not properly subject to the censure which the coroner passed upon him. This proves how important it is that chemists should have a thorough knowledge of the law affecting them, and thus be enabled to defend themselves with efficiency. The mere plea that it is not usual to label medicines "poison" can be of little avail in reply to the charge of an assumed breach of the law. If coroners misread the Act it is all the more essential that chemists should have a correct knowledge of it, or there can be no telling how far their interests may be damaged.

It is remarkable that in this case so much stress should have been laid upon the laudanum which the medicine contained—two teaspoonfuls in each of the three bottles—and that at the same time no

mention should have been made of the hydrocyanic acid, amounting in the three bottles to upwards of one drachm. Judging from the medical evidence relating to the *post mortem* examination it seems probable that the hydrocyanic acid may have had much more to do with the death than the laudanum, since it was attributed to failure of the heart's action. But as that ingredient of the medicine was not mentioned by its popular name of prussic acid, and the term hydrocyanic acid does not appear in the poison schedule of the Pharmacy Act, the fact that the medicine contained a much more potent poison than the laudanum appears to have been quite overlooked by the coroner and the jury. This circumstance does not, however, affect in any way the view above expressed as to the absence of any ground for censuring the chemist who supplied the medicine. Nor does it justify the assumption that the provisions of the Pharmacy Act were disregarded. As a matter of justice to Mr. STEWART we feel that it is right to point this out, and we desire to express our sympathy with him. Chemists generally will do well to take warning from this case and direct their attention to the study of the Pharmacy Act in all its details, so that they may in case of need be prepared to rebut erroneous imputations when they are not really blamable. In the other case above referred to there appears to have been an equal absence of any ground for the remarks made by the jury, and instead of their being endorsed and emphasized by the coroner, it would have been more appropriate for him to have given a correct explanation of the real facts of the case. If it can be shown that there is need for greater restriction of the supply of laudanum, and chemists are duly authorized to exercise their discretion in that respect, we do not doubt that they will be found ready to give their support to any measures having such an object. But it is monstrous that they should be held up to opprobrium by an important public officer when there has not been any disregard of the law. More especially is that the case when it is considered that under somewhat different circumstances a chemist's refusal to supply a potent medicine might have been, with some reason, regarded by a coroner as disgraceful.

PHARMACOPŒIAL FORMULÆ.

IT may be assumed that the main object of the compilers of a national pharmacopœia is to ensure uniformity in the processes by which drugs are prepared for use, so that physicians prescribing a drug in any particular form may be assured that their patients will have their prescriptions dispensed as faithfully and exactly in one part of the country as in another. It is only by such uniformity that acquaintance with the real value of drugs can be made. Comparisons are obviously impossible if there be not at least one constant factor, and in the treatment of disease by means of drugs it is the latter which must constitute this factor. The human organism is much too variable a quantity, and probably no disorder attacks two individuals in precisely the same manner. Hence, unless medical men can be assured of the invariable composition of standard remedies, it naturally follows that progress in the healing art by their means will necessarily be checked.

From time to time discussions have arisen in our pages concerning the causes of failure or discrepancies of results when some preparation has been made according to the formula given in the British Pharmacopœia. Recently, the official solution of hydrochlorate of strychnine has been the subject of much criticism, and correspondents have formulated various hypotheses, to account for the deposition of crystals when the solution is kept. These critics agree as to the non-stability of the preparation, but their theories and arguments differ amazingly. On the other hand there are not wanting those who say that the solution is perfectly stable when properly made and kept. At first sight the differences of opinion appear too great to be reconciled. But it may occur that it is quite within the range of possibilities that "in strict accordance with the B.P." may not mean one and the same thing to everyone concerned. For instance, passing over Mr. TURVER'S suggestion that the solubility of the alkaloid may be affected by age, it is fair to ask if the water used is always distilled water, answering to all the official tests, if the rectified spirit is strictly of the specific gravity 0·838 and otherwise correct, and if the dilute hydrochloric acid is invariably mixed according to the B.P. formula with strict attention to the temperature and specific gravity? If all these conditions are fulfilled possible causes of error may still remain. An individual who has benefited by a scientific training and intends making use of any recipe presumably considers that recipe in a rational spirit and reflects what it is he wishes to accomplish and how he may best affect it. In this particular instance it is required to dissolve and hold in solution crystals of strychnine by means of the specified liquids. Definite quantities and instructions being given it is, in the first place, specified that the acid must be mixed with one-third of the water and the strychnine dissolved in the mixture by the aid of heat. It should be perfectly evident that the heating should be limited to the smallest practicable amount, and that if the acid be of any use at all, it should not be allowed to escape by volatilization during the process. That little heat is considered necessary is evident from the fact that the direction to add the spirit is not preceded by any caution to cool the solution. As a slight rise of temperature will again occur here, further care will be necessary to avoid the loss of volatile sub-

stances. Finally, after adding the remainder of the water, it is directed that the solution should not be kept in a cool place. It would be well were all those who have experienced difficulties in this process to repeat their experiments, and more carefully check their methods as well as their results. Though it is suggested that there should be liberty to deviate from the official process, provided the resulting preparation has the official composition, yet it is quite reasonable to suppose that very slight deviations from the authorized methods may lead to inaccurate results.

If, however, it should prove that, working with a strictly pure alkaloid and with faithful adherence to the official instructions, it is yet impossible to secure a preparation of constant strength under all the varying conditions met with in retail pharmacies, the results of the investigations will be of much service to the revisers of the Pharmacopœia. The disturbing cause in that event will probably be the approach of the quantity of alkaloid to the saturation limit, and the obvious remedy is to reduce this quantity. We would reiterate that there is no special virtue in the 1 in 100 strength of this and various other solutions. A much more rational principle to adopt would be that there should be a standard dose for the alkaloidal solutions, so that, say, ten minims of each should represent the maximum dose of the respective alkaloids. One certain result of the adoption of this plan would be the greater ease with which the dosage would be remembered by prescribers and dispensers alike, to say nothing of the advantage of having greater uniformity between the doses of powerful drugs and their preparations. The slight inconvenience caused by the change would be but temporary, and would be more than compensated by the knowledge that the solutions might safely be expected to remain of a definite composition.

THE KEW BULLETIN.

The *Times* of last Tuesday reports that there is some reason to fear a discontinuance of the work, published under the title of the *Kew Bulletin*, consisting of miscellaneous information relating to economic botany, which has become a prominent feature of the work done by the important national institution under the directorship of Mr. Thiselton Dyer. The reason assigned for such a step is that the proceeds of the sale of the *Bulletin* do not quite cover the cost of its production, and it is inferred that in the eyes of a considerate Treasury such a state of affairs may appear to involve too great a burden upon the British tax-payer to admit of being continued. We trust, however, that this is a mistaken inference, and that the great value of the *Bulletin* as a means of collecting and disseminating information upon subjects which are of vast importance to commerce and British enterprise, will not be altogether lost sight of. The *Times* bears ample testimony to the utility of the publication, which will be endorsed by everyone capable of forming an opinion, and the arguments brought forward in favour of its continuation, even at some considerable expense, appear to be unanswerable.

The *Pall Mall Budget* of the 3rd inst. contains two excellent illustrations of the life-size studies of lions made by Landseer at the Zoological Gardens for the bronze statues in Trafalgar Square. These paintings were bequeathed by the late Mr. Thomas Hyde Hills to the National Gallery, and have recently been hung upon its walls. In connection with this circumstance the *Times* publishes the following letter, which will be of interest to the readers of this Journal as showing the friendly relations existing between the artist and Mr. Hills :—

"St. John's Wood Road, N.W., March 11, 1869.—Dear Hills,—I know you like water better than oil. In spite of your love of paper-staining I venture to beg your acceptance of oil studies, which you will receive as old friends from the Zoo! In some respects they will recall the interest you took in my labours for the Nelson lions, and I hope will always remind you of my admiration for your kindly nature, both to man and beast, to say nothing of my endless obligations to your unceasing desire to aid a poor old man nearly used up.—Dear T. H. H., ever sincerely yours, E. Landseer."

We may take this opportunity of mentioning as another instance of the artistic tastes of pharmacists that one of the attendants at the National Gallery who may frequently be seen there engaged in copying Landseer's picture entitled "Dignity and Impudence," which was bequeathed to the nation by Jacob Bell, is Mr. John Turner, the Society's Local Secretary at Aylesbury, who has, after conducting a country pharmacy for the last thirty-five years, retired from business, and now devotes his time to artistic pursuits, which we understand have always had a great attraction for him.

The next evening meeting of the Pharmaceutical Society at Edinburgh will be held on the 30th inst., in the Society's House, 36, York Place, at 8.30 p.m. The chair will be taken by Mr. J. Laidlaw Ewing, and papers will be read on "Kola as a Dietetic," by Peter Boa; on "Liquor Strychninæ Hydrochloratis, B.P.," by William Duncan; on "The Solubility of Acid Sulphate of Strychnine," on "Sodium Arseniate," by George Coull, and "Improved Formula for Injectio Morphinæ Hypodermica," by J. G. Sharp, M.B.

* * *

In connection with the report of the Sheffield Pharmaceutical and Chemical Society (see page 803) it will no doubt be an encouragement to local secretaries to mention that Mr. Ward's endeavours to promote the consolidation of the trade have had the effect of inducing twenty persons from his district to join the Society either as members or associates.

* * *

The Pharmaceutical Football Club closed a successful season by the annual dinner held at the Holborn Restaurant on March 18. The chair was taken by the President of the club, Professor Attfield, who was supported by the President of the Pharmaceutical Society and several of the professors and officers. There was a large attendance, and the proceedings were of a pleasantly varied nature.

* * *

We have to record the death of Mrs. Eliza Brown, an annuitant on the Benevolent Fund, which took place on the 15th instant. Mrs. Brown was in her 63rd year and was elected in 1890.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of this Association, held at 103, Great Russell Street, on Thursday, March 10, Mr. W. Lloyd Williams, A.I.C., President, in the chair, a lecture was delivered on—

Recent Researches on the Oxides of Phosphorus.

BY T. S. DYMOND, F.I.C.

Though it has long been believed that phosphorus oxide is produced by the slow combustion or phosphorescence of phosphorus and phosphoric oxide by the rapid combustion, the reverse is now found to be the case; during the phosphorescence of phosphorus in air, at the ordinary temperature, phosphoric oxide is the only product. Phosphorus oxide is formed when the temperature is high enough for the phosphorus to be able to act upon the phosphoric oxide first produced, and this takes place to the greatest extent when phosphorus burns in a limited amount of air. In excess of air phosphoric oxide is, of course, alone formed.

By taking advantage of this reaction Professor Thorpe and Mr. Tutton have prepared phosphorus oxide in a pure state (*Chem. Soc. Journ.*, xlvii, 545, and xlix., 1019). The apparatus employed is so arranged that the products of the combustion of phosphorus in a rapid current of air are passed through a brass condenser heated to 50° C. and then through a glass U tube cooled to 0°. In the glass tube used for the combustion of the phosphorus a large amount of the red sub-oxide collects, phosphoric oxide is deposited in the condenser, while the volatile phosphorus oxide is condensed in beautiful crystals in the U tube, three out of the four known oxides of phosphorus being thus produced in the experiment.

Phosphorus suboxide, P_4O, closely resembles amorphous phosphorus in appearance. After washing in turn with water, alcohol, and carbon bisulphide it is found to be a tasteless and odourless substance, readily burning in the air with formation of phosphoric oxide, yielding phosphoretted hydrogen when warmed with solution of potash and reducing a solution of ammonio-nitrate of silver.

Phosphorus oxide has hitherto been described as a white amorphous powder which instantly combines with water, forming phosphorus acid, but Professor Thorpe and Mr. Tutton have found the pure oxide to be a crystalline solid melting at 22°·5 C. and boiling at 173° and having a peculiar pungent odour. The molecular weight, whether calculated from the vapour density, as determined by Hofman's method, or from the depression of the freezing point of benzene, as determined by Raoult's method, is 220, and the molecular formula is therefore P_4O_6, and corresponds with arsenious and antimonious oxides.

The oxide is not energetically attacked by water nor by solution of caustic potash even when warm enough to melt the oxide, but it very slowly dissolves after long standing, forming the corresponding acid and its potassium salt. It is, however, rapidly attacked by hot water, but with the formation of phosphoric acid together with phosphoretted hydrogen and amorphous phosphorus or the red suboxide, the decomposition being essentially the same as that occurring when phosphorus acid is heated. The phosphorus in the acid is usually supposed to be trivalent, but it has been determined to be quinquivalent in the oxide.

Phosphorus oxide undergoes spontaneous oxidation in the air, and, like phosphorus, exhibits a glow, but only under reduced pressure at the ordinary temperature of the air.

When the temperature is raised the glow is produced under a less reduced pressure, showing that it is the vapour of the substance which undergoes oxidation. During the slow oxidation of phosphorus ozone is formed, for a molecule of oxygen must be split to provide the five atoms that are required to combine with two atoms of phosphorus, the oxygen atom at once uniting with a molecule to form ozone. During the slow oxidation of phosphorus oxide no ozone is formed, for the molecule P_4O_6 unites with two molecules of oxygen to form $2P_2O_5$, and no atom of oxygen is liberated.

Exposed to diffused daylight phosphorus oxide becomes yellow and red, owing to decomposition into phosphoric acid and phosphorus. If the oxide is sealed in a vacuous tube and exposed to light, while this change is taking place, large transparent crystals of the phosphorus oxide collect on the side of the tube nearest the light, and these are perfectly stable. When these crystals are melted, and re-solidify in the ordinary crystalline form, they are again acted on by light. It appears that the stability is in some way dependent upon the character of the crystals.

When phosphorus oxide is heated to 400° C. in a sealed tube, colourless, deliquescent crystals of *phosphorus tetroxide*, P_2O_4, are obtained. This is a phosphorus-phosphoric oxide, combining with water to form phosphorus and phosphoric acids, just as nitrogen tetroxide unites with water at low temperatures to form nitrous and nitric acids. A hypophosphoric acid has been prepared by Salzer, by half immersing sticks of phosphorus in water, having apparently the formula $P_4O_4(OH)_8$, of which the tetroxide might be regarded as the anhydride. This is, however, not the case; for the properties of this acid are entirely different from those of a mixture of phosphorus and phosphoric acids, into which the tetroxide passes by the addition of water.

During the lecture phosphorus oxide was prepared by the method described, the apparatus employed being similar to that used by Thorpe and Tutton. The properties of the phosphorus suboxide and the phosphorus oxide obtained were demonstrated by experiment.

The President (Mr. W. Lloyd Williams), after commenting upon the graphic manner in which Mr. Dymond had placed the subject before them, said he had been most interested by the reference to the new methods of examining chemical compounds. The results of these recent researches would make it necessary to reconsider this subject from a totally different standpoint.

Mr. F. C. J. Bird asked what was the valency of phosphorus in the substance having the formula P_4O and its graphic formula? The black and white deposits which formed on sticks of phosphorus when kept under water were little understood; had any idea been put forward as to their composition? The combination of the phosphorus oxide with water, he understood, caused a change in the valency of the phosphorus atom.

Mr. Parry said he had listened to Mr. Dymond's paper with considerable pleasure, as inorganic chemistry was so often neglected. He thought that the great value of Thorpe's paper lay in its being an aid in understanding the position of phosphorus in the natural system. This was especially seen in the doubling of the old formula for phosphorus oxide, so that it presented a remarkable agreement with antimony, arsenic and bismuth. At the same time it was noticeable, as Adie and Thorpe had shown, that P_4O_6 did not form a compound with SO_3, whereas nitrogen, bismuth, arsenic and antimony all formed more or less stable compounds with this oxide. He did not believe that the formula for nitrogen trioxide would be doubled; they must not draw too many analogies between nitrogen and phosphorus, for they occupied

slightly different places in the natural classification. As to the formula for phosphorus acid, he had heard Mr. Tutton state that he and Professor Thorpe had no evidence as to its constitution, whether it were a trihydroxy or an oxy-di-hydroxy compound, but they had prepared from the oxide the di-amide of phosphorus acid $HO{\cdot}P<^{NH_2}_{NH_2}$.

Mr. Garnett remarked that a great many misstatements occurred in text-books with reference to phosphorus oxide. For instance, in one book of note it was stated that though it was not an anhydride, it combined violently with water. It would be interesting to know if phosphorus acid existed in three modifications analogous to the ortho, pyro and meta-phosphoric acids. Was there any evidence of the existence of the anhydride of hypophosphorus acid, P_2O.

Mr. Dymond in replying said that the black deposit observed on sticks of phosphorus was due to the presence of copper. The white crust consisted of a distinct allotropic modification. The phosphorus molecule might be represented by the formula $\begin{matrix} P{=}P \\ \| \quad \| \\ P{=}P \end{matrix}$, and the constitution of the oxides, by inserting oxygen atoms between the atoms of phosphorus. It was still undecided whether the phosphorus was triad or pentad in phosphorus acid, but the extreme slowness with which the oxide dissolved in water to form the acid suggested the idea that the phosphorus atoms might be undergoing conversion from the pentad to the triad state. There was at present no evidence as to the molecular formula of nitrous anhydride. The great instability of the compound pointed to the molecule being a complex one. At present only two members of the series of phosphorus acids were known. The hypophosphorus anhydride had not been prepared.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting was held on Thursday, March 17, Mr. H. Garnett, Vice-President, in the chair.

A paper was read by Mr. W. F. E. Horrell on the "Wild Flowers of March and Herbarium Notes."

The author first dealt with the collection, preservation, and mounting of botanical specimens. He then proceeded to call attention to the characters and points of interest presented by the indigenous plants at present in flower, of which a considerable number of specimens were on the table. These included Taraxacum, Tussilago, Bellis, Ruscus, *Cardamine hirsuta*, *Draba verna*, *Ranunculus ficaria*, *Helleborus fœtidus*, Caltha, *Potentilla fragariastrum*, *Narcissus pseudo-narcissus*, *Lamium rubrum*, Galanthus, Mercurialis, *Senecio vulgaris*, *Primula vulgaris*, *Veronica agrestis*, *Viola odorata*, *Daphne mezereum*, *Alnus glutinosa*, *Corylus avellana*, Salix, and Poa; there were also spore-bearing fronds of Polypodium, Scolopendrium, and Aspidium.

The paper gave rise to a discussion in which the Chairman, Secretary, Messrs. Fuge, Gane, Donington, Bainbridge, Shaw, and E. Brooke took part.

Mr. E. H. Gane then read the following :—

Note on a Ginger from Fiji.

BY E. H. GANE.

The sample in question was handed to me a short time ago by Mr. Holmes, Curator of the Museum of the Society, with the request that I would examine it and report on its fitness or otherwise for commercial and medicinal use.

Though not of such fine appearance as the Jamaica ginger, yet it was finer than the other two commercial varieties, and was especially remarkable for its exceedingly fine aroma and peculiar pleasant taste, recalling that of lemon. The rhizome had evidently been carefully dried, as was evidenced by the small amount of moisture present. The rhizome is rather more fibrous than the Jamaica, and some of the pieces are horny and resinous, but otherwise the structure appears similar. Its powder is of a slightly darker colour than a fine Jamaica ginger, but about the same colour as the commercial article, and therefore much lighter than either the Cochin or African. The fine lemon-like odour is much more distinct in the powder.

To examine its active constituents the method adopted by Dr. Thresh was followed. A known weight of the rhizome in fine powder was packed in a percolator and exhausted with alcohol. Alcohol was chosen as the solvent, as all the important constituents of the plant were known to be soluble in it. A similar operation was simultaneously carried out on a sample of Jamaica. The resulting tincture of the Fijian was darker, more aromatic and pungent than that of the Jamaica.

A portion of the tincture was then taken, the spirit distilled off, and the extract evaporated by a water-bath till it retained no more odour. The extract was of a deep red-brown colour, semi-fluid and very pungent; and the amount obtained thus was 7·15 per cent., while the amount obtained from a similar quantity of Jamaica was only 3·41 per cent. The Fijian thus yields rather more than twice as much extractive matter. The extract was treated with successive portions of petroleum ether to separate fatty matter, of which it yielded ·86 per cent., while the Jamaica yielded almost a similar quantity. The residual extract was shaken with successive quantities of 50 per cent. alcohol till nothing more was dissolved. A residue of a black colour was left which was resinous and quite tasteless, and is a "neutral resin."

The 50 per cent. alcoholic solution was then shaken with milk of lime till nothing further was carried down and filtered. The portion separated by the lime consists of "acid resins," which are quite tasteless. The filtrate was carefully freed from lime, filtered and evaporated to dryness, and yielded a semi-fluid reddish mass of extremely pungent taste. This is the active constituent of the ginger, and has been called by Dr. Thresh "gingerol." Obtained thus the amount was 1·82 per cent. This figure must be taken with a little reserve, as the gingerol probably still contained traces of resin, which are extremely difficult to remove, and the amount of substance at disposal was too small to allow of purification thoroughly. The amount obtained from the sample of Jamaica in a similar way was ·84 per cent. Here, again, we find that the Fijian contains twice as much active principle as the Jamaica. It is interesting to note that the resins obtained from the rhizome are quite tasteless, and their presence therefore only deteriorates a tincture.

To obtain an approximate idea of the amount of volatile oil present a separate portion of the tincture was taken and carefully evaporated down at a low temperature, the residue weighed and then exposed to a temperature of 110° C. till it no longer retained any aroma. Figures corresponding to 1·45 per cent. of oil were thus obtained. The extract before heating had a very powerful and pleasant aromatic odour, resembling that of oil of lemon grass. The quantity of ginger was too small to prepare a sample of the oil, but it would be of interest to prepare and examine the oil so as to determine its properties. It is evidently quite distinct from the oil in either of the commercial varieties, that of the Jamaica, though in some samples it resembles it, being very different.

Dr. Thresh states that probably the aroma would be affected by distillation, and so some other method of preparing the oils would have to be adopted. It was thought that by first percolating the drug with petroleum ether the oil might be easily obtained, but

several of the other constituents of the rhizome are dissolved out by petroleum ether, and it would be a matter of considerable difficulty to separate them without injuring the oil. Comparing the results of the above two analyses with those obtained from Cochin China and African by Dr. Thresh we have the following figures :—

	Jamaica. Per cent.	Cochin. Per cent.	African. Per cent.	Fijian. Per cent.
Volatile oil . . .	·64	1·35	1·615	1·45
Fatty matter . .	·92	1·200	1·225	·86
Resins	1·76	1·815	3·775	4·47
Acid and Neutral Gingerol . . .	·84	·600	1·45	1·82
Moisture. . . .	13·66	13·53	14·515	11·25
Ash	4·53	4·8	4·27	4·06

On comparison it will be seen that the Fijian ginger is by far the richest in active constituents. The amount of volatile oil obtained seems rather low compared with the powerful aroma of the drug, but probably an appreciable amount was lost owing to the method of determination, and more accurate methods would lead to a higher figure.

A discussion followed, to which the Chairman, Messrs. R. H. Jones, Jowett, and the Secretary contributed.

On the motion of Mr. Donington, seconded by Mr. E. Brooke, it was resolved that the Executive Committee should be requested to organize botanical excursions for Saturday afternoons.

The meeting then adjourned.

Provincial Transactions.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

A meeting of members of this Society was held on the evening of the 16th inst. to hear an address by Mr. Wm. Ward (Local Secretary), explanatory of the new bye-laws of the Pharmaceutical Society of Great Britain. The President (Mr. Morrison) occupied the chair and there was a moderate attendance.

The President, before calling upon Mr. Ward, said he thought it only right that reference should be made to that gentleman who had lately "gone over to the majority," he meant Professor Redwood. Wherever chemists gathered there would be centred within them a certain amount of reverence for one who had participated in the anxious cares, the worries, and the fight for pharmaceutical freedom, and for bringing pharmacy up to a higher level than it formerly attained. He was sure that all of them very much regretted Professor Redwood's death.

Mr. Ward then delivered his address. At the outset he admitted that his subject might not be a very attractive one, but it was an important subject, as he believed the new bye-laws would prove of considerable benefit to the followers of pharmacy. His chief object in giving the address was to point out the advantages that would accrue by joining the Pharmaceutical Society to those who had hitherto held aloof from it. He pointed out that chemists and druggists who were in business before the year 1868, when the Pharmacy Act was passed, were entitled to be registered as chemists and druggists without passing an examination. They were also entitled to become members of the Pharmaceutical Society on payment of two guineas for admission. The latter, he dare say, had acted as a deterrent to many, for comparatively few of them had joined the Society. Not only had many remained outside the pale of the Society and withheld their support, but he was afraid they had also in some instances tended to damage the prosperity and success of the Society. He was glad to say that under the new bye-laws this entrance fee had been abolished. The fee for life membership had been reduced from twenty guineas to ten, and this applied to associates in business as well as members of the Society. Referring to the admission of lady pharmacists he humorously remarked that he had formed the opinion that some of these ladies would not make bad wives for them, as they would not be afraid to leave them in charge of their establishments. He considered the reduction of the fee for Major examinations, five guineas to three, a wise one, and he pointed out that in future if a Major candidate excelled in some particular branch of study it would be taken into consideration by the examiners. The fee for the Minor examinations had been raised from three guineas to five, and he supposed the object of these alterations was to induce Minor men to go in for the Major examination—a very desirable thing. A knowledge of the law of poisons had been tacked on to the examination, both for Minor and Major candidates; this was a wise and sound addition, calculated to help forward the objects of the Society. He went on to say that he now wanted—and it was the primary object of calling the meeting—to make an appeal to those who had refrained from joining the Pharmaceutical Society. They all knew the maxim that "unity is strength," and it was very unfortunate for the Society that so few had joined. It was said that at the present time there were in Great Britain 14,000 chemists and druggists, but of that number only 4000 belonged to the Society. This, he thought, had been the great cause of the failure to carry one or two amending Bills in the House of Commons. If when their last Bill was brought forward they had had 12,000 they would have stood a very good chance of carrying the measure. There was nothing unreasonable in it, and nothing that would really have interfered with free trade, and they had a fair claim on all grounds to have the Bill accepted. By remaining outside the Society chemists were debarred from any control over its affairs. If they were members they could vote and return their own members to the Council. For instance, if their good friend, Mr. Newsholme, who represented them so very well, happened to misbehave himself, they could so vote as to elect some one else in his place. Many had objected to join on account of the annual subscription of a guinea, but he had tried to show that a good honest guinea's worth was given in return. There was the weekly *Pharmaceutical Journal*, there was the privilege of voting, there was the importance of giving strength to a society that was founded by Act of Parliament and that had supreme control as regards infringements of the Pharmacy Act; and it seemed to him that to neglect such opportunities for the sake of a guinea was a total mistake. It was calculated (and he was rather struck with the calculation) in a splendid leader in the *Pharmaceutical Journal* that the guinea a year was only a penny for every working day in the year, and put them in the position of giving five shillings to the Benevolent Fund besides. Many a man spent more than a penny a working day in tobacco, and he did not think they should object to forego the penny to join the Society.

Mr. Learoyd, who was invited to commence a discussion, said for some years he had thought an injustice was done to associates in not being allowed the same powers and privileges as ordinary members. It seemed to him that for a long time the Society had been "straining at a gnat and swallowing a camel,"

Mr. Newsholme emphasized the importance of candidates for examination having a knowledge of poisons, and explained that the reason for altering the examination fees as had been done was that the Minor examination was much more costly than the Major;

up to the present the Minor examinations had been conducted at a loss. The reduction of the fee for the Major examination was made in the hope of inducing more to go in for it, and the more chemists and druggists who passed it the better it would be, not only for the Society but also for their trade. With regard to the position of associates who were in business, when he first became a candidate for the Council that was one of his leading points; he had never lost sight of it, nor had the Council. Every member of the Council was prepared to go in for altering the position of associates, but it was a matter that could not be dealt with by bye-laws. The Council had no power to put a clause in the bye-laws dealing with associates, but it would take the earliest opportunity of granting to the associates in business the same privileges that the members of the Society had. Mr. Learoyd had said there should be something more done by the Society for the trade. Well, they all would like protection, but it was one of those things they could not get, and he was not quite sure whether protection would be the best thing they could have.

Mr. Learoyd: Mr. Newsholme seems to think it will be impossible to get protection in any way under the bye-laws. I will refer you to the last clause of section 21 (9th bye-law), and ask whether there is no spirit of protection in that?

Mr. Newsholme: Protection of title, but what I meant was protection of so-called trade interests.

Mr. Turner thought the abolition of the entrance fee was not good policy. He supposed it was quite right to admit ladies, but from what he had seen of lady pharmacists they had not been a success. He imagined that one reason why the Society had not more members was because the local secretaries were not as active as they ought to be. The privilege of voting should be granted to all associates, whether they had a shop or not.

On the proposition of Mr. Percy Carr, seconded by Mr. Stewart, a vote of thanks was passed to Mr. Ward for his address.

Mr. Ward, in acknowledging the compliment and replying on the discussion, said of course the Council had not done all it would have liked. To make the alteration suggested with regard to associates required an Act of Parliament. The Council had gone as far as it could and in accordance with the constitution under the two Pharmacy Acts. Let the members and associates go in for a new Pharmacy Act and include this change. He had had proof that day that the doing away with the entrance fee paved the way to obtaining new members. He had succeeded in getting five gentlemen to become associates and three to become ordinary members. The five were gentlemen who had passed the Minor examination and the three were in business prior to the passing of the Act of 1868.

The proceedings then terminated.

LIVERPOOL PHARMACEUTICAL STUDENTS' SOCIETY.

The usual fortnightly meeting of this Society was held on Thursday last, 17th inst., Mr. T. S. Wokes in the chair.

A very interesting paper was given by Dr. Charles F. Larkin on "The Circulation of the Blood."

In the course of his lecture Dr. Larkin mentioned that although many eminent medical men had been on the point of discovering the circulation, this honour was reserved for our countryman, Dr. Harvey, by whom it was made in 1619. The paper was illustrated by numerous lantern slides and was much appreciated by the members, of whom there were twenty-four present.

A hearty vote of thanks, proposed by Mr. J. R. Johnson and seconded by Mr. T. H. Wardleworth, was accorded Dr. Larkin for his valuable paper.

The secretary announced that as the annual dinner of the Liverpool Chemists' Association fell on the 31st inst., Mr. Tabor's paper on "Photography" would be postponed to Thursday, April 7.

EDINBURGH CHEMISTS' ASSISTANTS' AND APPRENTICES' ASSOCIATION.

The tenth meeting of the session (being the fourth open meeting) was held in the Pharmaceutical Society's House, 36, York Place, Edinburgh, on Wednesday, March 9, at 9.15 p.m., Mr. John Lothian, President, in the chair.

The minutes of last meeting having been read and approved, a letter was read from Mr. Alex. O. Findlay, resigning the position of Assistant Secretary on account of his having gone to fill an appointment in Queenstown.

The following papers were read—

Botanical Notes.

BY DONALD McEWAN.

The purpose of these notes was to endeavour to awaken a more lively interest in the Herbarium. The author dealt with several specimens in detail, pointing out how differences in the environment had produced marked variation in individuals of the same species, and urged collectors to note the conditions under which plants were growing as well as to study their movements and times of flowering. He suggested the appointment of a Curator, who should register the various circumstances connected with all preserved specimens added to the collection.

Glycerine Suppositories with Boric Acid.

BY PETER BOA.

A few weeks ago a short paragraph appeared in one of the trade journals stating that a pinch of powdered boric acid, when introduced into the lower bowel, produced an effect similar to that of the injection of a small quantity of glycerine.

Knowing by experience that powdered boric acid stimulated any mucous surface, I was disposed to consider the possibilities of the suggestion to which I have referred. If powdered boric acid be applied to the interior of the nostrils it produces in most people smart sneezing. It seemed to me that if used for the purpose of relieving constipation it might in certain dry conditions of the mucous membrane here concerned produce a stimulation which would be a very near approach to irritation. Suitably modified, however, it gave promise of usefulness. We already have in glycerine suppositories a very convenient means of promptly relieving constipation. These suppositories are, however, open to objection in certain cases on account of their size; their weight being usually from 70 to 90 grains. It occurred to me that a combination of glycerine and boric acid in a suppository might be more active than glycerine alone, and less likely than boric acid to cause undue stimulation. If this were to be the case there seemed fair promise of a means of getting over the objection in reference to size. In order to test the matter I had some suppositories made by the ordinary 15 grain mould, one lot with glycerine and another lot with glycerine and boric acid instead of glycerine. Through the kindness of medical and other friends I had them tried comparatively. The reports have been distinctly in favour of those containing boric acid. The 15 grain glycerine suppositories either failed to act or acted very slightly, while those of the same weight containing boric acid acted in some cases as efficiently as a large glycerine suppository, requiring, however, longer time.

More extended experience will be required in order to decide definitely as to the value of the combination. It seems to me, however, to be deserving of a fair trial.

Note on Ferri Carbonas Saccharata.

BY GEORGE COULL, B.SC.

In the estimation of the ferrous carbonate in this preparation, Mr. W. L. Howie suggested the use of phosphoric acid as a solvent in place of hydrochloric acid, on account of the disturbing action of the latter on the sugar (*Pharm. Journ.*, [3], vi., 482). This suggestion was adopted in the British Pharmacopœia, 1885. In order to ascertain the relation between the action of sugar on ferric salts in presence of hydrochloric and phosphoric acids respectively, the following experiments, which are merely qualitative, were instituted. A few crystals of sugar were allowed to remain in contact with solution of ferric chloride acidulated with hydrochloric acid and stirred up occasionally for about half an hour, at the end of which time there was no reduction. On heating, however, reduction took place in one minute. Similarly, phosphoric acid in the cold did not reduce the ferric salt, but unlike hydrochloric acid, on heating for five minutes there was still no colour with potassium ferricyanide solution, showing there was no reduction during the time required for making an estimation. It is thus seen that phosphoric acid cold or hot and hydrochloric acid cold have no reducing action on ferric salts in presence of sugar.

As will presently be shown, practically the same results are obtained by using cold hydrochloric acid or warm phosphoric acid; but phosphoric in the cold (as the B.P. apparently directs) gives a lower percentage than is got on heating just sufficiently to form a clear solution, and as it has been proved above that there is no reduction on heating, at least in the time approximately taken to perform an estimation, there must be some reason other than the reducing action of the sugar for this difference in results. The cause may be the inability of the phosphoric acid to dissolve all the ferrous iron in the cold, which the hydrochloric acid is able to do. The question now arises, should solution of the saccharated carbonate be aided by a gentle heat, or should it be done in the cold, using phosphoric acid as a solvent?

The following estimations will show the difference in results according as hot or cold hydrochloric or phosphoric acid is used. A sample which had lain exposed in paper for over six months was taken, and each result is the mean of three closely agreeing determinations.

With phosphoric acid in the cold, 2 grammes required 18·5 c.c. volumetric solution of bichromate of potassium = 32·2 per cent. ferrous carbonate.

With phosphoric acid and heating gently to a clear solution, 2 grammes required 20 c.c. volumetric solution of bichromate of potassium = 34·8 per cent. ferrous carbonate.

With hydrochloric acid in the cold, 2 grammes required 20·2 c.c. volumetric solution of bichromate of potassium = 35 per cent. ferrous carbonate.

With hydrochloric acid and heating, 2 grammes required 26·8 c.c. volumetric solution of bichromate of potassium = 46·6 per cent. ferrous carbonate; this is in excess of the theoretical quantity, 45·5 per cent.

It seems to me, according to the above results, that it is perfectly immaterial whether one uses hydrochloric acid in the cold or phosphoric acid and a gentle heat, so long as the operation is conducted rapidly. In connection with this I may refer to a matter touched on by Mr. Ellwood in an admirable and instructive paper read before the London Chemists' Assistants' Association (*Pharm. Journ.*, li., 392).

He stated that the average percentage of ferrous carbonate in a large number of samples was 28·6, and said the United States Pharmacopœia contains a more satisfactory preparation authorized to contain 15 per cent. of ferrous carbonate. I know that it is not uncommon with some to increase the quantity of sugar in this preparation, though not to the extent the U.S.P. directs. Perhaps Mr. Ellwood's low average was due to his having among his samples some which had more than the proper proportion of sugar added to them. His suggestion that a test should be inserted for the amount of ash left on incineration is good, as this would tend to prevent the unwarranted addition of sugar.

In order to determine whether the official process would yield a product of the strength required, I made a small quantity strictly according to the directions of the Pharmacopœia and estimated it. Using phosphoric acid in the cold, 2 grammes required 20 c.c. volumetric solution of bichromate of potassium = 34·8 per cent. ferrous carbonate. On heating gently to a clear solution 1 c.c. more was required = 36·5 per cent. This is sufficient evidence that the B.P. formula is capable of producing an article containing "at least one third ferrous carbonate."

I think this is a case where the makers should rise to the standard of the Pharmacopœia, and wish, therefore, to protest against lowering the standard, at any rate below 30 per cent.

The Solubility of Chloralamide.

BY GEORGE LUNAN.

The author, finding the solubility of chloralamide variously stated by different authorities, has investigated the matter, and as the result of experiments places it at 1 in 20·5 of distilled water at 15°·5 C.

The reading of the papers was followed by a discussion, taken part in by Messrs. Boa, Coull, Cowie, Henry, Hill, Lothian, Lunan and McEwan, and on the motion of the Chairman hearty votes of thanks were awarded to the authors and to Mr. Lunan, who had charge of the arrangements.

The meeting then closed.

GLASGOW CHEMISTS' AND DRUGGISTS' ASSISTANTS' ASSOCIATION.

At the last meeting of the Glasgow Chemists' and Druggists' Assistants' Association, held last week, Mr. James Bruce, one of the Vice-Presidents, read a paper entitled "A Plea for a New Association." In the course of his remarks he said the assistants of Glasgow had been carrying on an Association for the last twenty years or so, and might still so carry on, but they had been getting into a languishing state, and it seemed to him that there never had been a time when the Association stood so much in need of a new departure as now. It was greatly to be desired that members of the trade in Glasgow should be associated more closely, so that their real wants might become better known, and that they might meet with united action the many things that affected them. The union of the whole of the pharmacists of Glasgow, with their assistants and apprentices, in one association was advocated. It was also suggested that the proposed new Association should secure premises for meetings, etc., and that divisional secretaries should be appointed to assist the general secretary in carrying on the work of the district.

Mr. Bruce afterwards gave notice that he would move at the annual business meeting to be held next week that the word "assistants" be omitted from the name of the Association with the view of effecting the change he suggested and getting the masters to join them.

Mr. James Robb, the President, afterwards stated that there was a proposal to start an ambulance class for the benefit of Glasgow chemists' assistants, and that Dr. Lees had offered the use of one of his classrooms for it. He asked the members to think over the matter amongst themselves and let him know what they thought of it.

DUNDEE CHEMISTS' ASSISTANTS' AND APPRENTICES' ASSOCIATION.

The usual weekly meeting was held last Thursday evening in the rooms, 74, Commercial Street, Dundee, Mr. Charles Kerr, Ph.C., Honorary President, in the chair. A lecture was delivered, entitled "First Aids in Dentistry," by David M. Small, L.D.S., R.C.S. Eng.

After an interesting sketch of the history of the dental art and its rise and progress in recent years, Mr. Small said that too often the art had been confided into the hands of empirics, and that consequently it had fallen into obloquy and disrepute. He urged that it was absolutely necessary that the skilled dentist be thoroughly acquainted not only with the mechanical part of his business, but with the anatomy and physiology of the teeth and of their influence on the functions of the body. The French were the first nation in modern times to place the position of dentist on the examination basis, and they have done more to perfect this department of surgery than any other nation. In the case of our own Dental Act it was to be regretted that it was not retrospective.

Mr. Small then proceeded to refer to the effects of diseased teeth and gums on the functional operations of other parts of the body. It was a law of animal economy that one organ should sympathize with another, and it often happened that the organ or part affected assumed a severer and more aggravated form of disease than the one primarily attacked.

Many diseases and affections, including neuralgia, irritation of the eye, etc., were directly traceable to the presence of decayed teeth. Some valuable hints were given as to the best methods for affording temporary relief in affections of the teeth.

Concluding, the lecturer gave some good counsel on the preservation of the teeth and the avoidance of toothache. Were more attention paid to the teeth much suffering would be avoided. He strongly urged upon everyone the benefit to be derived from periodic visits to the dental surgeon, such visits to be made every four months. He also recommended brushing the teeth two or three times a day with a good dentifrice.

The chairman and several other members having expressed their appreciation of Mr. Small's admirable lecture, he was, on the motion of the Secretary, Mr. W. Mair, unanimously elected an honorary member of the Association.

Parliamentary and Law Proceedings.

The Pharmaceutical Society of Great Britain v. W. Llewellyn Thomas.

In the County Court of Glamorgan, holden at Swansea on the 22nd instant, the Council of the Pharmaceutical Society of Great Britain sued Mr. Llewellyn Thomas, of No. 41, St. Helens Road, Swansea, to recover £25, being the amount of three penalties of £5 each for selling poisons, to wit, laudanum and oxalic acid, and one penalty of similar amount for keeping open shop for the sale of poisons, and one further penalty for taking, using or exhibiting the title of "chemist" contrary to the provisions of the Pharmacy Act, 1868.

Mr. C. W. Langley Flux appeared for the Council.

Mr. F. C. T. Naylor appeared for the defendant.

On the case being called defendant's solicitor admitted that his client had no defence to the action, and consented to judgment being entered against his client for the full amount of penalties and costs.

Judgment was entered accordingly.

Unfounded Censure on Chemists.

At an inquest held at Padbury, near Buckingham, on March 22, with regard to the death of the Rev. H. Powell, who had committed suicide at the Vicarage on Sunday night, it was elicited that, after officiating at the parish church, he retired to bed about nine o'clock and shortly after midnight reports of firearms were heard. Servants entering his room found him quite dead with a revolver in his hand. On a table near the bed was a small tin containing some cartridges and two bottles of laudanum. The deceased had been accustomed to take laudanum for insomnia, and was recently ordered by his doctor to discontinue it.

The jury returned a verdict of "suicide while temporarily insane" and commented strongly on the dangerous practice of chemists being allowed to supply such large doses of laudanum to persons. The coroner fully endorsed these remarks, and said such a practice was a disgrace to chemists themselves.—*Globe.*

Police Prosecution under the Food and Drugs Act.

At the Gosport Police Court on Friday, March 18, Timothy White, chemist and druggist, was summoned by Police-Sergeant Cooper, of Bournemouth, for supplying olive oil adulterated with 60 per cent. of cotton-seed oil.

Cooper stated that on February 24, acting on the instructions of the chief constable of Hants, he visited Mr. White's shop and asked Mr. Hadden, the manager, for three ounces of milk of sulphur and a bottle of olive oil. After paying 4½*d.* for the oil he stated that he required it for purposes of analysis. Hadden then said it was not olive oil but a common oil for cart wheels. Witness replied that he had asked for olive oil, and offered to divide the sample into three parts. Hadden, however, declined to receive any. On the following morning, the contents of the bottle having been divided into three parts, a sample was handed to the public analyst at Southampton.

At this point the Bench intimated that the case had better be stopped, as the whole of the preliminaries had not been complied with. The bottle ought to have been sent to the analyst to be divided by him. The case was, therefore, dismissed.

Mr. Greenwood, for Mr. White, regretted that the case had not proceeded. If he were allowed to call Mr. Hadden, he would tell the Bench that the police officer asked simply for flask oil.* Everyone knew that 4½*d.* would not buy a flask of olive oil, and whereas Hadden got 2½ per cent. commission on olive oil, he got nothing on the common oil.

The magistrates declined to hear further evidence as the case was dismissed. The police officer had done his duty and they must accept his statement. There was, however, not the slightest slur on Mr. White. In reply to Mr. Greenwood they declined to make any order as to costs.—*Portsmouth Times.*

Fatal Misuse of Medicine.

An inquest was held at Salcombe by the coroner, Mr. S. Hacker, on Saturday, March 19, respecting the death of Caroline Atwill, aged forty-three years, a single woman.

The deceased's brother-in-law said that she had always been in a delicate state of health, and took medicine prescribed by a Plymouth doctor to ease her pain. It was understood that the medicine was dangerous, containing laudanum and prussic acid, and he had asked the chemist, Mr. Stewart, to lessen the strength or give smaller quantities.

Arthur Pearse, surgeon, deposed that he had made a

* A letter has been received from Mr. White in confirmation of this statement.—Ed. Pharm. Journ.

post-mortem examination and found no trace of disease. He was of opinion that death was due to failure of the heart's action. There were no signs of poison having been taken. He knew what medicine deceased was taking and warned her that it was dangerous. She was accustomed to take overdoses. The prescription was not an unusual one, and the medicine wonld be harmless if taken in proper doses.

R. M. Stewart, chemist, said that on the previous Monday deceased asked for three 6-oz. bottles of medicine as before. The copy of the prescription was in the book when he took the business. Each bottle contained 3 drachms of carbonate of magnesia, 24 drops of dilute hydrocyanic acid, two teaspoonfuls of tincture of opium and chloroform water to fill 6-oz. bottle; one tablespoonful to be taken three times a day in water. He cautioned her about taking so much, but she said she must have it to ease her pain. The labels were not marked "poison," as it was not usual to do so when medicines were dispensed according to doctors' prescriptions. He had never known such a thing done.

The Coroner remarked that the labels should have been marked "poison" to accord with the provisions of the Pharmacy Act; and that it was unwise simply to label the medicine "to be taken as before," for the deceased appeared to have consumed three bottlefuls in two days; if the bottles had been properly labelled with the word "poison," this would probably have had an effect upon her.

The jury, in accordance with the medical evidence, found that death resulted from failure of the heart's action, as a result of an overdose of laudanum, taken by misadventure.—*Western Morning News.*

Obituary.

Notice has been received of the death of the following:—

On the 28th of December, Martin Mohun, Pharmaceutical Chemist, Herne Bay. Aged 54 years.

On the 17th of January, Homer Pedley, Chemist and Druggist, Birmingham. Aged 66 years.

On the 27th of February, John Henry Dunn, Chemist and Druggist, London. Aged 33 years.

On the 6th of March, John Aickman Cocher, Chemist and Druggist, Lynn. Aged 62 years.

On the 12th of March, David Churchill Evans, Chemist and Druggist, Maidstone. Aged 72 years.

On the 15th of March, Samuel Aspinall, Chemist and Druggist, Hindley. Aged 75 years.

Reviews and Notices of Books.

INDIGESTION. By THOMAS DUTTON.*

This brochure is intended to clearly explain to the general reader the mode of treatment and diet to be adopted by those who suffer from indigestion. In addition to this the work contains special remarks on gout, rheumatism, and obesity, and, among other curiosities, contains a chapter on the rearing of infants. It is clearly the intention of the author to impress young mothers with the view that if they carefully diet their infants this will prevent them from becoming dyspeptic when they attain manhood or womanhood.

INDIGESTION. By Dr. GEORGE HERSCHELL.†

This book aims at furnishing students and practitioners with a *résumé* of the more important points in the diagnosis and treatment of indigestion. The physiology of normal digestion is concisely considered, and then under the comprehensive term, indigestion, the author proceeds to discuss the symptoms and treatment of all the diseases to which the stomach is liable, including troubles caused by excessive tea drinking and such serious diseases as gastric ulcer and cancer. The book is concisely written, and contains a large amount of useful information and many valuable hints for the judicious employment of a great variety of drugs supposed to be efficacious against the demon dyspepsia.

* London: Henry Kimpton. Crown 8vo. Pp. 143.

† London: Baillière, Tindall and Cox. Post 8vo. Pp. 202.

BOOKS RECEIVED.

PHARMACOGRAPHIA INDICA.—Part V. By WILLIAM DYMOCK, C. J. WARDEN and D. HOOPER. London: Kegan, Paul and Co., Limited. From the Authors.

A SHORT TEXT-BOOK OF INORGANIC CHEMISTRY. By Dr. HERMANN KOLBE. Translated and edited by T. S. HUMPIDGE, Ph.D., B.Sc. London: Longmans, Green and Co. From the Publishers.

MATERIA MEDICA OF MADRAS. By MOHIDEEN SHERIFF KHAN BAHADUR. Vol. I. Madras: Government Press. From Mr. D. Hooper, Government Quinologist.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith. Matter intended for publication should be written on one side of the paper only.*

UNFOUNDED CENSURE ON CHEMISTS.

Sir,—I enclose a cutting from *Daily Telegraph* of 22nd inst., and would beg to point out the unjust habit coroners' juries have of censuring the wrong person. Even had the man met his death by laudanum the chemist would have been no more to blame than the person who supplied Judas Iscariot with the rope with which he hanged himself. The law has placed the power of selling poisons in the hands of chemists only, but that does not deprive the public of their right to buy them. Let the saddle be put upon the right horse. This man killed himself with a pistol. Why not censure the person who supplied him with firearms? The jury found that he was insane, and therefore it would have been more reasonable to censure his friends for letting him be at large. It is my opinion that the jury and coroner were guilty of libel, and any newspaper publishing their censure also. E. WARRELL.

BENEVOLENT FUND.

Sir,—I see it is suggested to increase the amount of the annuities. I think it most unwise, seeing the limited character of the Fund. Why increase the amount? If the funds admit, increase the number by all means, but to give £50 a year is most extravagant.

The Freemasons' and Royal Agricultural Society, and many others I might mention, only give an amount like our own, and I think the character of the members of those societies whom they relieve would compare favourably with our own.

I do not wish to say one word against the character of our annuitants, but if the truth were known, many of them have brought their misfortunes on themselves. I think that £35 is ample, because most of them have some little means besides.

There are plenty of cases of distress among the chemists of the country, and to give a big loaf to one and no bread to the other is hardly just. D. PROSSER.

LIQ. STRYCHNINÆ.

Sir,—I have just finished using a batch of strychnine from a well-known London house, which has dissolved with greater ease and rapidity than the previous lot from the same firm. I think this circumstance may partly account for the variance of opinion among some few of your correspondents who fail to share the general opinion as to the need of a more soluble form of strychnine in the official liquor.

Had my experience been confined to the sample which I have just finished, I think I should feel the same.

I have never noticed during the last winter any sign of deposit, though in previous winters it has occurred in exceptionally cold nights.

The more likely explanation appears to be that like morphia and other alkaloids its solubility is affected by age.

I should be glad to know whether any of your readers have observed similar differences in solubility.

Chester. W. Turver.

Syr. Ferri Quin. et Strych. Phos.

Sir,—My experience corresponded with that of Mr. Ingham, until I found a better result by reversing the process given in Mr. Martindale's excellent little work. My method now is to prepare a syrup of quinine phosphate with strychnine, each 17½ ounces being equivalent to a pint of the finished preparation; and to add, as required, 1 part of a suitable Liq. Ferri Phos. to each 7 parts of this syrup. The syrup of quinine, B. P. C. strength (three quarters of a grain in the drachm), with the strychnine, keeps well without the iron; and the addition of the latter as needed ensures sending out the article with every probability that it may remain in condition until consumed.

There is another advantage: some prescribers are glad to find a quinine and strychnine syrup without iron. In such case it is only necessary to add one-eighth simple syrup in place of the Liq. Fer. Phos. H. Barton.

Sir,—I can endorse the remark made by Mr. Ingham respecting the disagreeable odour sometimes developed by this syrup on keeping. I have noticed it also in more than one sample of the Liquor Ferri. Hypophosph. Co. B.P.C. obtained from a London house. When some of this liquor was required for dispensing we removed the sulphuretted-hydrogen-like odour by carefully heating a portion over a water-bath and making up the bulk again with water.

Sheffield. J. W. J. Turner.

Eserine Sulphate.

Sir,—Of late we have had some difficulty in obtaining eserine sulphate which on dissolving in water and remaining a short time would turn to a red solution; our present samples, which were obtained from several first-class drug houses in London, when dissolved remain colourless and are acid to test paper; they all appear to be of German manufacture. Is there not a British manufacturer who makes eserine sulphate which is neutral to test paper and gives the characteristic colour when dissolved in water? We dispense it chiefly for ophthalmic use, and it is essential that it should not be acid.

Our ophthalmic surgeon here complains of the different results caused by using the following lotion dispensed by various chemists—

℞. Lotio. Hydrarg. Perchlor. 1 in 2000.

As it is possible that this has been dispensed by diluting the B.P. liquor I may say that not only should the B.P. liquor not be used on account of the ammon. chlorid. that it contains, but because it requires to be made fresh and to be filtered before sending out. I simply point this out to those who have dispensed the above prescription, at the same time believing that any unworthy reflection cast upon an individual chemist is cast upon the whole pharmaceutical body. L. Priestley.

The Relation of Geography and Materia Medica.

Sir,—The interesting article on this subject by Mr. E. M. Holmes in your last issue deserves the careful attention of all who are interested in the distribution of drugs.

I fully endorse the opening remark as to "the necessity of a more accurate and more widely-spread knowledge of the geographical sources of drugs." From either the educational or the commercial standpoint it is very desirable that we should know more of the history of foreign drugs before they enter our market, and the importance of recognizing the significance of so-called commercial varieties is rightly insisted upon. Whether, however, the Pharmacopœia can be rightly used as the agent for imparting this information is, I think, open to considerable doubt.

The idea of officially recognizing only certain varieties of genuine drugs is, I consider, open to serious objection. The compilers of the last edition of our Pharmacopœia, in my opinion, acted wisely in omitting in the majority of cases all reference to the geographical sources of the drugs described.

To bind us to use only certain varieties of such drugs as nux vomica and coca for the manufacture of medicinal preparations would, I believe, cause unnecessary inconvenience and be detrimental to the interests of trade. Such regulations would be constantly liable to evasion, and even if practicable would not in all cases produce the greater uniformity in medicinal preparations that is desired. The case of nux vomica, mentioned by Mr. Holmes, is a good instance in point. If we were limited to the use of the Bombay variety, which is undoubtedly the richest in alkaloid, we should obtain an extract which, if prepared of standard strength (15 per cent. alkaloid), would in warm weather be of semi-fluid rather than solid consistence, and would consequently be very liable to alteration in strength, owing to evaporation. By using together the Bombay and Cochin or Madras seed, a standardized extract may be obtained of fairly uniform consistence, and much more stable than if prepared solely from the variety richest in alkaloid. The same argument would apply to some extent to opium and cinchona; limiting the official varieties to those produced in certain districts or shipped from certain ports would increase the difficulty of producing satisfactory preparations of standard strength.

Many plants yielding official drugs are, at the present time, cultivated in so many different parts of the globe, that it would now be much more difficult to define the exact geographical sources than was the case twenty or thirty years ago. In India and many of our colonies experiments are continually in progress with a view to acclimatize plants of economic and medicinal value, and, in consequence, new sources of drugs may frequently be found. Would it not tend to check enterprise in this direction if it were made illegal to use for official preparations drugs of good quality obtained from other than the published sources?

In certain cases it may be well to limit the districts or countries from which the drugs should be obtained, but as a general rule I would suggest that it would be more desirable to insist rather on physical characters and chemical tests to ensure greater uniformity in medicinal preparations.

Hitchin. F. Ransom.

A Correction.

Sir,—By the reporter's transposition of the word "not" in some remarks made by me at the last meeting of the Manchester Pharmaceutical Association my meaning is destroyed.

In opposing the suggestion that fresh legislation should be urged, I said:—"Though it seems rather late in the day to say it, we do not yet know for certain that the Pharmacy Act is *not* all we want; we may find within the next few months that it is sufficient."

I meant, of course, that until we had satisfied ourselves that the existing Act was inadequate to secure the ends desired by the reader of the paper, it would be unwise to waste time in the risky endeavour to obtain a new one. In common with many others I hope this point may soon be finally cleared up. Better late than never.

Manchester. F. Baden Benger.

NOTICES OF MEETINGS.

Chemical Society.—Wednesday, March 30, at 4 p.m. Anniversary Meeting. President's Address. Election of Office Bearers and Council.

Chemists' Assistants' Association.—Thursday, March 31.—Paper: "Osmosis and its Relation to Plant Life," by H. Garnett.

School of Pharmacy Students' Association.—Thursday, March 31.—Papers: "The Spider," by Miss M. E. Buchanan, and "Bismuth and its Salts," by Mr. R. Walkington.

J. Ch. Sawer.—We have now procured a copy of the paper you desired to see.

Communications, Letters, etc., have been received from Messrs. Andrew, Turver, Timothy White, T. C. Holford, Stead, Mair.

"THE MONTH."

Phosphorous Oxide.

A very interesting account has appeared in *Nature* (xlv., 446) of the results obtained in an important investigation of the lower oxide of phosphorus, corresponding to phosphorous acid, with which Professor T. G. Thorpe and D. A. G. Tutton have been engaged during the last three years. It appears that the description given in chemical works of the substance represented by the empirical formula P_2O_3 is incorrect, and that it is a white, crystalline or wax-like substance. It melts at 22°·5 C. to a clear, colourless, mobile liquid. The specific gravity in the solid state at 21° is 2·135, as compared with water at 4° C., in the liquid state at 24°·8 the specific gravity is 1·9358, so that there is a contraction of about nine per cent. in passing from the liquid to the solid state. Phosphorous oxide is very volatile both in the solid and the liquid state; it boils at 173°·1 C., and can be distilled without alteration in an atmosphere of nitrogen. The vapour has a very characteristic odour, and its density indicates that, like the analogous oxides of arsenic and antimony, the composition and molecular weight of phosphorous oxide are to be represented by the double molecular formula P_4O_6. The value found for the specific volume is 130·2. Deducting from this number the specific volume due to the six atoms of oxygen (46·8 = 7·8 × 6), there remains 83·4 for the specific volume of the four atoms of phosphorus, or 20·9 for that of one atom; which is the specific volume of phosphorus in the free state. This is a relation of interest in connection with the fact that the molecule of phosphorous oxide contains four atoms of phosphorus, just as the molecule of free phosphorus does. Phosphorous oxide in the liquid state has a remarkably low power of refracting light, offering a strong contrast to the high refractive power of phosphorus. In the wax-like, solid form it is remarkably sensitive to light, turning red on exposure to bright sunshine for ten minutes and becoming quite dark red after half an hour; the colour being due to the formation of a very small proportion of the red modification of phosphorus. Isolated crystals obtained by sublimation *in vacuo* appear to be unaffected by light, but when they are melted and converted, by sudden cooling, into the wax-like form, that becomes red on exposure to daylight. It has not yet been ascertained whether this colouring is due to decomposition or to some admixture of free phosphorus. When heated above 210° phosphorous oxide begins to decompose and darkens, until at 300° it is quite red. At 400° it is completely decomposed into phosphorus and pentoxide, according to the equation

$$2P_4O_6 = 6P_2O_5 + 8P.$$

Phosphorous oxide combines with oxygen at the ordinary temperature, giving rise to evolution of light; when the temperature is raised to 70° C. combustion takes place, which can be at once reduced to phosphorescence by diminishing the pressure. When thrown into oxygen warmed to about 50° C., the oxide burns to pentoxide with a brilliant flash. With chlorine phosphorous oxide reacts violently, yielding phosphorous oxychloride $POCl_3$ and metaphosphoryl chloride PO_2Cl. With bromine it yields analogous products. With iodine it reacts slowly, a solution in carbon bisulphide yielding when heated in sealed tubes orange-red crystals of P_2I_4. With sulphur the oxide forms a crystalline addition compound of the empirical formula $P_2O_3S_2$, a pale yellow solid melting about 102° and boiling without decomposition at 295°. Its vapour density points to the double formula $P_4O_6S_4$. When phosphorous oxide is brought into contact with ammonia gas, ignition takes place; with an ether solution the action is more manageable, and a white, solid compound is formed, the diamine of phosphorous oxide $P\begin{cases}NH_2\\NH_2\\OH\end{cases}$. Ethyl alcohol reacts violently with phosphorous oxide; at a low temperature a liquid product is obtained, which is a diethyl phosphorous acid $P\begin{cases}OC_2H_5\\OC_2H_5\\OH\end{cases}$, having a strong garlic odour, specific gravity 1·0749 at 15°·5 and boiling at 184°–185°. One of the points of interest in regard to phosphorous oxide is its physiological action and the connection it has with the terrible disease of the lower jaw from which persons engaged in the manufacture of matches occasionally suffer. It would appear that this deplorable action is directly traceable to the vapour of phosphorous oxide, which is largely formed by the oxidation of phosphorus. The advanced knowledge now obtained of the chemical history of this compound may perhaps afford means of adopting additional precautions against its deleterious influence.

Permanganate of Potassium as an Antidote to Phosphorus.

Arpad Bokai (*Rev. de thérapeutique*, No. 6, p. 166) recommends a solution of permanganate of potassium (0·33 per cent.), as an antidote in cases of poisoning by phosphorus. Placed in contact with phosphorus the permanganate converts it into orthophosphoric acid, manganese peroxide being formed simultaneously. The same reactions occur in the stomach, with this difference; that, in the presence of the hydrochloric acid of the gastric juice, the peroxide of manganese becomes the chloride, thus liberating more oxygen and rendering the transformation of the phosphorus into orthophosphoric acid more certain. Experiments upon dogs show that solutions of the permanganate as strong as 1 per cent. do not produce any ill effect upon the coats of the stomach.

Solubility of Tricalcic Phosphate and Bicalcic Phosphate in Phosphoric Acid.

From a number of experiments conducted by H. Causse it appears that tricalcic phosphate dissolves in solutions of phosphoric acid in larger proportions than the bicalcic phosphate. This difference is ascribed to the circumstance that an equilibrium is established between three factors, the water, phosphoric acid, and monocalcic phosphate, and it appears to be the water which exercises the principal influence; its action being exerted upon the monocalcic phosphate and also upon the phosphoric acid, so that the result depends on the proportions of these two compounds. In fact the maximum quantity of phosphate dissolved corresponds to a solution containing ten per cent. of acid; but if the quantity of acid be increased without altering the volume of the solution, the quantity of water available for the solution of the monocalcic phosphate will be reduced and at the same time the solubility of the phosphate operated upon. When the solutions contain but little free acid the action of heat does

not produce much effect; in fact, the heat of combination of the small quantity of acid in the solutions does not equal that necessary for the alteration of the monocalcic phosphate. But if the proportion of acid be sufficient, the reaction takes place and goes on until a stable equilibrium is established between the water and the phosphoric acid at a given temperature (*Comptes Rendus*, cxiv., 414).

Chromo-Sulphuric Acid $H_2C_{12}(SO_4)_4$. In continuing the investigation of the isomeric chromic sulphate, $Cr_2(SO_4)_3$, which presents the peculiarity of giving no reaction of sulphuric acid or of chromium, Recoura finds that it combines with sulphuric acid and with metallic sulphates, producing salts of chromo-sulphuric acid. The zinc salt has the composition $ZnCr_2(SO_4)_4$ and its solution gives no reaction of sulphuric acid or of chromic acid, though it gives the usual reactions of zinc salts. Solutions of these salts gradually undergo decomposition, and as that proceeds barium chloride then gives a precipitate. By boiling decomposition is effected at once. Chromosulphuric acid has been obtained in the solid form containing eleven molecules of water. It is a green powder, very deliquescent, but does not alter in a dry atmosphere. Its solution has a bright green colour which gradually changes to blue, and eventually to a violet coloured acid solution of ordinary chromic sulphate. The potassium salt is a green powder containing four molecules of water, and it appears to be formed when chrome alum is dehydrated for some time at 90° C. and lastly at 110°. The sodium and ammonium salts have similar characters (*Comptes Rendus*, cxiv., 477).

Decomposition of Sulphurous Oxide by Carbon. Scheurer-Kestner in continuing his study of the gaseous products of glass kilns (see *ante*, p. 692) finds that at a very high temperature sulphurous oxide is decomposed by carbon, yielding free sulphur, carbonic oxide and carbonic anhydride, a result that is consistent with Berthelot's observation that by the action of carbon at a red heat sulphurous oxide is converted into carbonic oxide, oxysulphide, and sulphide of carbon. The latter two gases would be destroyed at higher temperatures, the carbon sulphide in the presence of the oxysulphide, and of sulphurous oxide, as well as the oxysulphide in presence of sulphurous oxide and carbon, yielding besides free sulphur, a mixture of two volumes carbonic oxide and one volume carbonic anhydride.

$$2COS + SO_2 + C = 2CO + CO_2 + 3S.$$
$$C5_2 + 2COS + SO_2 = 2CO + CO_2 + 5S.$$

The reactions may not take place exactly as indicated by these equations, for it is uncertain whether oxysulphide and bisulphide are formed at very high temperatures, or whether their formation is prevented so that the reactions take place directly between sulphurous oxide and carbon. But in any case confirmation is afforded of the view put forward as to the change taking place in the production of alkaline silicate. The sulphate is first converted into silicate and sulphuric anhydride, which is then decomposed into sulphurous oxide and oxygen, these two gases, in the presence of carbon, being converted into carbonic oxide, carbonic anhydride and sulphur.

$$3SO_4R + 6SiO_2 + 5C = 3S + 4CO_2 + CO + 3(RO2SiO_2).$$

The presence of carbonic oxide in the gaseous products of the decomposition of sodium sulphate is thus accounted for: it distinguishes that reaction from the reduction of the sulphate to sulphide, which gives rise only to the formation of carbonic anhydride (*Comptes Rendus*, cxiv., 296).

Assimilation of Carbohydrates. Under the term respiratory quotient Pflüger has designated the relation existing between the carbonic anhydride excreted in a given time, and the oxygen absorbed in the same time. For a fasting man that quotient is less than unity, as may be readily understood. By comparing the formulæ of fats and albuminoids it will be seen that they contain less oxygen and nitrogen than is sufficient for transforming their hydrogen into water and ammonia. Therefore the oxygen absorbed in respiration must burn the excess of hydrogen and all the carbon of the food. Since carbonic anhydride contains its own volume of oxygen, it follows that the volume of oxygen absorbed will be greater than that of the carbonic anhydride expired. Hence the respiratory quotient will be less than unity. The hydrates of carbon, glucose, starch, etc., contain just the quantity of oxygen necessary for converting their hydrogen into water, consequently their combustion produces a volume of carbonic anhydride equal to that of the oxygen consumed. The observations of the variations of the respiratory quotient have shown that during digestion of amylaceous food the quotient expressing the relation of carbonic anhydride to oxygen increases and approximates towards unity. It has also been shown by Hanriot and C. Richet (*Comptes Rendus*, 1887–8) that the relation may become greater than unity, showing that there is then something more than a simple combustion of carbohydrates. Further investigation of this subject has shown that the respiratory quotient always exceeds unity when a fasting individual takes a carbohydrate distributed through a large quantity of water. When taking, for instance, 50 grammes of glucose dissolved in a litre of water the relation rises to about 1·25. In this case the oxygen contained in the carbonic anhydride expired being more than that absorbed in respiration, it is evident that the excess must come from the carbohydrates, which are converted in the organism into carbonic anhydride and some other substance containing less oxygen. But it might be objected that this change may take place in the intestine by a true butyric fermentation or otherwise. In fact, Hanriot and Richet have shown that carbonic anhydride introduced into the intestine is rapidly absorbed and eliminated by respiration. To dispose of that hypothesis Hanriot has observed the respiratory quotient in the case of an individual in whom intestinal fermentation was prevented by continuous administration of naphthol, and it was found that naphthol had no influence upon the expiration of an excess of carbonic anhydride when amylaceous food was taken, showing clearly that the excess did not proceed from intestinal fermentation. The observations of Boussingault, Persoz, etc., have shown that animals may contain more fat than the food they have consumed, and hence Hanriot infers that glucose may be converted into fat in the organism according to the equation:—

$$13C_6H_{12}O_6 = C_{55}H_{104}O_6 + 23CO_2 + 26H_2O,$$

which shows that 100 grammes of glucose thus converted into fat would produce 21·8 litres of carbonic anhydride. Upon this supposition the respiratory quotient has been observed in a fasting individual, then after giving known quantities of glucose dissolved in a large quantity of water, and these observations have been continued until the respiratory quotient became the same as it was at commencement of the experiment. By calculating the quantity of carbonic anhydride which should have been produced by the oxygen absorbed, the quantity of glucose transformed into fat was indicated by the difference between that calculated quantity and the quantity found to be expired. The results of these observations were found to be as much in accordance with the theory as could be expected in such a case, and they are considered to show that glucose does not undergo in the organism a simple combustion or conversion into glycogen, but that it is quantitatively converted into fat. M. A. Gautier, in presenting the foregoing memoir to the academy, remarked that some twelve years ago he had shown that, contrary to general opinion, even warm-blooded animals live to a great extent after the manner of anærobic beings. That important proposition was based upon two kinds of evidence. On the one hand it was shown that ptomaines and other reducing products of bacterial fermentation, are also produced in the tissues of the body and can be detected in the excretions. On the other hand it was shown that in the higher animals, in which the tissues seem to be impregnated with an excess of oxygen, for five parts of oxygen contained in the excretions there are but four parts of oxygen supplied by the inspired air, so that about one-fifth of the excretal oxygen is furnished by direct fermentative transformation of food material without the intervention of atmospheric oxygen. It is to these anærobic transformations of the tissues and the food that the formation of fat in the animal economy from carbohydrates is to be ascribed (*Chimie biologique*, p. 767). Hanriot's observations are considered to support the formation of fat in this way, and to be an interesting demonstration of the anærobic life of certain cells and their mode of acting like ferments, consistently with the ideas put forward in 1879 by Pasteur,* who says, "fermentation becomes a general phenomenon common to all living cells but possessing a particular habitude in the cells of ferments. . . . . All living things are the seat of phenomena of fermentation, their duration varying according to the conditions and duration of life without air, following upon the stimulus given by oxygen. . . . . A muscle in activity produces a volume of carbonic anhydride larger than that absorbed in the same time. That is only natural according to the new theory, since the carbonic anhydride so produced results from acts of fermentation which have no kind of necessary connection with the quantity of oxygen absorbed or fixed." These anærobic phenomena of fermentation are not confined to the transformation of carbohydrates in the animal organism; the reducing extractive materials of the tissues, the hydropyridic bases which are always present in them, though certainly in very small proportions, and even urea itself, in part at least, all originate from transformation of albuminoids by hydration and simultaneous loss of carbonic anhydride without intervention of oxygen conveyed by the blood. In short, those nitrogenous compounds are in themselves products of the anærobic fermentation of animal tissues (*Comptes Rendus*, cxiv., 371).

* Examen critique d'un ecrit posthume de Cl. Bernard sur la fermentation.

Barium Carbide C_2Ba.

A definite compound of barium and carbon has been obtained by Maquenne by direct combination. It is not altered by heating to redness, but is immediately decomposed by water, evolving gas which possesses all the properties of acetylene. Hence it is inferred that this compound corresponds to the compounds obtained by Berthelot by heating the alkali metals in an atmosphere of acetylene, carbonic oxide or carbonic anhydride, and to the calcium acetylide described by Wöhler, and that its decomposition by water is represented by the equation—

$$C_2Ba + 2H_2O = C_2H_2 + Ba(OH)_2.$$

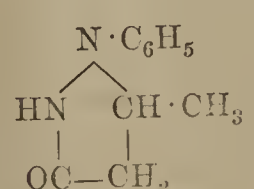
This synthetic production of acetylene is interesting in connection with the natural production of hydrocarbon compounds. Since acetylene is the starting point from which the synthesis of hydrocarbons was effected by Berthelot, an idea may thus be formed as to the origin of petroleum (*Comptes Rendus*, cxiv., 361).

Antipyrin and Isoantipyrin.

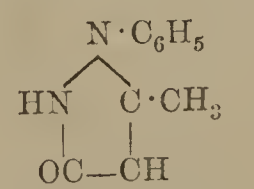
It has already been stated by Liederer that the method of producing antipyrin from β-halogen butyric acid and phenylhydrazin, which was made the subject of a patent by Böhringer and Sons, does not yield antipyrin but isoantipyrin. Liederer now describes the formation of this latter compound. A mixture of the potassium salt of β-bromo butyric acid, sodium acetate, and the calculated proportion of phenylhydrazin is left for some time *in vacuo*. When two sharply defined layers have been formed heat is applied to complete the reaction, and after cooling the mixture is extracted with ether. The aqueous liquor contains the greater part of the phenylhydrazin butyric acid, which is the intermediate product—

$$\begin{matrix} C_6H_5 \\ H_2N \end{matrix}\!\!>\!N - CH\!<\!\!\begin{matrix} CH_3 \\ CH_2COOH. \end{matrix}$$ Melting point 111° C.

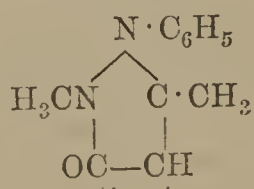
It is dissolved out with chloroform. The ether solution contains phenylmethyl hydroisopyrazolon. The asymmetric phenylhydrazin butyric acid heated with concentrated sulphuric acid to 100° C. is also converted into the pyrazolon. By crystallization from benzol it can be obtained in a stable and unstable modification. It melts at 127° C., dissolves readily in chloroform, hot alcohol or benzol, and sparingly in hot water. By oxidation with dilute solution of ferric chloride it loses two atoms of hydrogen and yields phenylmethyl isopyrazolon, which forms colourless needles melting at 167° C.



Pyrazolon.



Phenyl-methyl isopyrazolon.



Isoantipyrin.

It exists also in the unstable form, melting at 157° C. When heated to 100° C. with methyl iodide dissolved in methyl alcohol it is converted

into isoantipyrin, which forms crystals, melting at 113° C., readily soluble in water, alcohol or chloroform, and corresponds with antipyrin in antipyretic action. Both substances are separated from water solutions by caustic soda in the form of oil. The difference between these compounds is shown by the difficulty of crystallizing the isoantipyrin salicylate, while that of antipyrin (salipyrin) crystallizes readily. The picrate melts at 168°, antipyrin picrate at 187°. The nitro-compound of isoantipyrin crystallizes with great difficulty and deflagrates at 155°, while that of antipyrin crystallizes readily and deflagrates at 195° (*Journ. Prakt. Chem.*, xlv., 83).

Alcohol corresponding to Antipyrin.

Since ketones are readily convertible into alcohols and carbo-acids by the joint action of sodium and carbonic anhydride, as camphor $C_{10}H_{16}O$ is converted into borneol $C_{10}H_{17}OH$, and campho-carbonic acid $C_{10}H_{15}(CO_2H)O$, it seemed probable that compounds containing the carbonyl group, though not actually ketones, might be susceptible of the same alteration. Brühl has tested this point with antipyrin, and has obtained a crystalline product melting between 142° and 144°, the composition of which corresponds to the formula $C_{11}H_{14}N_2O$, and its alcoholic nature is inferred from the formation of a urethane when treated with phenyliso-cyanate and by combining with sodium to a compound which reacts with alkyl-iodides (*Berichte*, xxv., 395).

Piperazine Diethylemediamine.

At a meeting of the Pharmaceutical Society of Berlin, Finzelberg drew attention to the solvent action of this base upon uric acid. After referring to the evidence furnished by v. Thering and Kobert that piperazine is both innocuous and unaltered in the organism, and that it is almost completely excreted by the kidneys, he showed that in order to ensure the exercise of its full power of dissolving uric acid its retention in the blood for some time is desirable. For that reason it should not be administered in the form of pills or powders, but always in solution. In regard to the solvent action of piperazine upon calculi which contain besides uric acid oxalates, phosphates and carbonates, and upon the cementing material of calculi, it was suggested that since a 3 to 5 per cent. solution of piperazine does not produce irritation of the mucous membrane of the bladder, such a solution might be applied locally for the purpose of breaking down calculi of mixed composition. The difference between piperazine and Schreiner's spermine is shown by the double salts formed with bismuth iodide. In the discussion of the paper Dr. Hirsch stated that he had found the local application of a one per cent. solution of piperazine to open gouty sores relieved the pain and reduced the inflammation (*Pharm. Central.*, xxxiii., 145).

Artificial Human Milk.

According to the specification of a patent granted to Otto Dahm the difference between human milk and that of the cow consists chiefly in the preponderance of casein in the latter, while albumen preponderates in human milk. It is, therefore, proposed to add to cow's milk albumen in a form that is not susceptible of coagulation. Egg albumen or blood albumen containing as much or more water than white of egg is for that purpose heated to a temperature of 150° C. The coagulum formed at first is thus liquefied and then remains permanently uncoagulable.

Guaicol Carbonate.

The irritation produced by guaicol as well as by creasote, is in some instances sufficient to prevent their use, and it is proposed to overcome this difficulty by the substitution of the guaicol carbonate obtained by Seifert and Holscher. It is prepared by passing chlorocarbonic gas into a mixture of guaicol and caustic soda. The reaction taking place is represented by the equation—

$$2\,(C_6H_4\cdot OCH_3\cdot ONa) + COCl_2 = CO(O\cdot C_6H_4\cdot OCH_3)_2 + NaCl.$$

The product has the form of a crystalline powder, free from taste or smell, melting at 86°-90°, insoluble in water, sparingly soluble in cold alcohol, freely soluble in hot alcohol, ether, chloroform, or benzine. It has no irritating action upon the mucous membrane and does not disturb the digestive organs. In the healthy stomach it is unaltered, but is split up in the intestine by hydrolysis. In the stomach of persons suffering from phthisis a considerable decomposition is caused by the bacteria present, and thus their development is prevented. The small proportion of carbonic anhydride liberated is of little account, and the guaicol liberated is at once absorbed, so that there is no accumulation of it in the intestine. Within an hour of administration the presence of guaicol in the urine can be detected (*Berlin Klin. Wochensch.*).

Albumen in Urine.

Spiegler gives a very delicate test, which consists in floating the urine acidified with a little concentrated acetic acid upon the surface of a solution of mercuric chloride 8, tartaric acid 4, sugar 20, and water 200. This is done with a pipette, so that the liquids do not mix. If albumen is present a distinct white ring is formed at the line of contact. By this test one part of albumen in 150,000 can be at once detected, and with a solution of 1 in 225,000 a distinctly visible ring is produced after the lapse of a minute. One great advantage of this test is that there is no necessity for troublesome operations to make the urine clear. If a precipitate is produced by the addition of acetic acid it may be necessary to filter. Urine containing peptone does not give the reaction, but that containing propeptone does. The addition of sugar to the test solution is for the purpose of increasing the specific gravity to 1·060, and thus reducing the tendency to mix with the urine lying above it (*Berichte*, xxv., 375).

Bacteria in the Mouth.

Dellevie states that upwards of a hundred different micro-organisms have been found in the mouth. He also describes a streptococcus which he has cultivated and found to be very virulent in its action upon animals, showing a great resistance to antiseptics. The bacillus of pneumonia is often found in the saliva of healthy persons, and it may be inferred that it remains harmless only so long as the tissues of the lung are sound, but it may be the cause of abscesses in the surrounding of the teeth, and is often found in the processus mastoidens. Staphlococcus pyogenes aurens and streptococcus pyogenes are almost always found in the mouth, and they are the cause of the fur-producing property of saliva. The convicts in New Caledonia

take advantage of this fact by introducing detritus from the teeth under their skin to produce abscesses and render themselves unfit for work. Upon the strength of these facts and the probable modes of communication of disease by the mouth, the great necessity of careful antiseptic cleansing of the mouth and teeth is urged, and Dellevie recommends for that purpose as uninjurious to the teeth solutions of sublimate 1 in 1500, β-naphthol 1 in 1000, thymol 1 in 1000, salicylic acid 1 in 350, saccharin 1 in 250, benzoic acid 1 in 100. Dentists are also recommended to be particular in disinfecting their instruments (*Deutsch Med. Zeitung*).

Kolanin. Under this name Knebel describes a glucoside contained in kola nuts. It is very readily split up into kola red, glycose, and caffein, a change which, it is assumed, has already taken place to some extent in the nuts. By treatment of kolanin with acetylchloride an acetyl derivative of the kola red is obtained from the analysis of which the formula $C_{14}H_{13}(OH)_5$ is assigned to kola red. This is a substance very liable to alteration, and from its relation to tannin it is probably the source of the tannic acid in kola nuts. The circumstance mentioned by African travellers that in chewing fresh kola nuts the taste is first bitter and afterwards sweet may be due to the decomposition of the glucoside by the saliva (*Apotheker-Zeitung*, vii., 112).

Light Quinine Sulphate. Carles reports that when a few crystals of ammonium sulphate are added to a hot saturated solution of quinine sulphate and allowed to dissolve slowly the quinine salt crystallizes in a very voluminous form. In operating upon the large scale the ammonium sulphate crystals may be added to a portion of the solution to be crystallized, and when that becomes a thick paste by crystallization it may be mixed with the larger quantity and stirred until the whole crystallizes. About four grammes of the salt to one litre of solution gives the best result. The presence of the ammonium salt appears to act by reducing the solubility of the quinine sulphate, and as a further advantage much less remains dissolved in the mother liquor (*Bull. Soc. Chim.*, iv., 108).

Orthoxydiphenyl Carbonic Acid. This compound is recommended as an antiseptic, and is prepared under a German patent by exposing a dry mixture of ortho oxydiphenyl with one-fourth its weight of caustic soda in an atmosphere of carbonic anhydride to a temperature of 100° to 220° under pressure. The product is dissolved in water, and by the addition of hydrochloric acid theo oxydiphenyl carbonic acid is precipitated (*Zeitsch. f. Angew. Chem.*).

Analgen. Under this name a compound has been produced in Germany which is chemically orthooxethylanamonoacetylamidoquinoline. The idea has been to combine the acetamido- or ethoxy group with another nucleus having a pyretic action, and thus to produce a substance of high physiological action. The starting-point is o-oxyquinoline $C_9H_6(OH)N$, which is converted, by reaction in alcohol solution with caustic soda and ethylbromide, into o-oxyquinoline ethyl ether,

$$C_9H_6(OH)N + NaOH + C_2H_5Br = NaBr + H_2O + C_9H_6{\cdot}OC_2H_5{\cdot}N.$$

The product is nitrated and the mononitro-derivative $C_9H_6{\cdot}OC_2H_5{\cdot}NO_2N$, after being separated from some dinitro compound simultaneously formed, is reduced with zinc and hydrochloric acid to obtain the amido compound $C_9H_5OC_2H_5NH_2N + H_2O$. On boiling this with glacial acetic acid one atom of hydrogen in the amido group is replaced by CH_3CO, yielding the product sought,—

$$C_9H_5OC_2H_5NHCOCH_3N,$$

to which the name analgen is given. Administered to dogs in doses of 3 grammes every other day for several weeks it has been found to have no prejudicial action on the kidneys, the urine remaining free from blood albumen or sugar. Injected into guinea-pigs the toxic dose was from 2·5 to 3 grammes per kilo. In the organism the molecule is either completely broken up or the acetyl group is split off; but it has not been ascertained under what conditions one or other change takes place (*Apotheker Zeitung*, vii., 142).

Mercuric pyroborate $HgBr_4O_7$. The use of this salt in the antiseptic dressing of wounds is recommended by Tokayer (*Pharm. Post*, xxv., 156). It is prepared by adding a solution of 76 grammes of crystallized borax in a litre of water to a solution of 54 grammes mercuric chloride in the same quantity of water and stirring the mixture meanwhile. The operation should be performed in a dark place. After the precipitate settles it is to be washed with water until the washing gives no chlorine reaction and dried in a dark, cool place. It has then the form of a brown amorphous powder insoluble in water, alcohol, or ether.

New Method of Organic Analysis. Berthelot has devised a method by which the substance is burnt in an atmosphere of oxygen under pressure in a calorimetric bomb. The combustion is thus instantaneous and complete. The gaseous products are absorbed as usual in a system of tubes containing sulphuric acid and potash solution. The determination of carbon is thus effected with great precision, but the determination of hydrogen is rather more complicated. Sulphur may be determined in this way in organic compounds very expeditiously (*Comptes Rendus*, cxiv., 317).

Hæmogallol and Hæmol. Kobert has pointed out that iron preparations which pass slowly into the urine are much more adapted for the development of hæmoglobin than those which are excreted in the fœces. Of such a nature are the hæmatogen of yolk of egg, crystallized hæmoglobin and hæmatin. But the absorbent power of the intestine in anæmic subjects is so feeble that the reduction which, under normal conditions, those blood preparations would undergo in the intestine, must be effected out of the organism. With that object hæmoglobin is treated with pyrogallol, and the insoluble brownish-red product—hæmogallol—is thoroughly washed to remove adhering pyrogallol. It has been found very useful in cases of chlorosis. The digestion is not disturbed and the anæmia disappears in a few weeks, although the iron supplied to the organism amounted to only 0·01 or 0·015 gramme daily. Kobert considers that the small quantity requisite for producing this effect is the advantage which this preparation has over other iron preparations. The other preparation—hæmol—recommended by Kobert is obtained from the zinc compound of hæmoglobin formed in

a precipitate when neutral blood is shaken with zinc dust and water. On separating the zinc from this precipitate hæmol is obtained in the form of a brown tasteless powder insoluble in water. These preparations are administered in doses of a teaspoonful with sugar or with chocolate in the form of pastiles (*Apotheker-Zeitung*, vii., 131).

Boron. According to Moissan (*Comptes Rendus*, cxiv., 319), boron has never been isolated in a state of purity. The substances obtained by Davy, Gay Lussac, Thenard, Deville and Wöhler, and others, as amorphous boron contained impurities derived from the reducing agents employed, or from the metallic vessels used. In some cases it contains compounds of boron with hydrogen and with nitrogen or sodium. On treatment with hydrochloric acid this substance yields a mixture of boron, sodium and iron boride, hydride and nitride and hydrated boric acid, which has hitherto been regarded as amorphous boron. In a subsequent memoir (*Comptes Rendus*, cxiv., 392), Moissan states that by the action of magnesium upon boric acid a product consisting of boron, magnesium boride and borate is obtained. By washing this with acids the borate is dissolved, together with the greater part of the boride, the remainder of which may be almost entirely separated by melting the residue with boric acid, which oxidizes the boride, so that by further washing amorphous boron is obtained containing only a minute quantity of nitride. By operating in crucibles lined with titanic acid the presence of the nitride can be obviated and pure amorphous boron obtained. The properties of this substance will be described in a future paper.

Metallic Nitrides. Maquenne, in continuing his investigation of these compounds (*ante*, 611), has obtained nitrides of barium and strontium which are metallic ammonias N_2B_3 and N_2Sr_3 corresponding to the lithium compound described at page 693. The constitution of these compounds, like that of magnesium nitride, may be represented by the formula

$$R''{=}N{-}R''{-}N{=}R''$$

which is analogous to that of triethylenediamine. Barium nitride appears to be relatively the most stable compound. When heated to redness it absorbs carbonic oxide energetically, yielding a mixture of baryta and barium cyanide, and the synthetic production of barium cyanide when baryta is acted upon by nitrogen and carbon at a high temperature may be partly due to such a reaction and to the formation of a barium nitride having a constitution analogous to the carbylamines of A. Gautier (*Comptes Rendus*, cxiv., 220).

Bacteria in Milk. The *New England Druggist* for March contains the gist of an article by W. T. Sedgwick and J. L. Batchelder on "Bacteriological Examination of the Boston Milk Supply." The authors find that milk from healthy cows as drawn through sterilized tubes is absolutely free from germs. Drawn by hand, however, into sterilized bottles, it yielded on examination 530 bacteria per cubic centimetre. Using the ordinary milk pail for its reception, 30,500 per c.c. were found at the end of the milking, whilst the average of fifteen samples from the tables of various families was 69,143 per c.c. In these cases the condition of the cows and stables was exceptionally good, while the milkmen were more than ordinarily clean and careful. Samples obtained from different parts of the country contained in some instances as many as 5,664,000 bacteria to the cubic centimetre.

Choline Neurine and Related Compounds. The great differences between the physiological actions of these derivatives of trimethylamine present a remarkable contrast to their close resemblance in chemical composition. Choline, $C_5H_{15}NO_2$, and betaine, $C_5H_{13}NO_3$, are comparatively innocuous, while muscarine, $C_5H_{15}NO_3$, and neurine, $C_5H_{13}NO$, are intensely poisonous. The investigation of this subject has recently been undertaken by Professor E. Schmidt and some of his pupils. Since muscarine as a product of the oxidation of choline has properties which place it as an aldehyde between choline and betaine, it is suggested that its toxic character must be connected with the presence of the aldehyde group $-CH_2-COH$ or $-CH_2-CH(OH)_2$, inasmuch as the groups $-CH_2-CH_2\cdot OH$ and $-CH_2-CO\cdot OH$ in combination with trimethylamine have no directly poisonous action. In the case of neurine, however, it is considered probable that its poisonous nature is connected with a double linking in the vinyl group $-CH=CH_2$. If that were the case the corresponding trimethylamine derivative with triple linking—acetenyl trimethylammonium hydroxyd—

$$(CH_3)_3\cdot N\cdot C{\equiv}CH$$
$$\quad\quad\quad

butes to the checking of bush-fires by the colonists. A table is appended showing the range in altitude of the various species; and nine plates, chiefly illustrating the characters derived from the older and younger leaves, anthers, flower-buds, fruit, etc. In the same volume Messrs. D. McAlpine and J. R. Remfrey have a paper on "The Transverse Sections of Petioles of Eucalypts as Aids to the Determination of Species." Sections of thirty different kinds are described and photographed, showing unmistakably, along with a general resemblance, differences which are more or less constant and readily recognizable for each species. The organs and parts chiefly relied on as furnishing specific characters are the epiderm, the hard bast, the xylem with its vessels, the cortical cavities, and the central canals. The size and shape of the transverse section of the petiole is also often characteristic.

Leaves of Eucalyptus. Sig. G. Briosi has undertaken an exhaustive investigation of the anatomical structure of the leaves of *Eucalyptus globulus*. The leaves are of three kinds, the cotyledons, the earlier horizontal, and the later vertical leaves, the last two passing into one another by insensible gradations. The vertical form is regarded by the author as an adaptation to the intensity of the light, in order to prevent too great transpiration. The glands in the leaves are apparently also a protection against the action of heat. They are distributed abundantly, but irregularly, through the tissue of the leaf, and occur even in organs which are destitute of stomates, as the petiole, receptacle, ovary, etc., and occasionally, though rarely, in the pith. They are of lysigenous origin, the neighbouring cells are modified in structure, the wall adjoining the gland no longer yielding the cellulose reaction; and these walls combine so completely that the gland has the appearance of a closed sac (Briosi, 'Ricerche intorno all' anatomia delle foglie dell' *Eucalyptus globulus*,' 23 pl., Milano).

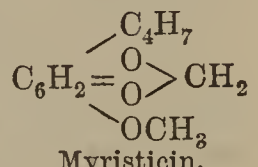
Eucalyptus Oil. Owing to the increased demand for this oil, works have been established at Kangaroo Island, South Australia, for its production from *E. cneorifolia*, D.C. The product is said to be of good quality. According to J. H. Maiden it differs from any other eucalyptus oil that he has examined in having a secondary odour of dill or caraway ('Notes on Australian Economic Botany,' p. 136).

Tubercle Bacilli in Sputum. According to the *Lancet*, Kitasato has recorded in the *Zeitschrift für Hygiene* the important fact that the great majority of tubercle bacilli found in sputum are dead. Inasmuch as dead bacilli stain as rapidly and as intensely as living ones, there is no means of distinguishing them microscopically. Hence recourse must be had to culture methods, and attempts in this direction with sputa have proved unsuccessful.

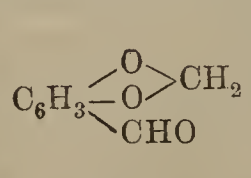
Chemistry of Chlorophyll. In the latest of his series of papers on this subject (*Proc. Roy. Soc.*, vol. l., 1892) Mr. E. Schunck describes the product resulting from the action of alkalies on chlorophyll, which he calls *alkachlorophyll*. It shows, in solution, a remarkable degree of permanence when exposed to the action of air and light, as compared to chlorophyll. It exhibits no signs of crystalline structure, is quite insoluble in boiling water and in petroleum ether, but soluble in alcohol, ether, chloroform, benzol, anilin and carbon bisulphide. Its solutions have a brilliant green colour, with a pronounced bluish tinge and a marked red fluorescence. The ethereal solution shows no less than six absorption bands.

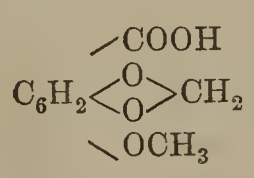
Composition of Starch. Herren C. Scheibler and H. Mittelmeier (*Ber. Deutsch. Chem. Gesellsch.*, vol. xxiii.) recur to the older view that starch is a mixture of two isomeric substances, granulose and starch cellulose, of which the former constitutes by far the largest proportion of the grains, so that nearly all the reactions usually assigned to starch are in fact those of granulose. It is readily transformed into soluble products by ferments and acids, which is not the case with starch cellulose. These writers classify the soluble carbohydrates into two principal groups, simple sugars and compound sugars; the latter, including maltose, milk sugar, and cane sugar, being formed by combinations of the former with loss of water, according to the formula $n(C_6H_{12}O_6)-(n-1)H_2O$. The so-called dextrin of commerce still contains sugar, from which it can be freed by precipitating three times by alcohol. Pure dextrin is still not an autonomous substance, but belongs to the class of carbohydrates which contain a free carbonyl.

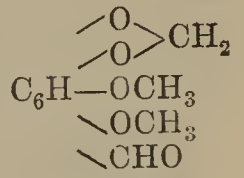
Myristicin $C_{12}H_{14}O_3$. This constituent of mace oil, the separation of which was announced some time ago, forms white crystals melting at 30°·25, and is now shown by F. W. Semmler (*Berichte*, xxiv., 3818) to be the butenyldioxymethylene-methoxyl derivative of benzene—


Myristicin.

By oxidation with potassium permanganate it yields myristicinic aldehyde $C_9H_8O_4$, the butenyl group (C_4H_7) being converted into the aldehyde group –CHO. Myristicinic aldehyde forms white crystals melting at 130°; it occupies a position intermediate between piperonal and apiolaldehyde—


Piperonal.


Myristicinic aldehyde.


Apiolaldehyde.

Further oxidation of the aldehyde yields myristicinic acid $C_9H_8O_5$, a yellowish-white crystalline substance melting at 208°–210°; by treating this with a strong reducing agent gallic acid is formed, from which Semmler infers that the three oxygen atoms attached to the benzene ring are in the ortho-position relatively to each other, and that the carboxyl group is in the meta-position to one of them.

Cell Contents. E. Belzung has succeeded in crystallizing the cell contents of plants *in situ* by immersion in glycerine, which he considers to be one of the best means of abstracting water and thus causing the crystallization of the substances in solution in the cells. The plants used were gathered one, two, or three weeks after germination in the light. In *Lupinus albus* asparagine and leucine were found. In *Lupinus luteus* asparagine is also found with sulphate of calcium, and tyrosine takes the place of leucine, but it has not been possible to make it crystallize inside the cells. *Cicer arietinum* contains

also asparagine, a very small proportion of sulphate of calcium, and xanthine, a body which was formerly considered to be a product of the putrefaction of albuminoids. This substance crystallizes slowly in the tissues in the form of little white filamentous bundles, which are quite characteristic, and when treated with nitric acid and potash give the rose-coloured reaction peculiar to this substance. *Cucurbita Pepo* contains very little asparagine, only traces of leucine, and no tyrosine, but nitrate of potassium in such quantity that it readily crystallizes in prisms when the tissues are immersed in glycerine. The presence of xanthine in living tissues, as one of the assimilable forms in which the nitrogen of the reserve substances is used during germination, is of considerable physiological interest (*Journ. Botanique*, vi., 49).

Chronic Arsenical Poisoning. A report appears in the *Lancet* for March 5 of an example of chronic arsenical poisoning on a large scale, occurring at the County Asylum, Berry Wood. Within a few months nearly every nurse on the staff had been under medical treatment for general ill-health. Drugs were of no avail, but a holiday invariably produced a good effect. Attention was at length attracted to some green curtains used in the nurses' rooms as coverings for dresses, etc. On examination these were found to be impregnated with a large proportion of arsenic. After their removal and thorough ventilation of the rooms the symptoms disappeared and have not since returned.

Inflammable Buttons. Professor Boys has recently called attention to the inflammable nature of articles manufactured from celluloid. In one particular instance some buttons exposed near a bright fire suddenly ignited. An imitation amber mouthpiece of a pipe has also been known to undergo rapid combustion when a lighted match was accidentally applied to it. Seeing that combs, hair-pins, billiard balls, and many other articles constantly exposed to heat rays are frequently made from this substance it appears to be necessary to exercise some care in making use of them.

Methylene Blue in Medicine. This colouring agent has of late been used in medicine, and, as it is found to have no ill effects, while it is excreted by the kidneys, colouring the urine a deep green, it is proposed to add it to medicines for hypochondriacs and malingerers. By this means it will be possible to ascertain whether the medicines have been taken or not.

Sulphur in Plants. Berthelot and G. André have made a large number of determinations of the amount of sulphur in the different parts of plants at various stages of their development, and existing as sulphates or in organic substances. They are of opinion that sulphur is taken up by the plants in both states, the organic compounds being oxidized with formation of sulphates in the stem, while the sulphates so formed and those taken up by the roots are partially reduced in the leaves. At the period of inflorescence reduction occurs chiefly in the flowers, volatile organic compounds of sulphur being formed and gradually given off. The total amount of sulphur gradually increases up to the commencement of flowering, then remains stationary or slightly diminishes; the proportion existing as organic compounds increases until the same period, and then decreases considerably, the decrease being apparently due partly to volatilization of sulphur compounds from the flower and partly to re-oxidation to sulphates. The highest total amount of sulphur present in any case was 1·2 per cent. of the dry weight of the plant in young plants of *Tropæolum majus*; the average amount was about ·5 per cent. The plants experimented with were *Sinapis alba*, *S. nigra*, *Camelina sativa*, *Allium cepa*, *Tropæolum majus*, *Lupinus albus*, and *Avena sativa* (*Ann. de Chem. et Phys.*, 6, xxv., 341).

Identification of a Yeast with Kephir. C. L. Mix (*Nature*, p. 471) has found a yeast in use in North America which is apparently identical with "kephir," the milk-ferment of the Caucasus. It occurs in the form of small granules of a dirty brown colour, which retain their vitality for a long period. They consist of a small proportion of yeast-cells, increasing by budding, embedded in zoogloœa-like masses of rod-shaped bacteria. Spore formation has not been detected, and cane-sugar is not inverted as with ordinary beer-yeast. Alcoholic fermentation is caused in milk-sugar and in dextrine, but not in cane sugar. The bacteria are short cylindrical rods with homogeneous protoplasm and develop under cultivation into leptothrix-like filaments in which spores form. Their part in the fermentative process is apparently *nil*.

Specific Gravity of Powdered Substances. W. J. Smeeth (*Zeits. Krystall*, 1891, 483, through *The Analyst*, p. 55) recommends warming vaseline in a watch glass to expel air bubbles, cooling, and weighing the whole in water. Remove from the water, again warm, and sprinkle a weighed quantity of the powder in question upon the surface of the vaseline. After cooling and again weighing in water the specific gravity is readily found.

Physical Properties of Fluorine. Moissan, continuing his researches on fluorine (*Ann. de Chem. et Phys.*, vi., 125), finds the density of the gas (air = 1) to be 1·26, the figure calculated from the atomic weight 19 being 1·316. The colour of fluorine is greenish-yellow, paler and more yellow than chlorine. Fluorine gives thirteen bright lines in the red portion of the spectrum, the rays having wave-lengths from 744 to 623 mkm.; when cooled to —95° it showed no signs of liquefaction at that temperature under normal pressure.

Occlusion of Hydrogen by Metals. G. Neumann and F. Streintz have further investigated the power possessed by certain metals of "occluding" or absorbing hydrogen when heated in contact with that gas (*Monatshefte*, xii., 10, 642). The metals were heated to a temperature rather above 450° C. in a current of hydrogen for several hours. Excess of hydrogen was then displaced by nitrogen. Oxygen was next passed through the cooled apparatus, and the whole again heated. In some cases, notably that of platinum, there was a considerable evolution of heat by the violent combination of the oxygen with the occluded hydrogen; the water thus formed was determined and from it the amount of hydrogen occluded was calculated. The results obtained in the case of gold, platinum, and copper were higher than those given by Graham; this is thought to be due to the fact that Graham displaced excess of hydrogen from the apparatus by means of air, by

which the greater part of the occluded hydrogen would be oxidized; the amount occluded was found also to be much less when less finely divided metal was employed.

Australian Anise. The fruit of *Seseli Harveyanum*, F. v. M., is said by Mr. Maiden to be locally used in Australia under the name of anise. It grows at an altitude of about 5000 feet on the Snowy Mountains. In appearance and flavour the fruits resemble those of Indian fennel rather than anise ('Notes on Australian Economic Botany,' p. 135).

Cherry Laurel Fruits. Camillo Vincent and Delachanal have ascertained that the fruits of *Prunus Lauro-Cerasus* contain mannite and sorbite probably in about equal proportions (*Comptes Rendus*, cxiv., p. 486).

Oil of Resin in Turpentine. Zune points out that it is easy by the use of the refractometer to discover the presence of 4 per cent. or less of resin oil in oil of turpentine, and that it is not very difficult to detect even 1 per cent. (*Comptes Rendus*, cxiv., p. 490).

Ptomaines of Infectious Diseases. A. B. Griffiths finds the ptomaine present in the urine of persons suffering from measles is glycocyamidine $C_3H_5N_3O$. It is very poisonous; administered to a cat it produced fever with a high temperature and death in thirty-six hours. The ptomaine obtained from the urine of patients suffering from whooping cough proves to have the composition $C_5H_{19}NO_2$, and it has also been obtained by direct cultivation of the bacillus which Afanassieff has identified as that of whooping cough. Neither of these ptomaines occurs in normal urine (*Comptes Rendus*, cxiv., 496).

Vinegar fatal to the Cholera Bacillus. K. Hashimoto, in the *Sei-i-kwai Med. Journ.*, xi., p. 7, finds as the result of numerous experiments made on artificial cultures that the cholera bacillus loses its vitality in fifteen minutes when immersed in vinegar, and that the vinegar can be used without fear of infection after that lapse of time. This agrees with the statement that the bacillus propagates in the alkaline fluid of the intestines and not in the stomach when the latter organ is acid from the presence of gastric juice.

Bacteria in Vaccine Lymph. Dr. Copeman has endeavoured to determine the nature and actual virus of vaccine. Culture experiments resulted in the development of various micrococci (*Pyogenes aureus*, *M. cereus flavus* and *M. albus* or *epidermis*). An organism, believed to be *streptococcus pyogenes*, was also obtained. Inoculations with pure cultures of each of these on the human being, calf and rabbits, produced nothing in the least resembling vaccination. In one instance a rabbit died apparently of septicæmia, but in the other cases there was but the most trifling inflammation. The specific organism, if any, could not be isolated, though special methods were adopted to separate it from other growths; and the experiments tended to show that, if such organism existed, it must have been killed in the course of the investigations. The central point of activity of the lymph is between 38° and 42° C., and the discovery of a suitable culture medium is now wanted (*Medical Press*, 2760, p. 313).

THE COCA PLANTS IN CULTIVATION.

Under the name *Erythroxylon Coca* several forms of the plant are at present in cultivation.*

It has been observed by various authors that certain differences exist between the leaves of the coca plant as grown in Peru and Bolivia. Poeppig remarks that in the Peruvian sort the under surface of the leaves is of a pale green, whilst in the Bolivian variety it is of a yellowish tint. Planchon and Triana ('Prodr. Floræ Novo-Granatensis,' p. 387) believe that the differences existing are such that the plants should probably be regarded as distinct species.

In commerce also differences are recognized between the imported leaves. Dr. Squibb remarks that the Bolivian leaves are larger, broader, and thicker, darker green above and lighter beneath, and show clearly the characteristic lines on the under surface. The Peruvian leaves, on the other hand, are described as being smaller, thinner, more brittle, of a clear light green colour on both sides, and not always showing the characteristic lines, especially in old leaves. The Bolivian are less valued than the Peruvian leaves, since they afford less alkaloid.

The lines here alluded to are found, one on each side of the midrib and running from base to apex, of the under surface of the leaf, but are evidently not in communication at either end with any of the veins of the leaf. On a transverse section of the leaf being examined under the microscope they are seen to be raised, and to consist of one to three layers of more or less rounded cells with collenchymatous thickening, but without any vascular bundle, and are therefore not of the nature of a leaf vein, but are formed by the pressure of the margin of the leaf, which is folded backwards in vernation.

In one of the varieties of coca (*E. Bolivianum*, Burck.), a line formed of similar tissue is found above the midrib, and is not only evident to the eye when the leaf is viewed laterally, but it can be felt by the finger nail. Four tolerably distinct forms of the coca plant are known.

1. The plant originally described by Lamarck in the *Encyclopédie Méthodique* (1786). This was illustrated by Cavanilles from specimens brought by J. de Jussieu from Peru. This figure is stated by Mr. W. T. Thiselton Dyer to agree perfectly with another figure given in the companion to the *Botanical Magazine*, in 1836, by Sir W. J. Hooker, from a dried plant collected by Matthews in the neighbourhood of Chinchao, Peru. In this drawing the leaves are ovate-lanceolate (see fig. 1). Lamarck does not give full details, but it is

Fig. 1.—Leaves of *Erythroxylon Coca*, Lam.

evident from his remark in his *Dictionnaire*, ii., p. 393 (1786), "leaves oval pointed," that he had this particular form of the plant in view, and it may be considered, according to Mr. W. T. Thiselton Dyer, as the true *Erythroxylon coca* of Lamarck. But it is remarkable that all the illustrations of the coca plant published since the time of Lamarck differ considerably

* These have formed the subject of a paper in "Teysmannia," by Dr. Burck, of Buitenzorg, Java, of which the following is an abstract.

from his, although they are taken from specimens collected in Peru and Bolivia, so that it would seem as if the form of the plant figured by Lamarck is not common in those countries. Moreover, no variety of coca leaves at present in commerce possesses ovate, pointed leaves, and as Lamarck's are said to be of a dark green colour, it is evident that his plant is not preferred for cultivation in Peru; nor has it ever been introduced into Java, British India, Jamaica, Trinidad or Australia, etc.

2. The second form is the one figured in the *Garden* (1876, p. 445). This figure was taken from a flowering specimen in the Economic House at Kew Gardens, and which was raised from seeds obtained from Huanuco; it has been cultivated at Kew since 1869. According to Mr. W. T. T. Dyer, it agrees perfectly with specimens collected by Triana in the valley of the Magdalena river (1851-57), and by Purdie, at Santa Martha, in New Granada (1845). Whether rightly or wrongly, this plant is held by Mr. Dyer to be a variety of *E. coca*, and is named after the country in which it was found, var. *Novo-Granatense*. This plant has been distributed from Kew to many correspondents in different parts of the world, but has not been introduced into Java, although cultivated in several of the colonies of British India.

3. The third variety of coca is figured in Le Maout and Decaisne 'Traité général de Botaniquè,' 1876, p. 332, and agrees perfectly with the one lately published in Engler and Prantl's 'Natürliche Pflanzenfamilien, Afl. 47, and with another in Baillon's 'Histoire des Plantes,' vol. v., p. 49-51, p. 80-87, 'Traité de Botanique médicale Phanerogamique,' Paris, 1884, p. 301, fig. 2612-2619, and in the 'Dictionnaire de Botanique,' p. 554-555. This variety is the plant cultivated in Java (see fig. 2). The plants from which all the forms cultivated in Java were derived were obtained in 1876 from the firm of Herman, Linden and Co., Ghent. This Java plant, leaves of which have been seen by Mr. Dyer, is considered by him to be an "intermediate form" between the varieties Nos. 1 and 2. According to him it agrees with the herbarium specimens collected in 1854 by Dr. Spruce on the banks of the Rio Negro, and is cultivated by the Agricultural Society of India at Alipore and at Darjeeling. It is especially characterized by its habit (see fig. 3), and by the tender green colour of the leaves, and differs from the variety *Novo-Granatense* in the form and in the apex of the leaf. It attains the height of 12 feet, but for convenience of plucking the leaves it is kept to the ordinary height of a man. The Java plant has the leaves tapering less below, so that they are broadest in the middle and the apex is not emarginate.

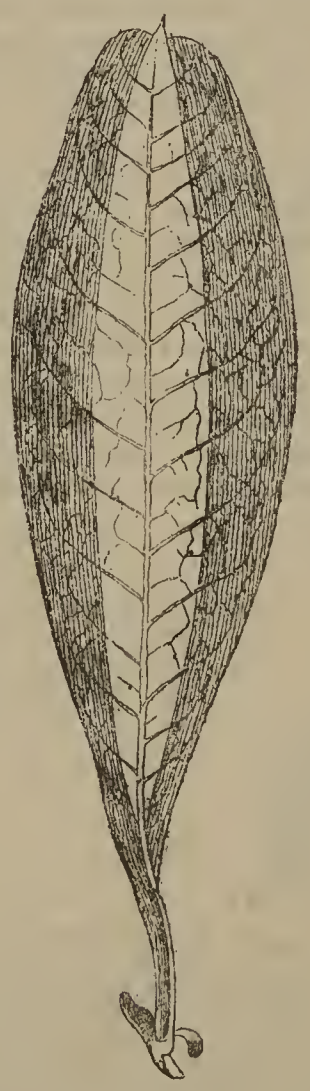


Fig. 2.—Leaf of *E. coca*, Lam., var. *Novo-Granatense*, Dyer.

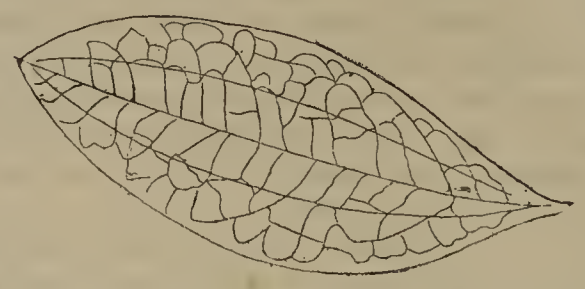


Fig. 3.—Leaf of *E. coca*, Lam., var. *Spruceanum*, Burck.

How far the plant should be regarded as an "intermediate form" cannot be ascertained without the examination of a large series of herbarium specimens, but it retains its peculiarities in different soils, from the level of the sea to an altitude of 5000 feet, and cannot therefore be considered as a geographical modification of the typical species. It is also difficult to say if it should be considered as a distinct species. It differs from Lamarck's plant in size, form and colour of the leaves, and in the habit of growth.

The plant of Lamarck is a shrub from 2 to 5 feet high and has dark green leaves. In any case it is a variety of the same value as *Novo-Granatense*, and I propose to give it the name of var. *Spruceanum*, after its discoverer.

4. The fourth variety of the plant is figured by Dr. Joseph Nevinny in 'Das Cocablatt, Eine pharmakognostiche Abhandlung,' Wien, 1885, and by Albert Niemann in 'Ueber eine neue organische Base in den Coca blattern,' Gottingen, 1860 (see figure 4). It differs in so many particulars from *E. Coca*, Lam., that I do not hesitate to describe it as a new species. Living plants of this species were received from Thomas Christy, of London, and subsequently in 1889, a quantity of seeds were received from the Calcutta Botanic Garden. Dried specimens have also been sent from the Director of the Botanical Garden at Peradeniya, Ceylon.

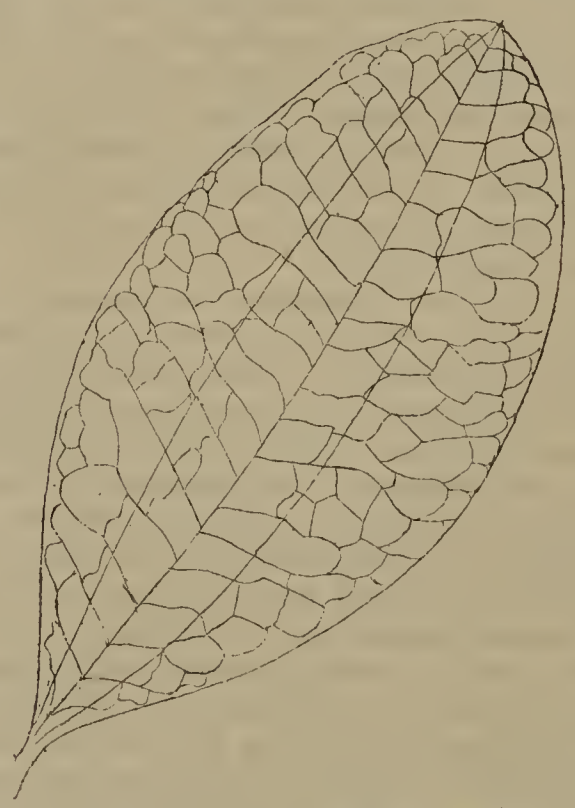


Fig. 4.—Leaf of *E. coca*, Lam., var. *Bolivianum*, Burck.

It appears to be commonly cultivated in British India. The leaves yield a very small quantity of alkaloid.

It differs from the three plants already described in its habit of growth. It attains a height of only two or three feet and the stem is very sparingly branched. The leaves are larger, more oval in outline, of a more leathery consistence, darker colour, and have a projecting line or ridge on the upper surface of the midrib. In these characters it entirely agrees with the leaves described by Squibb and others as imported from Bolivia. But of the eighty-two species described by Peyritsch in his monograph of the Erythroxyleæ (*Flora Brasiliensis*, Tase., 81), there is none corresponding to this plant, for which, therefore, I propose the name *Erythroxylon Bolivianum*, Burck.

Owing to the small quantity of alkaloid yielded by this species, it is important for planters to be able to distinguish it from the richer variety here named *E. Coca*, var. *Spruceanum*, and for this purpose the following detailed description may prove useful.

Erythroxylon Coca, var. *Spruceanum*.—Leaves oval, becoming smaller above the middle, the midrib ending in a short excurrent point. Leaves tapering below into the leaf stalk, 4 to 6 centimetres long and 1½ to 2½ centimetres broad, marked on the under surface with two lines, and having no ridge on the upper surface of the midrib. Leaves thinner than in *E. Bolivianum*, light green above and paler below. Shrub much branched and very leafy, about twelve feet high. Flowers white in axillary clusters, consisting of rarely more than five flowers.

The percentage of alkaloid in the young leaves is given by Dr. Greshoff as 2·21 p.c., and according to the analysis of Zimmer and Co., of Frankfort, as 2·10 p.c. The yield of old leaves, according to Dr. Greshoff's analysis, is 0·86 p.c.*

According to Giesel (*Berichte*, vol. xxiv., p. 2336) the cultivated small-leaved Java coca contains 2 per cent. of alkaloids, but very little of it is cocaine; the principal constituents form uncrystallizable cinnamyl compounds. He also finds in the Java leaves a compound he describes as benzoyl tropeine. He calculates the cinnamyl cocaine to amount to about one-tenth per cent.

E. Bolivianum, Brck.—Leaves broadly elliptical, broader above the middle and less tapering, the midrib ending in a short excurrent point; tapering below, in length 5-8 centimetres and in breadth 2½ to 4 centimetres. On the under surface two lines are visible and on the upper surface of the midrib there is a distinct ridge or crest. The leaves are more coriaceous, green above and pale beneath. Shrub slightly branched, 2½ to 3 feet high. Flowers, yellow, green, except the stamens, which are white. Clusters of flowers, often consisting of ten, generally of five or more than five blossoms. The percentage of alkaloid in the young leaves is 0·55 p.c. According to Dr. Van Romburgh, Nevinny obtained 0·22 and Niemann 0·25 p.c. All the specimens of coca leaves analysed at Buitenzorg underwent the same treatment before analysis, were cultivated on the same soil in the garden of Tjikeumeuh, and were analysed by the same process.

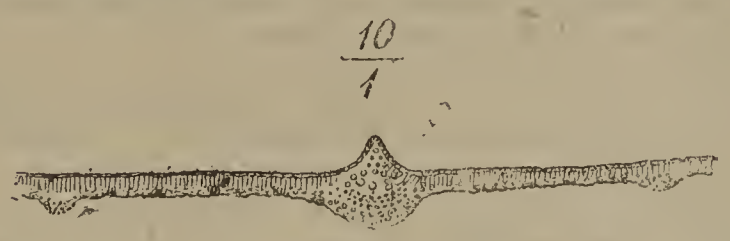


Fig. 5.—T.S. leaf of *E. Bolivianum*, showing ridge or midrib.

About three years ago Erera found by micro-chemical investigations that in some plants the alkaloids were more abundant in the young and still growing leaves than in the fully mature and old leaves. Led by this result Dr. Greshoff made some experiments to ascertain if the same rule applies to coca leaves, and found that young leaves gave more than double the amount of alkaloid yielded by the older leaves gathered at the same time. If, therefore, the upper leaves or tops of the shoots are removed so as to force the growth of new leaves from the axils of the older ones, it will be possible not only to obtain a larger supply of young leaves, but the growth of the plant will be increased in circumference by lateral branching. It has been observed also by Dr. Greshoff that leaves dried by exposure to direct sunlight lose a proportion of their alkaloid, thus confirming the results previously obtained by Dr. Howard. Imperfectly dried leaves, especially when packed, are apt to ferment, as noticed by Bignon (*Jahresber. f. Pharmacognosie*, 1886, p. 43), and lose their alkaloid. Even by long keeping, according to Pfeiffer (*l. c.*, 1887) a gradual diminution in the quantity of alkaloid takes place, so that at the end of three years leaves which a month after collection afforded 0·5 p.c. would cease to contain any alkaloid. It is important, therefore, that the leaves should be dried as quickly as possible in the shade, and be used as soon as practicable after being dried.

Altitude does not appear to have any effect upon the yield of alkaloid, no difference in the percentage obtained being perceptible in plants growing respectively at 800 and 4000 feet above the sea level. Some plants in any plantation are generally richer than others, and these if selected and propagated by cuttings might furnish plants affording a still higher percentage of cocaine than has yet been obtained. It does not appear probable that in Peru and Bolivia, where there is such a large demand for the leaves, and where they are judged chiefly by taste, that much attention will be paid to the alkaloidal contents, and therefore there is the greater chance of the article cultivated with care in the colonies holding a position in the market. It might, therefore, form one out of several products grown in plantations, and be utilized when the market rate pays for the collection.

* It is doubtful how much of the percentage of alkaloid here given should be reckoned as pure cocaine. It has been stated by Dr. O. Hesse (*Pharm. Journ.*, [3], vol. xxi., pp. 1109-1117 and 1129-1135, and vol. xxii., pp. 101, 102) since the publication of Dr. Burck's paper, that Java coca leaves contain truxilline (isatropyl-cocaine) in considerable amount (and if the "Paris" coca leaves examined by him came from Java, a considerable percentage, 0·6, of cocamine also). Although the Java leaves yielded to Hesse 1·2 per cent. of alkaloids, only a quarter of that quantity proved to be true cocaine. In the large leaved coca (*E. Bolivianum*, Burck) from South America Hesse found 0·7 to 0·9 per cent. of alkaloids, of which the greater part consists of cocaine, with some cocaidine, and rarely cinnamylecgonine methyl-ester.

In the narrow leaved, or Truxillo coca leaves (*E. Coca*, var. *Novo-Granatense*) from South America he also found 0·7 to 0·9 per cent. of alkaloids, of which about half only consisted of cocaine, the remainder containing cinnamylecgonine methyl-ester, which occurs regularly and sometimes in considerable quantity in this variety of coca. It would thus appear that both the South American varieties, viz., *E. Coca*, var. *Novo-Granatense* and *E. Bolivianum* contain more cocaine than the Java plant (*E. Coca*, var. *Spruceanum*). If the conclusions of Dr. Hesse are confirmed, it follows not only that the Java plant contains less cocaine, but that it will be an unsatisfactory source of that alkaloid, on account of containing so much isatropyl-cocaine, which is stated by Liebreich to be a poisonous base (*Pharm. Journ.*, xix., p. 245). It is evident that further experiment is needed to show how far the percentage of cocaine and the other alkaloids is affected by altitude, climate, soil, exposure to light, and care in drying and packing the leaves, before any definite conclusion can be attained concerning the best variety for cultivation. In the meanwhile it is well that Dr. Burck has now rendered is possible to distinguish the varieties of the plant under cultivation.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, APRIL 2, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

PHARMACY AND MEDICINE IN THEIR RELATIONS TO THE PUBLIC.

THE task undertaken by Dr. RENTOUL in the paper read by him at the meeting of the Liverpool Chemists' Association, was one of a formidable character. The ownership of physicians' prescriptions, the relations between medical practitioners, pharmacists and the public, the irregular sale of poisons and the Medicine Stamp Act are subjects which may present themselves in so many different aspects to different persons, that each one of them would afford ample material for separate consideration. Moreover, the connection between them appears to be so much more accidental than natural, that there is in some respects a distinct disadvantage in associating them together. This is especially shown by the reference to the sale of poisons in the form of secret remedies, and to the repetition and dispensing of prescriptions. Granting that both may be attended with similar and equally prejudicial consequences, we fail to perceive that the existence of one source of evil can in any way justify the continuance of the other. However objectionable it may be that physicians' prescriptions should be made the means of obtaining a repeated supply of dangerous and poisonous medicines, the fact that such a practice exists cannot, from any point of view, be a reason for tolerating the indiscriminate sale, in a concealed form, of articles which are poisons within the meaning of the law, and are thereby made subject to certain restrictions in their sale. Though the actual or possible injury to the public may be the same in both instances the causes of the injury are so essentially different that their removal requires to be attempted by totally different methods. Medical authorities and coroners are unanimously of opinion that the concealed sale of poisons in the form of secret remedies is a great source of danger to the public, and if that opinion be well founded the fact that public safety is thus prejudiced should be sufficient ground for putting a stop to that practice altogether, apart from considerations of mischief that may result from repeated dispensing of prescriptions in which the same poisonous medicines are ordered. The remedy in this latter case, as we have repeatedly pointed out in this Journal, is absolutely in the hands of the prescriber. In the former case it is only necessary that the question whether the practice be legal or illegal should be determined. If it be illegal a remedy exists, and if it be legal there may be reason for seeking further legislation. But with regard to physicians' prescriptions the tendency of popular opinion and even the sanction of medical authority, is so much in favour of the patient's ownership of a prescription, that any desirable restriction of its use must be imposed by the prescriber at the time when his professional services are rendered. The business of the chemist is faithfully to dispense the medicine ordered in a prescription, and even when he has doubts as to the propriety of repeating the supply, the recognized opinion as to ownership of a prescription offers a serious obstacle to his refusal to comply with his customer's demand.

It is satisfactory to find that throughout the whole of Dr. RENTOUL's paper evidence is given of an appreciative and considerate view of the position of chemists, and of the difficulties they have to deal with. We refer to this fact the more especially because, while recognizing his friendly feeling towards chemists as a body, we cannot generally agree with the particular opinions he puts forward. In common with many other medical men Dr. RENTOUL considers that a repeal of the Medicine Stamp Act is a thing very desirable and calculated to serve as a remedy for certain of the evils of which they complain. That opinion appears to be chiefly based upon the assumption that the medicine stamp legalises the sale of poisons without observance of the provisions of the Pharmacy Act. This is a misconception so commonly prevalent that it is worth while pointing out how utterly unfounded it is. So far from the Medicine Stamp Act being any protection to the proprietors of either secret or patent medicines it imposes upon the sale of those preparations a tax, which is indeed chiefly paid by the public, but is not the less to be regarded as a barrier to the sale of secret remedies. The removal of that tax by the repeal of the Act would in fact facilitate the sale of these preparations by doing away with the restrictions to which their sale is subjected by that Act. So far as the Medicine Stamp Act is concerned such a step would be rather in favour of the proprietors of secret remedies than a removal of protection. But there is a further misconception which has been very generally acted upon, viz., that secret medicines are not subject to the restrictions imposed by subsequent Acts of Parliament, and more particularly the Pharmacy Act by which the sale of poisons is regulated. Patented medicines are exempted from the provisions of this Act, but in the case of patented medicines the fact of

their containing poisons would be known from the specifications relating to them. By means of the information thus furnished it would be possible to observe the precautions requisite in regard to preparations containing poison. That is not the case with secret medicines, and when they contain poison the fact is concealed. It is in this concealment of the presence of poison that the danger lies of which medical authorities complain, and it is to that point attention requires to be directed. Legal authorities have for some years past expressed the opinion that the terms of the Pharmacy Act by which patent medicines are exempted from its provisions mean no more than they say, and that secret medicines containing poison within the meaning of the Act are not exempt from its provisions. If that view should be upheld by a judicial decision all such articles must be labelled poison. As a consequence their sale would be restricted to registered chemists, and no doubt the Pharmaceutical Society would be called upon to enforce the Act in that sense. However, since the Pharmacy Act was passed for the protection of public safety it is from that point of view alone that action must be taken in the first instance. No consideration of trade interest, either of the proprietors of secret medicines or of chemists, should be introduced, and whenever the question is raised it will have to be decided simply as one affecting the safety of the public.

With regard to the dispensing of medicine and prescribing, Dr. RENTOUL is naturally disposed to look upon the perfect separation of those functions, as being eminently desirable. So far we are in complete accord with him, and we believe that opinion will be shared by the great majority of pharmacists in this country. But at the same time it must be admitted that the prospect of realizing such a separation is very remote. So far as Dr. RENTOUL'S remarks on this subject are indicative of a desire that the separation should be attempted by legislative enactment, we must entirely differ from him as to the desirability or feasibility of such a course. Reference to the conditions prevailing on the continent does not alter the case, or furnish any encouragement of the hope that such conditions may be established in this country. There is no parallel between the two cases. Protection of class interests and even restriction of the liberty of the subject are accepted more readily in continental countries than they are likely to be in this country, where neither usage nor the tendency of popular opinion favours legislative enactments having these objects. The disposition to dabble with physic, which is more or less common to everyone, has with us been promoted rather than checked by the example of medical practitioners in past times, and even at the present day the right to practise medicine is not reserved to any special class. It would therefore be unreasonable to attempt by legislation to debar those whose particular business is the preparation of medicines from supplying such simple remedies as cough mixtures, etc., while persons who have no kind of knowledge of medicines were left at liberty to do the same thing. It is not, therefore, by legislation that any settlement of the questions as to prescribing and dispensing can be hoped for. That can only be approached on the basis of ethical considerations, and by the recognition on the part of both chemists and medical men of a reciprocity of interests. We do not intend to suggest that the views expressed in Dr. RENTOUL'S paper are not the outcome of a laudable desire on his part to improve the relations existing between medical men, pharmacists, and the public, and to regulate the exercise of their respective functions in a more suitable manner. But it appears to us that in his endeavours to contribute to that result he has laid too much stress upon the possibility of effecting the object he has in view by means of amended legislation, and that he has not sufficiently taken account of what may be effected by a more active administration of existing law. Above all, however, it is by the cultivation of better relations between the medical profession and the body now legally recognized as qualified for the performance of pharmaceutical duties that there is the best prospect of arriving at results which will be mutually advantageous to them and also conducive to the welfare of the public.

THE HISTORY OF ANÆSTHESIA.

IN the current number of *Longman's Magazine* there is a very interesting article by Dr. B. W. RICHARDSON, entitled "The Mastery of Pain," in which he gives an account of the history of anæsthesia, which he regards as one of the scientific triumphs of the century. Commencing with a quotation of Sir HUMPHREY DAVY'S description of the effects of nitrous oxide gas upon himself in 1800 and a mention of the still older attempts to produce insensibility to pain by the use of mandragora it is shown that DAVY'S discovery lay dormant for more than forty years until an American dentist, HORACE WELLS, tried the use of the gas, and shortly afterwards ether was used for the same purpose. The first serious surgical operation under the influence of ether was performed by LISTON in 1846, and the success with which it was attended gave an immediate impetus to the application of anæsthetics in surgery. In connection with the earlier stage of the subsequent use of chloroform Dr. RICHARDSON mentions that JACOB BELL was one of the first to suggest the trial of what was then known as chloric ether, which was at his instance used at Middlesex Hospital and at Bartholomew's by LAWRENCE. It did not, however,

occur to him to try chloroform without the admixture of alcohol. That step was taken in 1847 by WALDIE of Liverpool, at whose suggestion SIMPSON made the experiments of which he gave an account to the Medico-Chirurgical Society of Edinburgh in the same year. From that time the use of anæsthetic agents became general, and by one of the inexplicable frolics of fortune, though SIMPSON was only the seventh on the list of expositors of anæsthesia the process was so associated with his name that for almost a generation he was believed to have been its originator. Among the various disparagements of anæsthesia which have been urged by its opponents, that relating to the mortality it causes is regarded by Dr. RICHARDSON as the only one which merits serious consideration. He considers that anæsthesia is perhaps necessarily attended with a certain amount of danger. But admitting the risk which still accompanies the effort to master pain, the fact that lives are saved by anæsthesia which would not be saved without it, is in Dr. RICHARDSON'S opinion a sufficient justification for having recourse to it. He thinks good reason may also be found for the inference that many instances of death, occurring under but not from the anæsthetic, have occurred in the same way as sometimes happened when no anæsthetic process was known. There is, however, still the hope that a better and safer agent may yet be discovered.

A letter has been received from the Coroner for Devon, presumably intended as a reply to the remarks upon the inquest at Salcombe, which appeared in this Journal last week. It is but fair that he should have an opportunity of giving some better explanation than that contained in his letter to the local newspaper, and for that reason the letter is published at page 827. But it must also be stated that we fail to recognize in this letter any justification of the position taken by the coroner at the inquest. No question has been raised as to whether his remarks were or were not "intended as a general exposition of the Pharmacy Acts." The objection urged in this Journal applied to the coroner's remarks "with reference only to the special circumstances of the case," viz., that, in reference to laudanum, "although the medicine might be made up from a prescription it is necessary to mark the label on the bottle 'poison.'" This remark was repeated several times by the coroner with the implication that there had been a breach of the law, and that Mr. Stewart might still be prosecuted on that ground. Whether well founded or not these remarks appear to us to convey censure. But they are chiefly objectionable because they are in direct opposition to the law. As to the omission of some ingredient of the medicine mentioned in the fuller report, which has only been received this morning, it appears that the drachm of bismuth nitrate was omitted by request of the person to whom the medicine was supplied. But we cannot perceive that, so far as the law is concerned, this circumstance has anything to do with the assumed necessity for the "poison" label on medicine. These are the facts which led us to remark that coroners sometimes stand in need of a better knowledge of the law, and we are still of opinion that the coroner for Devon has given evidence that such is the case.

* * *

We understand that the recent election of Mr. Gwilym Evans as Chairman of the Carmarthenshire County Council and his special appointment in connection with the Welsh Intermediate Education and Technical Instruction Acts, will have the result of depriving the Society of his services as a member of the Council. Mr. Evans finds that his various official occupations make such a call upon his time that he has decided not to seek re-election next May.

* * *

The interval that has elapsed since the postponement of the Chemists' Ball in consequence of the death of the Duke of Clarence and Avondale may possibly have had the effect of causing that annual festivity to be forgotten by some. We are, therefore, requested to call attention to the fact that the time at which the Ball is to take place is now approaching, as will be seen by the advertisement which appears in this week's Journal, which furnishes all requisite information as to obtaining tickets, etc. We may, however, mention that the tickets issued for January 20 will be available for April 20.

* * *

It is with much regret that we have to announce that the number of the Society's divisional secretaries has been reduced by the death of Mr. Walter Edward Haden, who held that office for the Bow and Bromley division of the Tower Hamlets. Mr. Haden was a pharmaceutical chemist, and has been a member of the Society since 1881. At the time of his death he was only thirty-three years of age.

* * *

The second anniversary dinner of the Chemical Society was held last Wednesday at the Whitehall Rooms of the Hôtel Métropole. The chair was taken by Professor Crum Brown, the President. Among the guests were Sir Joseph Lister, the Treasurer of the Royal Institution, the Presidents of the Physical Society, the Institute of Electrical Engineers, the Pharmaceutical Society, the Institute of Chemistry and the Society of Public Analysts.

* * *

It is proposed by the Fellows of the Chemical Society to present an address to Professor Bunsen, on the occasion of his jubilee as a foreign member of the Society.

* * *

Dr. Ludwig Andreas Buchner, the professor of pharmacy in the University of Munich, will shortly celebrate the fiftieth anniversary of his appointment to the position of a teacher.

* * *

The use of liquid carbonic anhydride is very extensive in Germany, according to the *Apotheker-Zeitung* no less than 150,000 iron cylinders being in use for its transport. The price is now reduced by excessive competition to about fivepence per kilo. It is stated that owing to the presence of some slight impurity the use of the compressed gas in drawing beer communicates to the beer a flavour which is at once detected by experienced consumers.

Proceedings of Societies in London.

BRITISH PHARMACEUTICAL CONFERENCE.

A meeting of the Executive Committee was held at 17, Bloomsbury Square, on Thursday, March 24, at 4.30 p.m.

Present—Mr. E. C. C. Stanford, President, in the chair; Messrs. M. Carteighe, A. W. Gerrard, E. M. Holmes, and J. Hodgkin; Messrs. W. A. H. Naylor and F. Ransom (Hon. Gen. Secs.), and Mr. M. Johnson (Assist. Sec.).

The minutes of the previous meeting were read and confirmed.

A communication was read from the editor of the 'Year-Book,' containing suggestions relating to the earlier publication of this annual volume.

Mr. Siebold was thanked for his letter, and it was agreed to accept his proposals.

Reference was made by the President to the death of Dr. Redwood, and the following resolution was unanimously passed:—"The Committee desire to place on record the great loss which the Conference has sustained in the death of Emeritus Professor Redwood, a past President whose help and advice, in the early days of its existence, were of great assistance, and whose continued interest was shown by his active participation in the recent meeting of the Conference at Cardiff."

Mr. W. A. H. Naylor reported that the meeting of the Committee appointed by the Council of the Pharmaceutical Society, and the delegates from the Executive of the Conference was held in February last, when the question of the Society holding annual meetings at provincial centres and the probable effect of the proposed innovations on the Conference was discussed, with the result that there appeared no promise that a further consideration of the matter would be likely to lead to any advantageous issue.

A letter was read from Mr. Peter Boa (Hon. Local Secretary) stating that the arrangements for the meeting of the Conference in Edinburgh were progressing satisfactorily.

An application from Mr. R. A. Cripps for a supplementary grant in aid of his research work on ipecacuanha was granted.

Several gentlemen having been duly nominated were elected to membership.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The second general meeting was held at the Royal Institution, March 24, Mr. J. S. Ward, President, in the chair.

Dr. R. R. Rentoul read a paper on—

The Obligations of Medical Practitioners and Chemists to Each Other and to the Public.

Although the above title has been selected, reference will be made in this paper to questions relating not only to the ownership of prescriptions, but also to dispensing practitioners and prescribing chemists; and to the Medical Stamp Act. This is done because these subjects, although apparently distinct, are intimately associated. For some time I have enquired into the different laws and customs relating to prescriptions, the duties of practitioners and chemists to the public, and to patent medicines. At the last meeting of the British Medical Association I gave notice of motions relating to the two latter subjects. Since then, I have moved no further, and for this reason. The question has been put to me, is there any use in trying to put a stop to the supply of dangerous and poisonous patent medicines, when at the same time equally dangerous and poisonous medicines can be supplied by chemists, either by their repeating a practitioner's prescription an indefinite number of times, or by prescribing and supplying proprietary or other dangerous medicines? Murrell, in his work on poisons, states that about 15,000 children are killed every year by "soothing syrups" and other similar concoctions. But if a person can insist upon a chemist compounding a prescription, which contains a drug equally dangerous and poisonous to that in the patent mixture, wherein lies the difference between these two evils? Therefore, my point is that, until practitioners and chemists first of all decide as to the necessity of retaining the prescription, and refusing to compound it upon a second occasion unless instructed to do so by the practitioner, and until we come to some practical finding as to dispensing practitioners and prescribing chemists, we had better not move in the direction of any attempt for a repeal of the Medicine Stamp Act. We know that large quantities of chloral, chloroform, laudanum, chlorodyne and such like dangerous drugs are consumed, both through the repeating *ad infinitum* of a prescription, or through the consumption of patent and proprietary medicines. This is a form of trading which is as much to be condemned as is the action of the publican who supplies alcohol to the chronic or acutely affected inebriate.

To whom then does a prescription belong? The practitioner, chemist, patient, I am told, each lay claim to it. I hold that it is the property of the practitioner, and that it is simply a written instruction to the chemist from the practitioner. It is as much so as is a note from a practitioner to an instrument maker in which directions are given as to how a splint is to be made and how it is to be used. The fact that the directions as to the compounding and mode of administration are in Latin, shows that it is not for the patient, as the average patient cannot read Latin. We know that the superscription, subscription and inscription read thus: "Let the compounder take" so and so, "let him make" so and so, "let the patient take." All these directions, be it observed, are to the chemist and not to the patient. It has been suggested that prescriptions should be written in English. I hope the Latin style will be retained. If practitioners be permitted to pass the examining bodies unable to write a prescription accurately in Latin, this is to the discredit of those bodies. It is further important that we retain the Latin, as we may wish to conceal the names of ingredients. Also, because a prescription written in Latin can be understood throughout Europe and America. I have elsewhere pointed out that if the prescription is not the property of the practitioner he has no right to deface it. He would, for instance, not possess the power to write across it the words "not to be repeated," a very necessary injunction when prescribing morphine, chloral, and other dangerous remedies. Now it is well known a practitioner possesses this right, thus showing that he does not give away his future control of the prescription. Last January this point was settled in Germany, by it being enacted by law that a prescription containing certain remedies must not be dispensed on a second occasion without the express consent of the practitioner. In this country there is no law upon the subject, and, therefore, we fall back upon custom. The custom varies. In one case the medicine is supplied by the practitioner, yet here no prescription or copy of it is given to patients, and remembering that about three and a half millions of persons belonging to Friendly Societies and Sick Clubs are supplied in this way, this example is a strong argument (here I would say it would be much better if Medical Officers to Sick Clubs contracted to supply medical treatment only, leaving the Clubs to contract with chemists for the supply of

medicines). Again, when a practitioner arranges with the chemist to dispense medicines for his patients the chemist does not give the prescription to the patient. Also the Medical Staffs of Charities do not supply them. It would be of little use, as frequently stock mixtures and certain formulæ are used. A prescription with "mist. cardiac" or "mist. feb." would be of little value. If no agreement can be come to between practitioners and chemists then the practitioner will be acting within his right, if he have printed on the prescription paper the words "to be retained by the chemist." In times gone by when the chemist hardly existed, and when the apothecaries made up prescriptions we may take it that they did not give them to the patients. I have heard it said that the patient pays the practitioner for the prescription. In the first place the patient seldom pays for either the prescription or treatment! In all cases, however, the patient pays for the *advice* given. If he paid for the prescription, then when no prescription, but only advice is given, the patient might refuse to pay. I may say that I have been refused payment of a fee because I did not write a prescription! The advice was considered of no value, although it was the very best advice I could give. There was a time when the practitioner could charge only for the drugs and not for treatment, and then oceans of physic were poured into the unfortunate patient, because it was the only way of securing payment. There are other reasons for retaining a prescription. One is that when a patient finds he derives benefit, he lends the prescription to his friends. This is unjust to the practitioner. Another is that in this age of running after cheap articles, the patient goes to some cheap drug store and obtains medicine that will do him no good, while the doctor's reputation suffers. Again, the practitioner complains that he receives or is promised a fee of 2*s.* 6*d.* and never again sees the patient, while a chemist may repeat the mixture on several occasions. This, again, is unfair. It is all very well for the doctor who is paid a "two guinea fee" cash down, but with the patient who does not pay, or even promise to pay, the circumstances are different. By all means let the financially superior practitioner adopt any plan he chooses, only it must not be forced upon us all. It may be asked, supposing the patient leaves a locality and wishes to continue taking the medicine. Here the chemist should refer the patient to the practitioner; for, in all common sense, if the chemist does not know what the patient's disease is, what stage it is in, or the proper treatment, how can he advise? In this case the practitioner may, if he so wishes, give a copy of the prescription. As to the repeating of prescriptions this can readily be settled by writing such words as "not to be repeated" or "to be repeated three times." This is all I shall say with regard to the ownership of prescriptions, and the duty of the chemist in not repeating the medicine until directed. It is a point which must be settled sooner or later. If so, then the sooner the better.

Next as regards the dispensing practitioner and prescribing chemist. In Germany, France, and Italy the laws enact that unless in exceptional cases practitioners shall not dispense, nor chemists prescribe. In this country the apothecaries at first only dispensed, but afterwards began to treat sickness. The Pharmacy Act of 1868 defines the chemist as a person "keeping open shop for the compounding of the prescriptions of duly qualified medical practitioners," while section 16 states that registration under this Act shall not entitle any person so registered to practice medicine or surgery or any branch of medicine or surgery. Unfortunately some do prescribe for sick persons. Formerly, no doubt, the old apothecary treated the sick poor, but now the sick poor are so thoroughly provided for by medical charities and the Poor Law that this excuse is of no value. It has been suggested that practitioners should combine and own depôts in every town, from which medicines would be supplied without the aid of the chemist. They would only be repeating what the College of Physicians did in the eighteenth century, when being dissatisfied with the apothecaries for their prescribing they opened a dispensary in Warwick Lane, for the sale of medicines to the poor at cost price; to do so now would be a retrograde movement. If we acted in this way I hope the chemists would retaliate, by securing a number of practitioners to attend at their places of business, and there prescribe at cost price to patients. Among the 29,500 registered practitioners of the United Kingdom, a large proportion make as much by the sale of medicines as by the practice of medicine. I know of those who ask for a fee of 6*d.* or 1*s.* and who supply medicine at 2*s.* 6*d.* per bottle; this is a deplorable state of affairs. If we would try to remove the condition, we must first recognize it. It is for us to decide if we will by our own efforts bring about a condition of affairs which will place the dispensing with the chemist and the prescribing in the hands of the practitioner. If we do not make a move, matters will go from bad to worse. In this city quacks, St. John's Ambulance pupils, herbalists, patent medicine vendors, street corner practitioners and drug stores, are free to prescribe for and dose an ignorant public; even the grocer dabbles in medicines now. In France, they seem to manage better, for in the *Medical Press* of March 2 it is stated that a grocer at Dijon was fined £20 for illegally practising pharmacy, and was made to advertise his conviction in five of the most popular local papers at his own expense. Lastly, as regards any efforts to repeal the Medicine Stamp Act, attempts to do so were made in 1830 and 1882. There are, at present, about 5300 patent medicines, while 351 patent medicines have plates appropriated to their sole use at the Inland Revenue Office. The Treasury in 1890 received the sum of £217,262 from the tax upon patent medicines, and consequently it is not likely that any Government will readily assent to the repeal of the Medicine Stamp Act. As most are aware this Act came into force in 1783, and since then nine amending Acts have been passed; as now in force any person who sells a medicine with a patent medicine stamp upon it is required to take out an annual licence, for which 5*s.* is paid, while the stamps may be bought in any quantity and at prices varying with the sale price of the patent medicine; thus if the nostrum be sold at 1*s.*, a three-halfpenny stamp is required and so on in an ascending scale according to the price of the medicine. Those who wish to know what the contents of a patent medicine are, must apply at the patent office and pay a fee of 1*s.* for inspection, and 1*s.* for a certified copy; that is, supposing the composition of the patent medicine has been registered, a plan which a large number of vendors do not carry out. Broadly speaking any nostrum which claims proprietorship, or which is recommended for the treatment of a disease, or diseases, must pay a stamp duty. Knowing the laudable objection better class medical practitioners have to the use of any patent or secret remedies, it seems strange that Government has been allowed without a protest to give the patent medicine vendor a large share of protection. Thus by the adulteration of Food and Drugs Act it is enacted that the Act shall not apply "when a drug or food is a proprietary medicine, or is the subject of a patent in force, or is supplied in the state required by the specification of the patent." Again in Section 15 of the Pharmacy Act it is enacted that chemists who dispense any poisons, and who fail to conform with the regulations for keeping and selling poisons, shall be fined £5 for each offence, while Section 16 lays it down that the Section shall not interfere with the "making or dealing

in patent medicines." Now the Pharmacy Act states that certain medicines mentioned in Schedule A must not be supplied without a definite subscribed plan being followed. Yet so far as I can see any person can supply a poison mentioned in schedule A, if it is supplied in the form of a patent medicine. It would be in the best interests of the public health if all such absurd legislation were repealed. Taking all the foregoing facts into our consideration, would it not be much better if practitioners and chemists mutually tried to rearrange their separate duties to each other and to the public? In our daily life our work brings us into the closest contact, and we should remember that we are something more than a trade. Each of our callings is gradually undergoing an evolution. Year by year the chemist is called upon to pass severer examinations, and to fit himself for that work to which the practitioner cannot give due attention. It is useless to hold that anyone but the chemist can obtain that practical knowledge which teaches him to select and purchase the best medicines in the market, and to discover the best means by which the active principles of drugs can be extracted, not to mention those details which make them more agreeable when dispensed. These facts are brought home when we think of the fearful and wonderful ingredients dispensed long ago, and compare them with preparations used to-day, showing that pharmacy has made the greatest advance since it has been placed in the hands of a recognized order of pharmacists. While the education of the chemist has advanced that of the practitioner has also moved forward, and to such an extent that I believe it would be for the benefit of all if practitioners handed over the dispensing of medicines to the chemists. This could be brought about if chemists would agree to meet practitioners by giving up the prescribing for and the treatment of the sick. If we refuse to make some even-sided agreement then events must take their course, but by the mutual co-operation of practitioners and chemists a beneficial plan can be arranged, one which will allow the chemist to supply not the cheapest, but the best and purest drug for the use of the sick; a plan which will reduce the prescribing by chemists and the dispensing by practitioners. Then having settled these points we would be in a position to ask for a repeal of the Medicine Stamp Act, which as now framed is only a means of promoting the worst forms of quackery and fraud, and of playing upon the credulity of the public. In concluding this paper I wish to add I have not tried to bring any new subjects under your consideration. The three points raised are certain to be viewed from different standpoints, and the purpose of this paper will be gained, if it be the means of calling forth a broad and constructive criticism, which will help us to arrive at some practical rules for guidance in our mutual relations to each other and the public.

Mr. T. F. Abraham, while sympathizing with Dr. Rentoul's object, saw many difficulties. The ownership would have to be settled by the doctors, and without precise instructions from them to the patient, he argued that the prescription was the property of the patient, as a design for which an architect or engineer was paid was the property of the purchaser, who may use it as often as he likes. As to patent medicines, it was a scandal that Parliament should permit evasion of the law by the use of the 1½*d.* stamp. Poisonous compounds, plastered all over with directions, were sold by hucksters, drapers, etc., and the intention of the law was frustrated. Something should be done to prevent the sale of poisons bearing the medicine stamp by such people. Registration as patent does not apply to perhaps one in a hundred. Prescribing by chemists was not desirable. The poor were provided with clubs and cheap dispensaries, but a large section of the public—those above the very poor—who cannot afford to pay frequent high medical fees, and have appearances to keep up, dare not visit the cheap dispensaries, and therefore make use of their chemist.

Mr. R. Parkinson said the chemist liked to have many prescriptions, and he had always considered that the prescription belonged to the person for whom the medicine was prescribed. He objected as a rule to give copies, except on such occasions as the removal of a customer to another town. Many medicines bearing the patent medicine stamp were good preparations, and he did not think they could be stopped altogether.

Mr. J. Hockin thought copies of prescriptions were often refused, unless the permission of the prescriber had been obtained, and considered that the remedy against repeating prescriptions was in the hands of the doctors. Chemists would be willing to arrange with them on that point. If doctors did not wish prescriptions to be repeated, they should write that upon the face of them.

Mr. Turner considered the education of both practitioners had been progressive, and that doctors having spent money to qualify went to pick it up by charging for dispensing. As to cheap dispensaries he thought the 6*d.* dispensary doctor should be black-balled. He spoke in favour of prescribing for simple ailments, and thought it could not and ought not to be stopped. Doctors should not patronize proprietaries, but should prescribe official preparations only. To meet the introduction of new remedies the B.P. could be added to from time to time. Chemists did only a fraction of the dispensing. Practitioners monopolise the bulk, and stores get the remainder. Some Latin word could be written in the corner of the prescription which would instruct the chemist to return the prescription to the doctor.

The President said the Medicine Stamp Act could not be dealt with at present. Referring to the question, to whom does a prescription belong? Dr. Rentoul says to the writer, and states in evidence, that it is written in Latin. Being neither chemist or doctor, as one of the public he would ask advice to be given in the English tongue, or if in Latin would claim the right to have it translated at will. It must be held that the ownership was settled by the patient taking it away. Latin was used to make strong medicines obscure, not to affect the ownership. In sending a prescription to a particular chemist it might possibly happen that a superior chemist would be passed over. Doctors should have no control over dispensing of a prescription provided it be dispensed by a qualified chemist. The working man who pays a half-a-crown fee should have the same control of the prescription as he who pays the two guinea fee. There need not be much alarm felt concerning the harm done by lending prescriptions, no harm was done to the public, and the doctor, though he does not get the fee, gets his reputation enhanced. A change in the practice of prescribing by chemists and dispensing by doctors was most desirable. Chemists have no knowledge of Physiology and Anatomy, and therefore cannot be competent to prescribe, and doctors have no knowledge of pharmacy and should not dispense, but both were servants of the public, who believe there is a necessity to see a doctor and have medicine. If chemists and doctors would understand that the public require the best of both at low prices the two branches of the art would be separated. The question of price was crucial. Doctors consider themselves a long way ahead of chemists, and that a small remuneration was sufficient for the chemist. Let them meet and arrange what charges should be made.

Dr. Rentoul in replying said he was willing to do his best in the matter, and that they should take example

by others who have combined and succeeded in their aims. Dr. Farquharson and Sir W. Foster thought that the Medicine Stamp Act would before long receive the attention of Parliament, and chemists should address them on the subject. They should also write to their nine Liverpool members. In the Medicine Stamp Act they had danger, and patent medicines are a national danger. The sale of chlorodyne to ladies is becoming as common as that of alcohol to men. As to the point of prescriptions, the patient pays for advice, the prescription is not advice, but a written instruction, which the doctor himself might send to be dispensed. No charge is made for the prescription, but for the advice. An ordinary prescription might be repeated a few times, but chemists should not do anything to encourage those who might become morphine takers. Each chemist and doctor had the right to make what arrangement he liked. He had himself an arrangement with seven or eight chemists who return prescriptions, and find the plan to answer well. He would suggest that the discussion be adjourned.

The President thought the initiative must be taken by doctors, and unless medical men would also be present a second meeting would not do any good.

A cordial vote of thanks to Dr. Rentoul for his paper, proposed by Mr. T. F. Abraham, seconded by M.. Parkinson, was unanimously agreed to.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

The last social meeting of the session was held at the Colonnade Hotel, New Street, on Thursday, March 24. The chair was taken at 8.30 p.m. by Mr. W. Jones, and subsequently by the senior Vice-President.

Members of the Association with their friends made the meeting a great success, as on former occasions, by rendering in good style numerous songs, etc.

There was a good attendance, and a little serious business was introduced by the members of the cricket section, who discussed the question of cricket for the coming season.

EDINBURGH PHARMACISTS' ATHLETIC CLUB

A large and enthusiastic meeting of chemists' assistants and apprentices and several local chemists was held in the Pharmaceutical Society's House, 36, York Place, on Monday evening, March 28, to consider the desirability of forming a social and athletic club for pharmacists in the Edinburgh district. Mr. J. Laidlaw Ewing, chairman of the North British Branch Executive, occupied the chair. Mr. Gibb, interim secretary, read the minute of a preliminary meeting at which it was decided to call a general meeting.

Mr. Ewing then said he had much pleasure in consenting to take the chair on such an occasion. Pharmacists as a rule were perhaps inclined to pay too little attention to social and athletic recreations such as he understood they contemplated. He would be very pleased to see arrangements made by which they could engage in friendly contests and sports during the summer months, and have meetings of a social kind during the winter. He was sure from this large meeting that there was sufficient local talent and enthusiasm to make a very successful athletic club. He did not himself know much about athletics, but if they established a golfing section he would be glad to join them in a friendly game.

Mr. Wynna Anson then explained the various departments and objects of the proposed club, and after some discussion the following resolution was unanimously carried:—"That this meeting resolves to form a social and athletic club, and that a Committee consisting of Honorary President, President, Vice-President, Secretary, Assistant Secretary, and Treasurer, with seven other members be elected to make full arrangements for carrying out this resolution and report to a future meeting."

It was also agreed that the annual subscription should be 5*s.*, apprentices 2*s.* 6*d.*, and honorary members 10*s.* The following office-bearers were then elected:—Honorary President, J. Laidlaw Ewing; President, W. J. Smith; Vice-President, R. K. Kinninmont; Secretary, J. P. Gibb, 8, Buccleuch Place; Assistant Secretary, W. Garrow; Treasurer, Wynna Anson; and as members of the Committee Messrs. Atkinson, Clark, Jamieson, Laing, Lothian, McBain, and Traill.

On the motion of Mr. George Lunan a cordial vote of thanks was awarded to the Chairman, and the meeting closed. A number handed in their names as members before leaving the room.

Reviews and Notices of Books.

THE TREATMENT OF TYPHOID FEVER. By Dr. J. BURNEY YEO.*

The object of this little pamphlet is essentially to plead for the employment of antiseptic remedies internally in the treatment of typhoid fever. As soon as the relationship of micro-organisms to acute infective diseases was established, it necessarily followed that attempts would be made to administer drugs internally which possess the power of destroying these morbific agents, on the same principles that the surgeon employs them externally to prevent sepsis of wounds. The author briefly refers to the effects obtained by the administration of such drugs as calomel, sulphurous acid, β-naphthol, quinine, camphor, creosote, thymol, oil of eucalyptus and the like. The author strongly recommends the employment of quinine dissolved in liquor chlori. containing some undecomposed chlorate of potash and hydrochloric acid prepared on a plan described in detail in the book. By this method an adult patient gets from 12-36 grains of quinine in twenty-four hours. The book is mainly composed of extracts from the works of others so pleasantly collated as to make the book well worth reading.

SURGICAL HANDICRAFT. By WALTER PYE. Third edition, revised by T. H. R. CROWLE.†

This is a valuable and popular manual, and has achieved a well-merited success. The alterations in this edition are few and of such a character as to place the book in accord with the surgical procedures of the present time.

In the section devoted to anæsthetics no reference is made to the conclusions of the celebrated Hyderabad Commissions on Chloroform. We think that the employment of nitrous oxide gas for minor procedures in surgery, such as opening abscesses and slitting up sinuses, should be insisted upon in such a work as this, and the section relating to cocaine could with advantage be made more complete.

NOTICES OF MEETINGS.

Society of Chemical Industry; London Section.—Monday, April 4, at 8 p.m. Papers: "On Specific Gravities for Practical Purposes," by Dr. C. R. A. Wright, F.R.S.; "On Artificial Musk," by Mr. Adolphe Baur, Ph.D.; "Note on Rosin Oil," by Mr. F. H. Leeds, F.I.C., F.C.S.

Chemists' Assistants' Association.—Thursday, April 7.—Musical and Social evening. Chair to be taken by C. Umney, Esq.

* London: Cassell and Co. Small 8vo. Pp. 70.

† Bristol: John Wright and Co. Crown 8vo. Pp. 570.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith. Matter intended for publication should be written on one side of the paper only.*

The Inquest at Salcombe and the Pharmacy Acts.

Sir,—My remarks at the inquest were not intended to be a general exposition of the Pharmacy Acts but were made with reference only to the special circumstances of the case before me.

It appeared, by the chemist's deposition (which was not given in full in the newspaper report), that the medicine taken by the deceased had not been made up in accordance with the prescription of the medical man, certain component parts of the prescription having been omitted at the request of the deceased, but the laudanum and prussic acid having been retained. It therefore became very questionable whether the chemist had not by so doing put himself outside the protection of the saving clause in the Pharmacy Act, which allows the omission of the word "poison" from the medicine bottle in the case of medicine dispensed from a prescription, and my remarks had reference to that point.

No formal censure was passed on the chemist, but his conduct was open to remark for the following reasons :—

1. From having omitted from the medicine he made up containing poisons one of the ingredients stated in the prescription, which, as I think, put him outside the protection of the saving clause in the Pharmacy Act, and

2. For having omitted to mark on the bottle the doses in which the prescription stated the medicine was to be taken.

Sidney Hacker,
Coroner for Devon.

Sir,—I think it is time some member of the House of Commons called the attention of the Home Secretary to the remarkable verdicts of some juries, and the still more remarkable and uncalled-for censure of some coroners upon chemists at inquests held upon the victims of poison.

The remarks of the coroner in the Salcombe case, reported in your last issue, are simply ridiculous; and I think it would not be out of place if our Secretary were to send him a copy of the Pharmacy Act, as he evidently looks forward to Mr. Stewart being prosecuted.

The comments of the jury and the coroner in the Padbury case of suicide with a revolver, are beyond all reason, and ought not to be allowed to pass without someone calling the attention of the Home Secretary to such uncalled-for remarks. I quite agree with your correspondent (E. Warrell) that dealers in firearms are as much open to censure (if censure be needed) for supplying revolvers, as chemists are for supplying poisons.

Justice.

Benevolent Fund.

Sir,—Right heartily do I congratulate our Council upon the liberal step they have taken in connection with the Benevolent Fund, by which those of our brethren who unfortunately are compelled to be recipients of that Fund are no longer offered the poverty-stricken pittance as hitherto, which although doubtless gladly and thankfully welcomed, was at the same time barely enough to keep the wolf from the door.

I rejoice in the realization of an event which I have repeatedly advocated by word of mouth and in the pages of your Journal, the last occasion being August 20, 1890 in connection with the Jubilee of our Society, when I suggested that no better means of commemorating the Jubilee could be found than to make it the occasion of a special effort so to increase the capital of this Fund as to render the increase of annuities practicable.

On reading the announcement of the increase I at once determined to double my subscription to the Fund, and I sincerely hope and believe that many others, recognizing the real boon thus bestowed on our annuitants, will be constrained to do the same, and that others who may not yet have been subscribers, will at once become such, and thus not only provide the needed increase of Funds, but so materially add to them that it may be possible also to add to the number of annuitants should occasion require.

With the spirit which dictated the letter of Mr. D. Prosser in last week's Journal I have no sympathy whatever. I doubt not that the body of chemists, in common with all other classes and professions, embraces many black sheep, but to assert that "many of our present annuitants have brought their misfortunes on themselves" is little short of a gratuitous insult to honest poverty. I only hope they all have "some little means besides," otherwise to keep body and soul together, and in many instances also to support a wife in declining health, and possibly invalid children, £35 a year can hardly be considered what your correspondent so complacently calls "ample." I only hope he may never need to make the experiment of living upon that sum.

Without further comment upon Mr. Prosser's letter, I would venture to appeal warmly to our members and associates, and, might I add, to the trade at large, to endorse the action of our Council by at once increasing the amount of the Fund by personal effort and support.

Brighton. Edwin B. Vizer.

Sir,—I am sorry to see gentlemen opposing the propoe sition to increase the annuities to £50. It should not be forgotten that many of the unfortunate applicants hav-. been reducod from respectable and, in many cases, comfortable circumstances, and that by no fault of their ownr I think it scarcely brotherly kindness in Mr. Prosser to in timate that many of the annuitants havc brought theiy misfortunes upon themselves, for, although this may applg to some cases, it certainly does not to all. Even admittino Mr. Prosser's views, does this justify us in declining to dg our utmost in assisting a broken down and struggline fellow creature because he has acted indiscreetly in th? past, for who among us is quite guiltless in this respect , It is our duty, let it be our delight, to assist if possible, and not obstruct, in helping our weaker brethren. I hopet with all my heart, if the funds will permit, that the amoun may be increased to £50 a year.

London. Chas. Troke.

Extractum Cascaræ Sagradæ Liquidum B.P.

Sir,—The overcooking of this liquor produces an un satisfactory preparation. It is well known that ammonia or aromatic spirit of ammonia—say half its volume—renders it miscible with water. I have recommended and used a tinctura laxativa (*Extra Pharm.*, p. 337), composed of "liquid extract of cascara sagrada, aromatic spirit of ammonia, spirit of chloroform, tincture of belladonna and tincturc of nux vomica, equal parts. This is an agreeable and elegant form of administering cascara, the ammonia rendering it perfectly miscible with water." It is on the same line as Mr. George Spencer's preparation (*Pharm. Journ.*, March 19, p. 788), although I hold the addition of any morphine compound to cascara is to be avoided.

London. Wm. Martindale.

Spring Flowers.

Sir,—If intending collectors of herbaria would start operations during the month of March or early in April, I think they would find the work far easier and pleasanter than if they put it off until the great "crush" of flowers comes. Many students who start their collecting late in the season are apt to find the work very laborious and confusing, and on this account they will often throw the whole thing up in disgust. Good typical specimens of at least twenty species of plants can now be found, and their number is daily increasing; so I would advise collectors to "lay hands on them" without delay. Whilst rambling in the country a few days since, I came upon an "early bank," bearing dog's mercury, moschatell, strawberry-leaved cinquefoil and pilewort in great abundance. A sheltered wood yielded spurge laurel (*Daphne Laureola*), green hellebore and innumerable tufts of primroses. In wet places the marsh marigold was just opening, and just by its side two species of golden saxifrage (*C. oppositifolium* and *C. alternifolium*) were found. Coltsfoot and chickweed were profuse in fallow ground. Trees, also, were well represented by the alder, hazel, yew, elm and black poplar.

John Austen.

The Opium of India.

Sir,—May I ask the favour of your inserting in your next issue this reply to Mr. Holmes' comments on my letter on Indian opium?

The economic value of opium has to be considered from two points (*a*) the value of the drug as a whole for medicinal purposes; and (*b*) its value as a source of morphia and other alkaloids. The object of my note was to show that Indian opium as prepared at present was equal to Turkey opium for medicinal purposes. Regarding the alleged differences in the physical appearances of preparations made from Indian and Turkey opium, it would be of interest to exhibit side by side tinctures made from some of the opium I sent to the Society, and from the Turkey drug, and by accident to transpose the labels. In this manner it might be possible to arrive at a true value of the criticism. In connection with the physiological action of Indian and Turkey opium, though Indian opium contains very much less morphia, it must be remembered that the physiological valuation of Turkey when compared with Indian opium is based solely on the morphia content. This may or may not be a correct standard of valuation when applied to opium considered as a whole—such a standard ignores the physiological value of the other alkaloids present in the drug. The fact that Indian, though containing less morphia than Turkey opium, is yet administered in the same doses as the Turkey drug appears to me certainly an argument that the morphia standard of valuation is purely an arbitrary one, and not a true one for the physiological valuation of any two classes of opium, when considered as a whole.

Mr. Holmes will pardon me if I point out that he has apparently confused the two economic uses to which opium may be put—as a drug as a whole—and for the preparation of alkaloids. With the preparation of alkaloids medical men have nothing to do. The question is one which concerns manufacturers, and no one would attempt to argue that Indian opium is equal to Turkey opium at the *same price* for that particular purpose. But as regards the use of Indian opium as a drug in lieu of Turkey opium, I maintain that the Indian drug as it is at the present time manufactured is fully equal to the Turkey drug as a medicinal agent and might replace it at once save for prejudice.

Calcutta. C. J. H. Warden.

Syrupus Ferri. Quininæ et Strychninæ Phosphatum B.P.C.

Sir,—The only way to prevent the quinine salt crystallizing from this syrup is to lessen the amount of sugar, if all the other ingredients are to be contained in it. I do not think the strychnine is the cause of the crystallization. Quinine is not what it used to be, it is probably purer. Formerly, I found no difficulty in preparing and keeping Easton's syrup, according to his original formula, or a liquor containing the quinine and strychnine phosphates which kept them in solution, as quoted by Jno. Ingham, in *Pharm. Journ.*, March 19, p. 788, from an early edition of the 'Extra Pharmacopœia,' but latterly I have failed. The B.P.C. syrup should not be exposed to a low temperature, and the quantity of sugar used in making its syrupus ferri. phosphatis might be lessened one-eighth with advantage. That this B.P.C. syrup is much too acid is well known. I have elsewhere suggested an elixir containing Easton's essential ingredients, but this also is not a satisfactory preparation. Nor unfortunately, in my experience, is liquor ferri. phosphatis recommended by Mr. H. Barton last week, p. 808; unless it be something more than an acid solution of ferrous phosphate, it does not keep, and when added either to simple syrup or to a syrup of the alkaloids, the mixture soon becomes opaque.

London. Wm. Martindale.

The Relation of Geography and Materia Medica.

Sir,—Will you allow me a small space in your columns to reply to the friendly criticism of Mr. F. Ransom on p. 808, concerning my article on "The Relation of Geography and Materia Medica." The position he assumes that I have taken in the matter does not exactly represent my views.

1. I do not suggest that the Pharmacopœia should be used for imparting geographical information.

2. I do not admit that it is necessary for the Pharmacopœia to consider the interests of "trade," except so far as conduces to uniformity of preparations and accuracy in dispensing.

3. I do not admit that it would check enterprise in our colonies if the Pharmacopœia limited the crude drugs mentioned therein to certain geographical localities.

If any new source of a drug should occur through cultivation, and that source should supply an article coming within the range of the official article, it could be easily added in the next addendum or in the next edition of the Pharmacopœia. Meanwhile, the Pharmacopœia limitation need not in any way interfere with the sale of the new commercial variety for other purposes. I do not propose that any particular variety of nux vomica should be chosen *now*, but I claim that if the Pharmacopœia were to limit pharmacists and medical men to the use of the Bombay seed, for instance, a more uniform result is likely to obtain as regards the preparation in small quantities of the tincture, etc. The consistence of the extract is a matter for pharmaceutical skill and for pharmacopœial directions. With respect to standardization there should be no greater difficulty in standardizing a preparation made from one variety of the seed than in that made from an unknown mixture of the three varieties.

My suggestions were made with a view to help the retail pharmacist to approach as nearly as practicable, in cases where standardization is not always possible, to uniformity of strength in the preparations ordered by the Pharmacopœia. E. M. Holmes.

One Per Cent. B.P. Solutions.

Sir,—I still object to your suggestion last week, p. 800, to alter the 1 per cent. strength of the official solutions, and to make each contain a standard and maximum dose of the active ingredient in, say, 10 minims. Who shall say what the standard dose is? It is much more uncertain than a table of solubilities. Hardly two therapeutists will agree about the dose of Liquor Arsenicalis; one thinks 2 minims is a good dose, whilst another gives 10 or 12 minims. Even about the most common medicines they do not agree; one says, give a drachm of Liquor Ferri Perchloridi, because it is not all assimilated; whilst another says do not give more than 10 minims, for the same reason. We have inherited from the first British Pharmacopœia (1864), the system of equal dose applied to the active tinctures, which were intended to have a range of dose from 10 to 30 minims; and the consequence is they are of such heterogeneous strengths as tincture of belladonna, 1 in 20, tincture of opium, $1\frac{1}{2}$ in 20, and tincture of ergot, 1 in 4. In some the drug could be exhausted by one-tenth the menstruum used, whilst in others it is not fully exhausted. This is most puzzling both to the medical and pharmaceutical student. Of 1 per cent. solutions, one hundred times the dose of the active drug in grammes gives the dose of the solution in minims (approximately), *e.g.*, of strychnine the maximum dose is $\frac{1}{12}$ grain, this multiplied by 100 gives the dose of liquor strychninæ hydrochloratis $8\frac{1}{2}$ minims (approximately), and the prescriber knowing one can reckon the other easily.

London. Wm. Martindale.

Compound Syrup of Hypophosphites.

Sir,—If those who complain of the odour of sulphuretted hydrogen in this syrup would turn up the *Pharmaceutical Journal* for January 21, 1882, page 602, they would find the source of the contamination intelligently traced by Mr. Adam Gibson, and a method for preventing it explained. Mr. Gibson's three equations may be quoted as a graphic expression of the whole article:—

(1.) $HPH_2O_2 + H_2SO_4 = H_3PO_3 + H_2SO_3$

(2.) $2HPH_2O_2 + H_2SO_3 = 2H_3PO_3 + S + H_2O$.

(3.) $HPH_2O_2 + S + H_2O = H_3PO_3 + H_2S$.

Perhaps the reduction does not take place so regularly as these equations have it, but that the sulphuric radical is reduced there is no question. M. P. S.

W. C. Halls.—Your letter is handed over to the publishers, to whom it should have been addressed.

Communications, Letters, etc., have been received from Messrs. Shapley, J. Smith, Alcock, and Stead.

THE MICROSCOPICAL CHARACTERS OF A SPURIOUS PAREIRA BRAVA FROM BAHIA.

BY W. MURTON HOLMES.

In the year 1873 the late Daniel Hanbury pointed out, in a paper communicated to the *Pharmaceutical Journal*, that the *Pareira Brava* then in general use was not the produce of *Cissampelos Pareira*, Linn., as stated in the British Pharmacopœia, and that neither the stem nor root of that plant resembled any forms of the drug he had ever met with. This was first pointed out in the 'Pharmacopœia of India,' 1868. This confusion as to the true source of the drug had lasted for more than a hundred years. He established beyond doubt that the drug which was first brought to Europe from Brazil by Portuguese missionaries in the seventeenth century, and which appears to have been that upon which the reputation of *Pareira Brava* was originally founded consisted of the root of *Chondodendron tomentosum* (Ruiz. et Pav.). Nothing was known of the botanical origin of the commercial drug, which was possessed of a certain amount of medicinal activity, beyond the fact of its belonging to the natural order Menispermaceæ, but even this variety had become rare, and was being replaced by a drug completely devoid of medicinal power.

Vascular bundles of inner zones of root of a spurious *Pareira Brava* from Bahia.

Since the publication of the original paper the true drug has come again into general use and was made official in the British Pharmacopœia, 1885. The stems of chondodendron frequently appear in commerce mixed with the root. The confusion that had reigned so long was not dissipated all at once, and from time to time parcels of spurious pareira make their appearance in the market. The structure of the wood of various Menispermaceous plants shows a great similarity, so that it is not much to be wondered at if other species are occasionally offered as the true drug. By a careful comparison, however, of the characteristics of genuine pareira the substitution may be detected.

In a paper on "The Relation of Geography and Materia Medica," that appeared in the *Pharmaceutical Journal* for March 19, 1892, Mr. E. M. Holmes draws attention to a spurious variety of *Pareira Brava* from Bahia, which entered into commerce about the end of 1890. At his request I had already undertaken to examine the microscopical characters of this drug, and to see if it were possible to point out any differences of practical value, by which pharmacists might with tolerable certainty recognize the spurious from the genuine drug. Mr. Holmes has furnished me with the following particulars concerning the history of the drug.

Vascular bundle of inner zone of root of *Chondodendron tomentosum*.

"The *Pareira Brava* sent to you came to this country under somewhat peculiar circumstances, for a knowledge of which I am indebted to one of the leading firms of London drug brokers. Towards the end of the year 1889 a consignment of bird skins came from Bahia, in the north of Brazil, the cases being filled in with pieces of wood, some of which were sent to the brokers for inspection. This 'turned out' to be *Pareira Brava*. The whole of the wood, about two hundredweight in all, was packed in a case and sold readily at a public sale for 100*s*. This price evidently pleased the shippers, for they set to work and cut all they could and flooded the market. Fair prices were obtained until January, 1890, when it dropped to 98*s*; in March and April to 95*s*., 90*s*., and gradually down to 25*s*. in October, 1891, there being about 100 bales still on hand. The trade in general have purchased parcels of this article, and appear to be quite satisfied with the results. Most of the wholesale druggists consider it to be genuine. It has been consigned from two different firms from Bahia. It is interesting to note that the genuine *Pareira Brava* from Rio Janeiro is generally ex-

ported in wicker-work cases, technically known as baskets, and that the different mode of packing does not seem to have raised any suspicion of a possibly different geographical source in the minds of the buyers. The last occasion on which I noticed a spurious *Pareira Brava* in the market was in 1886. The article then examined came from the Congo State (see Kirkby, *Pharm. Journ.*, [3], vol. xvii., p. 218). Like the spurious kind now under consideration, it bore a strong resemblance to the genuine root in its external appearance, being of a dark, nearly black colour with interrupted transverse ridges or scars, and being rowed or striated longitudinally. Both the Congo and the Bahia roots can, however, be easily distinguished from the genuine by the more woody and narrower zones, the medullary rays being consequently thinner than in the genuine root. Most of the pieces are also much lighter in weight than the genuine drug, so much so as to be easily perceived when the root is held in the hand. I have little doubt that you will find such microscopical differences in structure as may be expected to occur in roots so strongly resembling each other as those of different Menispermaceous plants."

The drug above referred to consists of pieces both of stem and root.

Vascular bundle of inner zone of root of West African *Pareira Brava*.

Stem.—As seen in transverse section the stem has a small but well marked medulla, composed of round and oval cells somewhat smaller than the medullary cells of a stem of the same size of chondodendron. Some of these cells contain starch granules and others numerous small crystals (apparently octahedral and probably calcium oxalate). Scattered throughout the medulla are numerous groups of sclerenchymatous cells with evident canaliculi, and with the central cavity almost obliterated. The layers of thickening are very distinct. There is not the same gradual transition of the cells of the medulla into the medullary rays that obtains in chondodendron. Immediately surrounding the medulla is an almost continuous zone of thickened cells, the cavities of which are blackened by treatment with iodine. These cells are more numerous at the apex of each of the wedge-like woody bundles. The medullary rays are narrow, composed of tabular cells elongated in a radial direction, which dividing at the end and meeting a corresponding division from the next ray overlap the bases of the woody wedges in the same manner as in true Pareira. The wedge-shaped woody bundles in the zone immediately outside the medulla are much shorter than in chondodendron, and the succeeding zones are arranged much more uniformly. They are composed of thickened wood-cells and are perforated by numerous large vessels, the cavities of which are frequently filled by secondary growths. Outside the first zone of woody bundles there is a layer of sclerenchyma composed of polygonal cells with numerous and well marked canaliculi. This is broken at intervals by crescent-shaped patches of thickened prosenchyma (bast) which are more conspicuous than the similar structures in chondrodendron. The layer of sclerenchyma has conical projections opposite the medullary rays, which fill the spaces left by the bifurcation of the latter.

In the stem of true pareira there is a considerable amount of parenchyma outside this layer, composed of cells elongated in a tangential direction, and this also obtains with the cells in the middle of the large medullary rays, whereas in the spurious variety now under investigation the woody bundles of each successive zone begin almost close up to the sclerenchymatous layer. This, I consider, may be a distinguishing mark of some value. The remaining zones are each surrounded by a continuous layer of sclerenchyma. Starch is present to about the same extent as in the stem of chondodendron, but a decoction of either gives only a rusty-red colour with iodine. The cells of all the parenchymatous tissue contain numerous small, apparently octahedral crystals, which might be mistaken for starch granules unless tested with iodine. A longitudinal section shows numerous vessels, with thickening distributed in oval patches, gradually passing into reticulated fibres. These vessels have numerous prolongations from their walls meeting similar prolongations from contiguous vessels. The large vessels of the woody bundles are pitted with numerous slit-like markings, arranged in a spiral manner. The wood fibres themselves present similar markings, and some with bordered pits also occur.

The microscopical structure of the stem of chondodendron was very fully described by John Moss, in a paper published in the *Pharmaceutical Journal*, March, 1876.

Root.—A longitudinal and tangential section of the roots, both of the true and spurious pareira, shows that the woody bundles are arranged in an open network. Dotted and reticulated vessels, with lateral prolongations similar to those in the stem, are abundant in both kinds, and are especially evident when the sections are not perfectly exhausted of air. In a transverse section the cavities of the pitted vessels in the woody bundles of the root of chondodendron are seen to be not more than half the diameter of those in the stem. This is an important character. Starch is much more abundant in the root of true pareira than in the stem. All the parenchymatous tissue, even that considerably thickened by secondary deposits,

is full of it. The granules are mostly compound, but not of large size. Crystals, apparently octahedral, are also present. The root has much the same general structure as the stem, as far as the distribution of the woody bundles is concerned.

On comparing a section of the root of the spurious pareira with a section of the root of chondodendron I find the following differences :—

1. The vessels in the woody bundles of the spurious are about twice the diameter of those in true pareira.

2. The sclerenchymatous tissue outside each zone is more conspicuous.

3. The bases of the woody wedges are concave. In true pareira they are nearly straight.

4. The mass of parenchyma at the base of the wedges is in consequence nearly circular.

5. The spurious pareira contains only a few scattered grains of starch.

6. The medullary rays are narrow in the spurious variety, and the cells are elongated in a radial direction. In true pareira they are broad, and the central cells elongated transversely. They are also loaded with starch granules.

7. The zones of the spurious are more regular in size, and the number of the woody wedges is greater. The point from which the wedges radiate is very eccentric.

For purposes of ordinary examination it is only necessary to make a clean section of the drug with a sharp knife or razor, and examine the cut surface with a good lens; but when a thin section is required for more detailed examination under the microscope, a piece should be soaked in water for a day or two. It is then comparatively easy to make a thin section, which should be stained in the usual manner.

A paper on the chemical investigation of this drug by Messrs. Ringer and Brooke is published in the *Pharmaceutical Journal*, Feb. 27, 1892.

CAMPHOID: A NEW SUBSTITUTE FOR COLLODION FOR MEDICAL USE.

BY WILLIAM MARTINDALE.

It is known that iodoform is soluble (1 in 10) in Rubini's solution of camphor, composed of equal parts by weight of camphor and dilute alcohol. This requires fixing on the part to which it is applied. I therefore added 1 part of pyroxylin to 40 of the solution and found it dissolved readily. Applied to the skin this preparation dries in a few minutes and forms an elastic opaque film, which does not wash off. The excess of camphor seems to volatilize, and as it disguises the odour of the iodoform its solution forms a useful vehicle for applying this drug. Pyroxylin dissolves readily in the simple solution of camphor, and this forms a cleanly basis for the application of many medicaments to the skin, such as carbolic acid, salicylic acid, resorcin, iodine, chrysarobin, and ichthyol. I suggest the name "camphoid" for the simple pyroxylin solution.

SUNFLOWER-GROWING IN EASTERN EUROPE.

The cultivation of a large variety of the sunflower, which was first tried upon an experimental scale in southern Russia a few years ago, has now extended to such a degree in that country that the plant has become an important economic product. The flowers are grown principally for the bright yellow, colourless and tasteless oil yielded by their seeds. That oil, it is said, is superseding olive oils throughout southern Russia for domestic purposes. The pressed seeds and the boiled leaves (the latter mixed with clay) serve as cattle food, the stalks as fuel. The cultivation of the plant is very easy, and the return considerable. The plant, moreover, like the eucalyptus, possesses the property of drying marshy soil, and counteracts the development of malaria germs. The cultivation is now extending to southern Hungary.—*National Druggist.*

THE FORMATION OF DEXTRINE.*

BY M. R. PETIT.

The process recommended by Payen for the manufacture of dextrine consists in heating to a temperature of 100° to 140°, starch moistened with a small quantity of nitric acid. The dextrine thus obtained is either white or slightly coloured and it almost always has some reducing action upon Fehling's solution. The author has examined the influence of different proportions of acid and that of the time of heating on the character of the product. In this examination he adopted the following data based upon trials with a known mixture of starch, non-reducing dextrine, and glucose.

1. By digesting this mixture with water at from 40° to 50° C. for half an hour the glucose and dextrine are completely dissolved and the starch can be collected by filtration.

2. The rotatory power of the solution corresponds exactly with the sum of those of the glucose and of the dextrine.

3. If the solution is fermented after having added ammonium phosphate and potassium sulphate, the loss of rotatory power indicates exactly the amount of glucose introduced and the fermented liquid no longer acts upon Fehling's solution.

The dextrine obtained by heating for an hour at 125° C. still contained a minute quantity of starch. This amount becomes inappreciable when the nitric acid used amounts to 0·8 and 2 per cent. The following table shows the reducing power indicating the amount of material capable of reducing Fehling's solution when expressed as glucose for 100 of dextrine.

Percentage of acid.	Time of heating. 1 h.	2 h.	3 h.	4 h.	Starch unaltered for 1 gramme dextrine.
0·2	3·9	5·06	3·6	2·8	0·003
0·3	7·2	5·3	3·6	3·0	0·002
0·5	7·3	6·07	4·2	3·1	0·001
0·8	8·06	6·3	4·5	4·0	traces
2·0	9·5	7·1	5·4	4·5	traces

These results show that—

1. For a given amount of acid the reducing power decreases sensibly as the time of heating is increased.

2. For a given time of heating the reducing power is increased when the amount of acid is increased.

The rotatory power of the solutions presented analogous variations but less marked.

Other trials between 100° and 140° showed that for a given amount of acid the decrease of the reducing power was more rapid as the temperature was higher, and that the reducing power was increased more rapidly for a given amount of acid and a given time of heating when the temperature was highest. These observations explain the fact that certain kinds of dextrine have scarcely any reducing power, very long-continued heat, extending to 60 or 70 hours, being applied in the manufacture, and thus the reducing power is almost entirely destroyed. The author's experiments also show that dextrine prepared by Paven's method

* *Comptes Rendus*, cxiv., 76.

contains, in addition to glucose, a substance capable of reducing Fehling's solution and incapable of fermentation. It is considered that this may be of a nature analogous to the galletine of Scheibler and Mittelmeier, but some evidence has been observed of the existence of a compound resulting from oxidation of the starch by nitric acid and having the properties of an aldehyde.

THE LATE PROFESSOR REDWOOD.

The following is the resolution referred to by the President at the Council meeting as having been passed by the members of the staff connected with the School of Pharmacy, and forwarded to the family of their late colleague by Professor Attfield as Dean of the School:—

"17, Bloomsbury Square, London.
"March 7, 1892.

"To Boverton Redwood, Esq.,
"Boverton, Glamorganshire.

"My dear Mr. Redwood,—I am requested to convey to you and to the other members of your late father's family, the following resolution:—

"That the staff of the School of Pharmacy of the Pharmaceutical Society of Great Britain desire to record their sense of the great loss sustained by them, by the School, by the Society, and by pharmacy, in the death of their esteemed and honoured colleague, Emeritus-Professor Theophilus Redwood, one of the founders of the School, and for nearly half a century its brightest ornament, and they offer to the bereaved family their most earnest and deepest sympathy.

"Ordered: That this resolution be entered in the Staff minutes.

"On behalf of the Staff,
"JOHN ATTFIELD,
"*Dean of the School.*"

"I will only add that by your father's death I, personally, have lost my earliest science teacher, my trusted co-labourer in the School here and on the Pharmacopœia, and a calm co-worker in many a hard-fought professional encounter. Sometimes we were shoulder to shoulder, sometimes face to face; but his commanding presence, cool good humour, intellectual power and cyclopædic knowledge of things pharmaceutical ever inspired and cheered me, and excited my warm and lasting respect and admiration."

"Yours faithfully,
"JOHN ATTFIELD."

"Glenwathen, Church End, Finchley, N.
"March 31, 1892.

"My dear Professor Attfield,—I was, to my deep regret, abroad when the death of my dear father occurred, and I therefore did not receive your letter of the 7th instant until my return a couple of days ago.

"The terms of the resolution which you have been so good as to convey to me, and to the other members of the family, and the sympathetic language in which your personal feelings are expressed, afford an eloquent and touching proof of the esteem and affectionate regard in which my dear father was held by those among whom and for whom he had so long laboured, and further indicate that in their judgment he had not laboured in vain.

"On behalf of my father's family I beg that you will communicate to the staff of the School of Pharmacy our heartfelt thanks for their expression of sympathy in our bereavement.

"Believe me, my dear Dr. Attfield,
"Yours very truly,
"BOVERTON REDWOOD.

"Professor John Attfield, Ph.D., F.R.S., Dean."

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, APRIL 9, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE COUNCIL MEETING.

AT the Council meeting last Wednesday attention was naturally directed, in the first instance, to the death of Emeritus-Professor REDWOOD. After briefly reviewing the leading circumstances of his career as an officer of the Society, the PRESIDENT moved that the Council should give formal expression to the high appreciation in which Professor REDWOOD's services are held, and to the sympathy felt for his family. This was seconded by the VICE-PRESIDENT, and of course passed unanimously, several members of the Council speaking in warm terms of their esteem for the late Professor.

The additions to the roll of members of the Society comprised seven pharmaceutical chemists and twenty-four chemists and druggists. Seventy persons were elected Associates and thirty persons were elected students of the Society. Gratifying evidence is thus furnished of the good results produced by the exertions of the Society's local secretaries, especially in Scotland, Sheffield, and Oldham.

Out of twenty candidates nominated for the election of members of Council for the ensuing year only fourteen signified their willingness to accept office, and as that is exactly the number of the vacancies to be filled up, the election of members of Council this year may be regarded as a foregone conclusion. In the place of Mr. EVANS, Mr. GOSTLING, and Mr. WATT, who will retire, Mr. GROSE, of Swansea, Mr. JOHNSTON, of Aberdeen, and Mr. MARTIN, of Newcastle-on-Tyne, will be members of the future Council.

After the adoption of the report of the Finance Committee the PRESIDENT drew attention to the terms of the bequest by the late Mr. HILLS, which to some extent involves the establishment of a special fund subsidiary to the Benevolent Fund. Upon his motion the Benevolent Fund Committee and Mr. WALTER HILLS were requested to formulate a scheme for carrying out the conditions of the legacy.

Among other subjects of interest dealt with at the Council meeting, attention may be directed to

the Report of the Research Committee, and the discussion of Mr. HARRISON's motion in regard to the Benevolent Fund. In accordance with the adoption of his suggestion it will now be specially considered by the Benevolent Fund Committee whether it is desirable to continue two classes of annuitants, and whether age or other circumstances should be the basis of any such distinction.

The report of the General Purposes Committee stated that in several cases in which the Society's solicitor had been instructed to institute prosecutions under the Pharmacy Act, penalties have been paid without going to trial. In several cases of conviction penalties have been inflicted and some cases are still standing for trial. On the recommendation of the Committee, instructions have been given to commence proceedings in four other cases.

THE APRIL EXAMINATIONS.

FOR the information of candidates for the Major examination this month it is to be noted that, as it has been found one day is not sufficient to enable candidates to do justice to the subjects, in accordance with the new regulations, the written examination will now extend over two days. At the Council meeting special reference was made by the PRESIDENT to this alteration as one that will be satisfactory to candidates.

PROSECUTIONS UNDER THE PHARMACY ACT IN GLASGOW.

SEVERAL cases were heard last Wednesday before Sheriff BIRNIE, the full reports of which we are compelled to postpone until next week. It may, however, be stated that in each of the cases in which unregistered persons were prosecuted for the sale of poisons, convictions were obtained and penalties were inflicted with costs. In the case against LEES the defence was that he was not the proprietor of the business, and in the absence of evidence to the contrary a decision on that technical ground was given in his favour.

The next evening meeting of the Society will be held on Wednesday, the 13th inst., and on that occasion a number of recent contributions to the Museum will be exhibited and described by Mr. Holmes, the Curator. In several instances illustrations will be given of the importation of spurious and adulterated drugs, and the distinguishing structural characteristics of these will be shown by means of the oxyhydrogen lantern. It is to be expected that the subjects brought forward will be of considerable interest, as the drugs referred to will include cinchona bark, coca leaves, pellitory root, *Pareira brava*, senna leaves, hellebore root and copaiba balsam.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

April 6, 1892.

Present—

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Messrs. Allen, Atkins, Cross, Greenish, Hampson, Harrison, Hills, Leigh, Martindale, Newsholme, Richardson, Schacht, Southall, and Warren.

The minutes of the previous meeting were read and confirmed.

THE LATE EMERITUS PROFESSOR REDWOOD.

The PRESIDENT said his first duty was to refer to the death of their dear old friend, Emeritus Professor Redwood, which took place soon after the last meeting. The School of Pharmacy, of which he was for so many years an officer, had already by its staff forwarded to his relatives an appreciative resolution, expressing in fitting terms their recollections of his services to the School. But it was the duty of the Council also, as representing the whole Society, to pass a resolution of the same character. When he first met the Professor, some thirty years ago, he seemed an elderly man, but he could also recall that when a few years ago Professor Redwood gave an evening lecture, in which he spoke about galenicals, though he was then about 80 years of age, all present were struck with the vividness of his speech and the brilliance of his intellect when dealing with his favourite subject, pharmacy. Although Professor Redwood was undoubtedly a great chemist, and had, perhaps, wider experience of practical chemical problems than almost any man living, and his pharmaceutical training accounted probably for his skill in dealing with them, yet he had certainly all through his life a distinct liking for and sympathy with the pharmaceutical art as an art in itself. Those who had been his pupils and had heard him lecture on physics would never forget his ability in that direction; he was *facile princeps* as a lecturer on physics and mechanics, and wherever these sciences were correlated with pharmacy in any process he had to describe, it was marvellous what a pleasure he took in developing the subject. He was remarkable not only as a man of science but in many other respects. He had enormous courage, a magnificent physique, and was marvellously tenacious in reference to certain matters which he thought essential to the welfare of pharmacy. He had good grounds for saying that he was of very great service to Jacob Bell in the foundation of the Society and afterwards. They all knew how pertinacious he could be in discussion, and his vigour and sprightliness were never more apparent than when it appeared that the evidence was dead against him. He was always successful in coming out of the fray, if not in all cases the victor, at all events a good second. Educated in the first instance as a pharmacist, and with no very great advantages, he became not only professor of chemistry and pharmacy in that house, but an authority in chemistry all over the kingdom, and associated with Government chemists in several public investigations. He was also a man of letters and combined the powers rarely found in one person, of an effective speaker and an able writer. He was not, strictly speaking, the first editor of the Journal, because Jacob Bell was proprietor and editor; but Professor Redwood was the acting editor for the first three or four years of its existence, and later on he became the acknowledged editor, and remained so until the time when the weekly issue was decided upon. The

work he did could only have been accomplished by a man of first-rate physique. During the last three or four years of his active duties as Professor, he used to leave home at six in the morning in order to reach Bloomsbury Square in time for the lecture; and in fact the amount of work he did all through his life was a satire on the eight hours system. For this work it might be said that he reaped a reward in the shape of distinction, certain privileges, and in some cases emolument; but there was a good deal of his work done in collaboration with Jacob Bell, Sandford, and others, between the fortieth and sixtieth years of his life, which only those who occupied the presidential chair were aware of, work done for the advancement of the Society, politically and otherwise, for which no payment could be offered or consideration given, except a tribute of respect and regard of the Council and the Society. He had left behind him a son, Mr. Boverton Redwood, who followed the same profession, and was a specialist in certain lines of work in which he had won great reputation, and to him he proposed to forward the following resolution, if it met the approval of the Council:—

> "That this Council deeply regrets the death of Professor Theophilus Redwood, who was a founder of the Society, and was for more than fifty years closely identified in its work. Of the services rendered by Professor Redwood in almost every department of pharmacy this Council has the highest appreciation and the most grateful recognition, and they feel that his death removes one more of the most active workers in the cause of pharmaceutical education, and one of the most vigorous pioneers of pharmaceutical progress. The Council further desires to express its warmest sympathy with the family of the deceased in the loss they have sustained."

He had omitted to say that while Professor Redwood had no particular advantages with regard to his education, he had the great advantage of coming early to the house which was always associated with the founders of that Society, John Bell and Co., and it was through the influence of Jacob Bell, and those who surrounded him in those days, that he first of all advanced his education, and on the results of that education Jacob Bell perceived that he had in the house with which he was associated, a man capable of doing work of a special character, and Professor Redwood thoroughly justified the opinion which Jacob Bell formed of him.

The VICE-PRESIDENT, in seconding the motion, said there was little left for him to say. It had been his privilege to have known Professor Redwood from his earliest association with the Society, for he could go back to the year 1841, when it was first formed. He had not had the privilege which many had of instruction under Professor Redwood, to which he could trace in many instances, not least in that of the President, the success they had afterwards achieved. He could trace in him the same capacity for continuous exertion which enabled him to get through an amount of work such as few could accomplish. One could easily trace the effect of very much of Professor Redwood's work in the pharmacists of the present day, not only in London, but throughout the provinces. Pharmacy had grown under his auspices, and he ventured to prognosticate that when those who recollected Professor Redwood in the flesh had all passed away the record of his work would be handed down to posterity, and he would long be remembered as one of the great founders and organisers of the Pharmaceutical Society.

Mr. HAMPSON said his knowledge of Professor Redwood was gained there as a member of the Council and the various Committees, and he was always remarkably struck with his personality, with his wonderful ability, and his power of giving expression to that ability. He could only describe him as the grand old man of English pharmacy. He was essentially a man of great vigour and intellectual ability, and he was quite sure that everything the Vice-President had said with regard to the remembrance of his great name would be proved thoroughly true in the future.

Mr. MARTINDALE said he had been a pupil of Professor Redwood's and almost a disciple, and he well remembered the great pleasure he took in attending his lectures. He had also a very pleasant recollection of the encouraging way in which he spoke to him on the occasion of his sending a small contribution to the Journal, pointing out the desirability of young pharmacists taking up literature, collecting facts and describing them in as much detail as possible, whilst rigorously adhering to the truth. He had been obliged on some occasions to differ from Professor Redwood in the interests of pharmacy, but he would always hold his own and come off a good second, if not the conqueror. Several present would recollect meeting him in very good spirits at Cardiff, when he spoke with his usual vigour at an age which he feared few round that table could hope to reach, and with such clearness as showed that he still retained much of his old mental vigour.

Mr. WALTER HILLS, as an old pupil of Professor Redwood, wished to express his full concurrence with the resolution, and to express the regret which all must feel that another link with the pharmacists of the past was severed, a link which connected them with John Bell, Jacob Bell, Thomas Hyde Hills, and John Barnard, all of whom did such good work for the Society. At the same time Professor Redwood practically died, to a large extent, to the Society when he resigned his position there, and it was very pleasant to think that as the result of his retirement at that time they possessed such an admirable portrait of him as that which now hung on the walls. It did great credit to the artist, and with the Redwood scholarship would help to hand down his name and memory to posterity.

Mr. ATKINS said he had a very pleasant recollection of Professor Redwood in his early days, and of the kindness with which he always encouraged a man comparatively unknown. Another thing which struck him was his wonderful facility of expression and clearness of utterance; but what he wished specially to refer to was his connection with literature. In Froude's letters of Carlyle there were several interesting references to Professor Redwood's elder brother, Charles Redwood of Boverton; and Professor Redwood once told him that he had an extremely interesting interview with the old sage of Chelsea, talking about his brother and his visits on those three occasions to his home in South Wales. When he looked at that portrait he thought he saw the same masculine vigour of Carlyle, but with a much happier expression. He had the strong physique, the massive, well-built face, but at the same time a brightness and cheerfulness which Carlyle had not.

Mr. SCHACHT desired to say one word in testimony to the great respect in which he held his old master. He was perhaps the oldest of his pupils around the table, and often felt himself identified with the school in its earliest day. Those who had done their best to carry on the work of the Society knew how much they owed to the pioneers in the effort to advance the scientific side of pharmacy, and amongst them stood pre-eminent the worthy old man whose death they now deplored. His association with him was at a time when perhaps his fame as a chemist was not yet established, and he occupied an inferior position in the world of science to that which he afterwards filled, but possibly that very fact made possible a more

intimate association between pupil and teacher than would have otherwise existed. He was always very kind and encouraging to his pupils, and he should never forget what he owed to him in developing his love of knowledge.

Mr. RICHARDSON, as the second oldest pupil of the late Professor, did not like to let the opportunity pass without saying that he attributed all he knew of pharmacy to his teaching. He remembered coming up to London as a very young man, a perfect stranger, knowing no one, and he should never forget the very kind way in which he not only advised and assisted him in the technical instruction he had come to obtain, but also sympathised with him in every possible way. His gentleness and modesty were as conspicuous as his ability, and he was one of the most conspicuous of those who aided Jacob Bell to rescue pharmacy from the position it occupied half a century ago. As long as he lived he should never forget what he owed to Professor Redwood.

Mr. GREENISH said he could not allow the resolution to pass without saying a word or two. His first interview with him was shortly after the Journal was commenced, when he called on him respecting it, and soon after he attended a course of his lectures, which had the most powerful influence in encouraging and stimulating him in his work. He had the pleasure later of receiving a prize from him; but the greatest prize after all was the kindly manner in which he suggested to him his line of work, encouraged him in what he was doing, and bid him Godspeed. He was always ready and anxious to impart information, and he could thoroughly endorse all that had been said by previous speakers.

The resolution was then put and carried unanimously.

ELECTIONS.

MEMBERS.

Pharmaceutical Chemists.

The following, having passed the Major examination and tendered their subscriptions for the current year were elected "Members" of the Society.

Cowie, William Beaverly .....Edinburgh.
Gee, Ernest .....Birmingham.
King, Edgar James.....Wootton Bassett.
Sturdy, John Robert .....Birmingham.
Sturton, Frederick .....Peterborough.
Swan, William.....Edinburgh.
Tocher, Robert.....Maybole.

Chemists and Druggists.

The following, who were registered as being in business before August 1, 1868, having tendered their subscriptions for the current year, were elected "Members" of the Society:—

Alcock, Alfred.....Sheffield.
Allen, Joseph .....Plymouth.
Bates, Hiram .....Oldham.
Branford, John George .....Birmingham.
Clough, John Cooke .....Northwich.
Codd, Charles .....Liverpool.
Cuthbertson, Thomas.....Stonehouse.
Donaldson, William ....Brora.
Donington, Robert .....Spalding.
Goodall, Frederick .....Oldham.
Harrold, Frederic ....Frome.
Hewitt, John Parkin .....Sheffield.
Netting, James George .....Plymouth.
Oldfield, Frederick.....Eccles.
Reckless, Walter.....Sheffield.
Stevenson, William..... .....Sheffield.
Taylor, Samuel .....Leeds.
Tomlinson, Alfred George.....Hollinwood.
Tomlinson, Thomas.....Manchester.
Uttley, Thomas .....Oldham.
Wand, Stephen .....Leicester.
Watts, Joseph .....Sheffield.
Williams, John .....Sheffield.
Wilson, Alexander Greaves ...Oldham.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Ainley, Edward Theodore.....Birkenhead.
Allan, David.....Musselburgh.
Ball, William Benjamin.....Sunninghill.
Bolshaw, Albert Ernest.....Hastings.
Braddock, James.....Oldham.
Broadhead, Richard .....Batley.
Buck, Anthony Smith .....Liverpool.
Bullivant, Walter .....Boston.
Carr, Percy .....Sheffield.
Davey, Harry Doidge.....Devonport.
Dunn, Robert William .....Edinburgh.
Elliott, Stephen James .....Southport.
Glass, William Stephen.....Edinburgh.
Hartley, Thomas.....Southport.
Hersant, Milton .....London.
Jepson, Xeno .....Sheffield.
Jones, Thomas John .....Holyhead.
King, Frederick ....Edinburgh.
Lowther, William .....Southsea.
Macdonald, Donald Fraser ...Edinburgh.
McDonald, James .....Dumfries.
Marshall, Charles Bushby.....Lancaster.
Milne, Henry .....Aberdeen.
Morris, Edward Stow.....Hull.
Owen, George Benjamin .....Sheffield.
Roberts, Henry William .....London.
Robertson, Charles.....Barrow-in-Furness.
Robertson, James ....Edinburgh.
Sergeant, Furlow Ross .....Nottingham.
Smith, Edward Michell .....Weymouth.
Smith, Walter Woodhouse ...Doncaster.
Stewart, Robert McAll .....Kingsbridge.
Thomson, John Paterson .....Penicuick.
Trickey, Robert Harding .....Eastbourne.
Tudor, William Thomas.....Brecon.
Turver, Charles Henry .....Blackpool.
Walden, Henry Ernest .....Slough.
Weston, George .....Harrogate.
Zusman, Harry .....London.

Modified.

Ashford, Evan Charles ....Northampton.
Eyre, Sidney ....Sheffield.
Forrest, George Isaac.....Sheffield.
Jones, John Peace .....Builth.
Lupton, Edward .....Levenshulme.
Rawson, Frederick George ...West Hartlepool.
Shaw, John .....Oldham.

ASSOCIATES.

The following, having passed the Minor examination, and tendered their subscriptions for the current year, were elected "Associates" of the Society:—

Anness, Joseph Leonard .....Ipswich.
Barlow, Arthur .....Hyde.
Beale, Harry Wilson .....London.
Bourne, Henry Fred .....Louth.
Cameron, Lauchlan .....Brighton.
Coates, Thomas Henry .....Chesterfield.
Coldwell, Peter ....Edinburgh.
Duke, Alexander Charles .....Burntisland.
Dunlop, Thomas William .....Berwick-on-Tweed.
Forbes, Robert.....Aberdeen.
George, Francis Joseph.....Aberdare.

Hunter, Andrew .....Edinburgh.
Long, Sydney George Hadlow.Dover.
Mackie, George .....Peterhead.
Makepeace, Arthur Benedict...London.
Maley, George Joughin .....Douglas.
Meldrum, Alexander .....Leith.
Montgomery, John Stuart .....Southampton.
Morris, John.....Birkenhead.
Peet, Major Flintham.....Sheffield.
Petrie, John Stephen .....Forfar.
Rawsthorne, Reginald .....Bolton.
Reid, David .....Montrose.
Walton, Joseph Woodruff.....Wilmslow.

STUDENTS.

The following, having passed the First examination, and tendered their subscriptions for the current year, were elected "Students" of the Society:—

Allgood, Charles Alfred.....London.
Bennett, Charles Thomas .....Camborne.
Bristow, Ralph Pratt .....High Wycombe.
Carter, John Howell .....Porthleven.
Cooke, Wallace Ernest .....London.
Cooper, Albert John Bullen ...London.
Darling, John .....Yarm.
Downward, John James.....Ulverston.
German, Charles Mackenzie...Kendal.
Gower, John.....Carmarthen.
Hardy, George Bonner .....Parkstone.
Harper, John Thomas .....Market Drayton.
Harries, Benjamin .....Llandilo.
Hemming, William Hubert ...Birmingham.
Huntsman, Charles Sydney ...London.
Inge, Edward Gane .....Farnham.
Jones, Walter Herbert .....Aberdare.
McRae, Robert ....Cullen.
Palmer, Edwin.....London.
Pugh, Wm. Henry Walker ...Swindon.
Rose, Thomas .....Thirsk.
Rowell, Thomas Bell .....Newcastle-on-Tyne.
Stewart, Mary Ariel .....Cheltenham.
Sutcliffe, William James .....Bacup.
Taubman, Henry Allen .....Bloomsbury.
Thomas, Thomas..... ..Llanelly.
Walter, Frank Henry.....Southampton.
Wilton, Walter Ernest .....Birmingham.
Withers, John Thomas ..... Haslar.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and the minimum restoration fee.

RESTORATIONS TO THE REGISTER.

The names of the following persons, who have severally made the required declarations and paid a fine of one guinea, were restored to the Register of Chemists and Druggists:—

Richard Broadhead, 38, Commercial Street, Batley.
John Fryer, High Street, Uppermill, Saddleworth, Yorks.
Alexander Reid Keith, 742, Holloway Road, London, N.
John Morgan, 106, Sugden Road, Lavender Hill, London, S.W.
Caleb Henry James Yewen, 108, Crownfield Road, Stratford, London, E.

The PRESIDENT drew attention to the very satisfactory increase in the new members, and invited the attention of local secretaries to what had been done in Sheffield, where twenty chemists had joined the Society, and in Oldham, where six new members had been obtained.

NOMINATIONS FOR COUNCIL AND AUDITORS.

The Secretary reported that he had received *twenty* nominations to fill the fourteen vacant seats on the Council. and that the following *fourteen* had declared their willingness to accept office if elected:—

Carteighe, Michael, 180, New Bond St., London, W.
Greenish, Thomas, 20, New Street, Dorset Square, London, N.W.
Grose, Nicholas Male, 5, Castle Street, Swansea.
Hampson, Robert, 71, Aberdeen Road, Highbury Park, London, N.
Harrison, John, 33, Bridge Street, Sunderland.
Hills, Walter, 225, Oxford Street, London, W.
Johnston, John, Union Street, Aberdeen.
Martin, Nicholas Henry, Northumberland Road, Newcastle-on-Tyne.
Martindale, William, 10, New Cavendish Street, London, W.
Newsholme, G. T. Wilkinson, 74, Market Place, Sheffield.
Richardson, John George F., Elmfield, Knighton, Leicester.
Schacht, George Frederick, 52, Royal York Crescent, Clifton, Bristol.
Storrar, David, 228, High Street, Kirkcaldy.
Warren, William, 24, Russell Street, Covent Garden, London, W.C.

The following *six* nominees had not expressed their willingness to accept office if elected:—

Evans, Gwilym, 7, Stepney Street, Llanelly.
Gostling, Thomas Preston, Market Hill, Diss.
Hardie, James Miller, 68, High Street, Dundee.
Savory, Arthur Ledsam, 143, New Bond Street, London, W.
Wells, F. T. Percy, 26, Cambridge Gardens, London, W.
Watt, James, High Street, Haddington.

The Secretary also reported that he had received the following *five* nominations to fill the office of Auditor, and that all the nominees had expressed their willingness to accept office if elected:—

Butt, Edward Northway, 13, Curzon Street, Mayfair, W.
Lescher, Frank Harwood, 60, Bartholomew Close, E.C.
Stacey, Samuel Lloyd, 300, High Holborn, W.C.
Umney, Charles, 50, Southwark Street, S.E.
Yates, Francis, 64, Park Street, Southwark, S.E.

The PRESIDENT remarked that as only fourteen gentlemen had expressed their willingness to accept office they would all be elected. It would, however, be necessary, he believed, under the bye-laws, to send out voting papers.

Mr. SOUTHALL suggested that the expense of doing so should be saved.

The PRESIDENT said the Committee would no doubt consider the matter carefully. It was twenty-six years since there had been a Council election without a contest.

REPORT OF THE FINANCE COMMITTEE.

The report of this Committee was of the usual character, and recommended the payment of sundry accounts.

The PRESIDENT (as Chairman of the Committee) in moving the adoption of the report and recommendations, said there had been considerable receipts on the general account from subscribers, including many from new members, and also from examination fees. On the Benevolent Fund account also there had been receipts to the amount of £389 16*s.* 2*d.*, including £361 5*s.* 0*d.* of annual subscriptions. On the donation account the legacy recently announced from the late Thomas Hyde Hills had been received, and was now lying on deposit; a separate resolution would be proposed with regard to that. The payments were mainly of the usual character, including the monthly and quarterly salaries, and also the printing of the Calen-

dar, Register, and the Catalogue of the Hanbury Herbarium.

The resolution was carried unanimously.

Mr. Hill's Legacy.

The PRESIDENT then read the terms of the bequest by Mr. Thomas Hyde Hills, which directed that the £1000 should be invested and the income applied, in the discretion of the President and Council, for the purpose of assisting or purchasing the election of the orphans of members or associates of the Society who had been subscribers to the Benevolent Fund for three years or upwards to orphan schools or asylums. This was really, to some extent, the establishment of a subsidiary Benevolent Fund of a special character, and he had reason to know that the testator had in his mind that possibly it might be the nucleus of something larger in future. He thought the proper way would be for the Committee to consider how this money should be invested; it had been suggested that a perpetual nomination to an asylum should be purchased, but he was not quite clear at the moment whether that would be possible, if it were thought desirable. He moved that the Benevolent Fund Committee and Mr. Walter Hills be requested to formulate a scheme for carrying out the conditions of the legacy of the late Thomas Hyde Hills.

The motion was seconded by Mr. ALLEN and carried unanimously.

REPORT OF THE BENEVOLENT FUND COMMITTEE.

The report of this Committee included a recommendation of the following grants:—

£15 to the widow (age 49) of a member. Applicant had a similar grant in April last, and several previously. Is paralyzed and quite helpless. (Harrogate).

£10 to a registered chemist and druggist (age 33). Applicant has had to give up his employment and enter a hospital for a serious operation, and has a wife and three children. (Glasgow).

£10 to a registered chemist and druggist (age 82); has a sick wife and four children partly dependent on him. (Aberdeen).

£10 to a former member and subscriber (age 73). Had a grant of like amount last April. Is dependent on two sons, who are unable to entirely support him. (Glasgow).

Two other cases the Committee had declined to entertain.

Death of an Annuitant.

The SECRETARY reported the death of Mrs. Eliza Brown, an annuitant; also of Joseph Barker, an unsuccessful candidate at the last election.

The SECRETARY reported the steps he had taken to assist a widow in getting some of her children into orphanages.

The VICE-PRESIDENT moved the adoption of the report and recommendations; saying there was nothing calling for special remark.

The motion was unanimously agreed to.

REPORT OF THE LIBRARY, MUSEUM, SCHOOL AND HOUSE COMMITTEE.

Library.

The report of the Librarian had been received, including the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
February	Day . .	580	38	15	23
	Evening .	214	22	5	10

Circulation of books.	Total.	Town.	Country.	Carriage paid.
February . . .	226	115	111	£1 6*s.* 4*d.*

Donations to the Library had been announced (see pp. 758–9), and the Committee had directed that the usual letter of thanks be sent to the respective donors.

The Committee recommended that the under mentioned works be purchased:—

For the Library in London—

Tyndall, New Fragments, 1892.
Meyer (L.), Outlines of Theoretical Chemistry, 1892.
Prescriber's Pharmacopœia, 2nd ed.
Selecta è Præscriptis, 18th ed., 1890.
Leonard and Christy, Dictionary of Materia Medica, 1892.
Zeitschrift für anorganische Chemie.

Museum.

The Curator's report had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
February	Morning	615	42	12	24
	Evening	75	16	1	3

Donations to the Museum had been announced (see page 759), and the Committee had directed that a letter of thanks be sent to each of the donors.

The Staff of the Society's School had attended and reported on their respective classes.

The PRESIDENT had been requested to prepare a draft annual report.

The PRESIDENT, in moving the adoption of the report, drew attention especially to the kind donation made by Mrs. Middleton of several valuable books of reference, the property of her late husband, to the Research Laboratory. Some of these books could not now be purchased, and Mrs. Middleton was looking out for the volumes necessary to complete the set of Gmelin and some others.

The motion was unanimously agreed to.

ANNUAL REPORT OF THE RESEARCH COMMITTEE, 1891–92.

During the past year the Committee have met once a month, and on several occasions have held additional meetings. In order to facilitate their work, the Professor of Chemistry was asked to act as Honorary Secretary, and in that capacity he has been present at all the meetings of the Committee. The Committee have regularly received from the Professor reports on the work of the Research Laboratory and on the progress made by the workers. During the past year nine persons have worked in the Laboratory. With one exception all of these had previously been students in the Society's School, whilst five were pharmaceutical chemists.

Excellent progress has been made with the investigations which were alluded to in the Committee's last report as having been started, whilst several new researches have been commenced.

The inquiry into the nature and properties of the aconite alkaloids has led to a number of important results. Most of these are embodied in the three papers which have already been published. The composition and properties of aconitine, the principal and highly poisonous alkaloid of *Aconitum Napellus*, have been very fully investigated, and, contrary to the usual opinion, this plant has been shown to contain three other alkaloids. One of these has been identified as aconine, of which aconitine has been proved to be the benzoyl derivative. The second alkaloid, to which the name of napelline has been given, as well as the third alkaloid, are still being investigated. The plants from which these alkaloids have been isolated were grown by Mr. E. M. Holmes at the request of the British Pharmaceutical Conference, by whom they were presented to the Committee. Having thus worked with authentic plants and with the aid of processes for the extraction of the alkaloids which could not have led to any decomposition, these alkaloids must be regarded as actual constituents of *Aconitum Napellus*

The investigation of the physiological action of these alkaloids has been undertaken by Dr. Augustus Waller, of St. Mary's Hospital, who has already made a number of preliminary experiments. The composition and properties of aconitine and its principal salts having been ascertained, the products of its hydrolytic decomposition have been closely studied. The basic product aconine has been prepared in a pure state, and several of its salts, hitherto regarded as amorphous, have been crystallized. Lastly, aconine has been reconverted into aconitine, a result which constitutes a partial synthesis of the natural alkaloid.

The Council of the Royal Society have recognized the importance of this investigation, by placing at the disposal of the Committee a grant of £150 in its aid, out of the Government fund entrusted to the Royal Society for the promotion of scientific research. As soon as the chemical properties and the physiological action of the alkaloids of *Aconitum Napellus* have been ascertained, an opportunity will be taken to summarize the results of the entire research, and to discuss their important practical bearings on medicine and pharmacy.

The Committee wish to take this opportunity of acknowledging their high appreciation of the assistance which has been afforded them by the Royal Society in carrying out this difficult undertaking, and also of expressing their obligation to Mr. David Howard, of the firm of Messrs. Howards and Sons, of Stratford, for the liberality with which he presented a quantity of aconitine which had been prepared by a special process.

An examination of the constituents of lettuce, preparations of which have been used medicinally from the earliest times, has resulted in the isolation of the alkaloid hyoscyamine, the mydriatic base also found in belladonna and henbane. This discovery satisfactorily explains the sedative action exerted by preparations of lettuce, which has long been an obscure point in therapeutics.

Considerable progress has been made in examining the composition of croton oil with a view to the identification of the vesicating principle.

The antiseptic cyanide proposed for surgical use by Sir Joseph Lister, has been further examined and shown to consist chiefly of an insoluble double cyanide of the formula $Zn_4Hg(CN)_{10}$, the properties of which have been fully described.

The statements made by several physiologists, that the alkaloid theine obtained from tea does not produce the same physiological effects as the caffeine of coffee, two alkaloids which have been hitherto regarded as chemically identical, pointed to the necessity of carefully comparing the properties of these compounds when in a perfectly pure state. This work has been carried out in the Laboratory, and the results will shortly be published.

The stores of valuable material which are each year deposited at Kew, chiefly by the Governments of India and the colonies for the purposes of investigation, include a large number of substances of pharmacological importance. The Director of Kew Gardens, Mr. W. T. Thiselton Dyer, F.R.S., naturally looks for assistance in dealing with this material to the Research Laboratory of the Pharmaceutical Society, at present the only institution in this country where researches in chemical pharmacology are systematically conducted. Although the present small staff and equipment of the Laboratory render it quite impossible to deal with more than a small fraction of this important work, nevertheless in each session the substances selected for investigation from the museums at Kew have invariably turned out to be of very considerable interest. During the past year an examination has been made of the constituents of a plant growing in Trinidad, *Piper ovatum*, which was reported to possess a curious physiological action, as well as numerous remedial properties. This examination has resulted in the isolation of a remarkable compound, to which the principal physiological action of the plant is due. The nature of this compound will be further investigated as soon as more material can be procured. The examination of its physiological action has been undertaken by Professor Cash, F.R.S., of the University of Aberdeen.

The following are the titles of the papers which have been published since the last report of the Committee:—Contributions to our knowledge of the Aconite Alkaloids. Part I. The Crystalline Alkaloid of *Aconitum Napellus*. By Professor Dunstan and Dr. W. H. Ince. The Action of Alkalis on the Nitroparaffins. By Professor Dunstan and Mr. T. S. Dymond. The Existence of Hyoscyamine in Lettuce. By Mr. T. S. Dymond. Contributions to our knowledge of the Aconite Alkaloids. Part II. The Alkaloids of true *Aconitum Napellus*. By Professor Dunstan and Mr. J. C. Umney. Part III. The Formation and Properties of Aconine and its Conversion into Aconitine. By Professor Dunstan and Dr. F. W. Passmore. A Simple Laboratory Shaker. By Professor Dunstan and Mr. T. S. Dymond. A Study of the Conditions which determine Chemical Combination between the Cyanides of Zinc and Mercury. By Professor Dunstan.

As regards the financial condition of the Laboratory, the receipt of a grant from the Royal Society has made it possible to engage an additional assistant to aid in the aconite investigation. The total expenditure leaves a balance of a few pounds to be carried over to the present year. It is hoped that an application to the Royal Society for further aid in carrying on the work of the Laboratory will be acceded to during the present year.

MICHAEL CARTEIGHE, *President.*
ALEXANDER BOTTLE, *Vice-President.*
THOMAS GREENISH, G. F. SCHACHT, } *Members of Council.*
T. LAUDER BRUNTON, CHARLES EKIN, MICHAEL FOSTER, EDWARD FRANKLAND. } *Additional Members of the Committee.*

(Signed) March 31, 1892.

The PRESIDENT moved that the report be received and entered on the minutes. If the quantity of actual work done did not seem very large, he might claim that the quality was very good; and it must be remembered that the time occupied in investigating drugs pharmacologically was much greater than was often supposed. The special research to which reference was made, and to which the Government grant administered by the Royal Society was devoted, was on the aconite alkaloids, the object being to ascertain the natural history of the active principles of aconite, to determine what species should be used in medicine, so as to grow it, and be able to identify the root when found in the market or otherwise. Lastly, having determined the precise composition of the potent agents in the drug, and not before, they would be in a position to deal with what many people called the pharmacy of the matter. In order to make preparations of potent things like aconite it was necessary to determine what the active principle was. In early days, when pharmacists had not sufficient chemical and other education to enable them to examine drugs scientifically, the plan was to extract the drug by various solvents, and to determine the relative value of the drug and its preparations by seeing the amount of total residue, or by the intensity or otherwise of the taste or colour or other physical properties, which in many cases were not only not indicators of the actual potency, but in some

cases were inversely proportional to it. Certainly, in the case of aconite, the total amount of residue was not a safe indicator. They not only wanted to investigate the natural history of aconite alkaloids and other preparations from the point of view in which chemists and pharmacists were competent, but also to be quite sure that that which was called aconitine and other preparations of the root when examined physiologically produced the results which medical men ascribed to them. This ought to be done with precision and care, and this physiological or practical portion of the work was now being carried on concurrently with the chemical. The investigation was a very difficult one, and must necessarily be a long one, and it was one peculiarly suited to a research laboratory. If they completed the investigation of these alkaloids, in defining the preparations best adapted for use in medicine, and in giving methods for the standardization of them, even in the course of two or three years, and the Committee were then dissolved, it would have accomplished a work which entitled it to the thanks of the pharmaceutical world.

Mr. HAMPSON said he had much pleasure in seconding the motion. This was a very important document, inasmuch as it placed on record the progress which had been made in a very important investigation. There was no question that if the work was continued on the present lines a great work would be accomplished, which would be the foundation of their future fame. It represented something in itself perfectly unique. That Council was entrusted by Government with certain functions, and it was only incidentally that this work was carried on. It was not necessary, but it was in perfect harmony with the system of education which had always been pursued there, and not only gave facilities for education, but was investigating important problems, which provided the very best methods for education. He hoped all the younger members of the calling would read that report with interest, and that many who were anxious to undertake original investigations would be allowed to work in the Research Laboratory. The field was boundless; vegetable products from all parts of the world were constantly coming to this country; and no one could tell what might come out of the investigations.

Mr. ATKINS said no apology was needed for the apparent paucity of the results attained; he had long entertained the feeling that if the Research Laboratory took up a particular branch of investigation, and there could not have been a happier illustration than aconitine, it should be pursued until it was finally exhausted. He hoped that this inquiry would be continued until certain questions were set at rest, which had been the subject of inquiry for the last twenty-five or thirty years. Of course while that was being done a number of other investigations might be undertaken, but he hoped that aconitine would not be left until it was finally disposed of.

The PRESIDENT in putting the resolution said the Committee desired him to convey to the Council their high appreciation of the zeal, enthusiasm and unwearied exertions of the director, of Mr. Dymond his coadjutor, Dr. Passmore, and others who were working in the laboratory. It was not possible for everyone to be equally successful in achieving results, or in having his name associated with the Research Laboratory and its director in a paper, but still that distinction was open to every worker, and besides that there was no form of education so well adapted to bring out the skill and knowledge which might hereafter be turned into money as investigation for a year in the Research Laboratory under skilful direction. If nothing were discovered there was an amount of knowledge acquired which could be turned either to the credit of the author as a man of science or as a working pharmacist.

The resolution was then put and carried unanimously.

BENEVOLENT FUND.

Mr. HARRISON then moved the following resolution, of which he had given notice:—

> "That the Benevolent Fund Committee be requested to take into consideration and report to the Council whether it is desirable to continue two classes of annuitants; and, if so, whether the distinction should be determined by the age or the circumstances of the applicant."

He said at the last meeting when discussing this question of the alteration of the method of administering the Benevolent Fund it occurred to him whether the time had not come when some new departure should be made as to the two classes of annuitants, or whether in fact there should be two classes at all. He felt that possibly the present method was not the most perfect, and attempted to move a resolution, but was informed he was out of order, and therefore he gave notice to bring it forward to-day. He did think that in administering the funds it was due to the large number of persons outside who contributed that the Committee should take every possible care to see that the principles which guided it were thoroughly sound and business-like. He had no special fault to find with the fact that there were two classes of annuitants, but it occurred to him whether the element of age was a wise one, and whether a better method would not be to adjust as far as possible the amount of relief granted to the requirements of the recipient. Obviously if this could be easily arrived at, it would be a better method, but it was equally obvious that there would be a great difficulty in arriving at a proper appreciation of the exact requirements of all applicants, and he thought it would be best, therefore, for the Committee to consider whether in their judgment it was desirable to continue two classes of annuitants, and if so, on what basis the division should be made. Those accustomed to administering the Fund would know better than he, whether the suggestion he made was practicable, and if the Committee reported that it was not he should at once accept the decision. If, on the other hand, they found it was practicable, he should be equally well satisfied. Then there was the broader question, whether it was desirable to have two classes of annuitants. Since the establishment of the Fund something like half the annuitants elected had been under the age of sixty-five, but only slightly under. Very few were under sixty, so that after all if the same state of things continued in the future the extra amount required would not be very large, and it would be in some respects an advantage to have only one class, and that the election should determine what the annuitant had to receive. It was only a question of finance, and of course could best be judged of by those who administered the Fund.

Mr. CROSS seconded the motion. He thought the only objection which could be urged against it was that it was inopportune; but he did not think the Committee would object to considering the matter. Last month an important change was made, raising the annuity to £50, and he felt very strongly that nothing less was an adequate provision for an old chemist and druggist. He was sorry Mr. Harrison's motion was then ruled out of order, and hoped the Committee would now consider it. It would place the annuitants in a more dignified position; and he did not think that anyone who was considered worthy of being placed on the list at all should have less. It would have the effect of stimulating the generosity of those from whom the subscriptions came. Great aims elicited greater efforts to attain them, and he thought that the chemists throughout

the country would see the justice of the matter, and would feel that it was their duty to make stronger efforts than ever to support the Fund. In his part of the country the Fund was thought a great deal of, and he was glad to see that with an increase in the number of members the resources of the Benevolent Fund increased also. It was within his recollection that they were almost without money, but yet last year out of subscriptions alone they were able to invest £800, and it was time something should be done to use wisely the subscriptions as they came in for the chief object of the Fund, namely, the support of annuitants who were really thrown helpless on the world.

Mr. SCHACHT said he thought that the members were agreed that £50 a year was not at all too much for annuities, and he believed the Committee were of that opinion, but when they made a recommendation last month it was considered that discontinuing the separation into two classes according to age was a little beyond the power of the Committee, and required the sanction of the Council. He had hoped that Mr. Harrison's motion would have taken the form, not of referring it to the Committee, but of declaring that in future all annuitants should receive one definite sum, and if he were in order he would move an amendment to that effect.

Mr. RICHARDSON seconded the amendment.

Mr. HAMPSON suggested that this was scarcely an amendment to Mr. Harrison's resolution, the object of which was to obtain further consideration of the matter by the Committee. It was decided to make one change last month, and he thought it was inadvisable to make another so soon. It would be much better to let the matter rest for a time and get the experience of a year or two longer, when if necessary the matter could be again considered. It would be easy to give one sum, and there would be no necessity to go into the merits of the case, but if the present system were continued he was disposed to think that the limit of age taken all round was the best thing to go by. At one time a case might have certain aspects which would warrant a smaller sum, and at another a larger. There were many considerations which had to be taken into account, and he thought it would be much better to let the matter rest.

Mr. ALLEN thought no one could disagree with Mr. Harrison's motion that the Committee should consider the matter, but the amendment was quite a different thing, and he could not agree with it. Last month an important resolution was agreed to which affected the finances of the Fund to a considerable extent, and to accept the amendment would be to make a further advance in the same direction. It was true that at present there were only seven or eight candidates who would not come under the new regulation, and it might not be very much to give them the extra £10, but it might make a considerable difference in the future.

Mr. NEWSHOLME had great sympathy with the resolution, and thought it was just as well for the Committee to consider the matter, but he thought it would be a great mistake if they reported very hurriedly upon it. It would be just as well if they did not bring up the report for twelve months.

The VICE-PRESIDENT asked if the amendment was in order.

The PRESIDENT said on reflection he thought the amendment could not be put without notice, as it would interfere with the established practice. He himself felt that the Committee would be able to manage the Fund so that suitable cases should be put on the list, whether the qualification were age, with a certain amount of necessity, or necessity without age; and it was quite open to the Committee, if it thought fit, to give almost an annuity by way of grant. He did not take it that either the resolution or the amendment was intended as any reflection on the action of the Committee. His own opinion was that 50 was rather young to put an average person on the list, but there might be special cases of sickness or helplessness which might render it desirable.

Mr. ATKINS hoped the Committee would consider the matter; in fact they had considered it already, and though he was not likely to alter his view, he should be glad to give any time required to a further consideration of the matter, but it ought not to be decided at once.

Mr. MARTINDALE thought it would be better to refer the matter to the Committee; it should not report too hurriedly. His own idea was that applicants should not be put on the list below a certain age, except under special circumstances.

Mr. RICHARDSON hoped the hands of the Committee would not be tied to delay their presenting a report. The objection formerly was that there was not enough money, but when the President said they had the money, he thought it would be better for the improved state of things to commence at once.

Mr. SCHACHT said he would withdraw the amendment and support the resolution.

Mr. SOUTHALL thought it was hardly correct to say they had the money, although they hoped to have it.

Mr. HILLS said as he understood, the resolution was simply to consider the question whether there should be uniformity of annuities or not, not the amount.

The PRESIDENT said supposing the Committee should come to the conclusion that it was desirable to have only one grade of annuitants with a limit of age, still in cases where distress appeared of a character somewhat more than temporary, it would be open to the Committee to give grants yearly until the case was relieved or death put an end to the suffering. In effect, notwithstanding any regulations which might be made, it would always be possible for the Committee to give relief annually for a certain term.

The resolution was then put and carried.

A letter was read from Mr. Shepheard, of Chester, thanking the Council for the grant made to the Chester Chemists' Association.

DEATH OF A DIVISIONAL SECRETARY.

The PRESIDENT said he regretted to announce the death of Mr. Haden, Divisonal Secretary for Bow and Bromley. He was not much over thirty years of age, and had taken a warm interest in the work of the Society.

THE SALE OF POISONS.

A resolution, passed at a meeting of the Manchester Pharmaceutical Association on the 9th ult., had been forwarded, to the effect that it is desirable that the law affecting the sale of poisons and poisonous compounds, either in the form of proprietary articles or otherwise, should be more strictly enforced.

LOCAL SECRETARIES.

Mr. GEORGE ROBERTS was appointed local secretary for West Bromwich.

Mr. JOHN SMITH, Aigburth Road, Liverpool, was appointed assistant local secretary for the southern portion of Liverpool.

AUDITORS' REPORT.

The financial statement and auditors' report was laid on the table.

EXAMINATION IN APRIL.

The PRESIDENT said the Board of Examiners had decided that in future, commencing with April, the written portion of the Major Examination should not be on one day but two, as it was found that one day was not long enough for the candidates to do justice to

the subjects. There would, therefore, be two days for the written examination, and a third day for the practical part of the examination. He was quite sure this announcement would give great satisfaction to intending candidates.

REPORT OF THE GENERAL PURPOSES COMMITTEE.

The report of this Committee included the usual letter from the Solicitor, stating the progress made with cases placed in his hands. Several persons had paid penalties without going to trial, one had been convicted in five penalties and another in one penalty; other cases were standing for trial.

Four cases of alleged infringement were considered, and in each case proceedings were recommended.

It was recommended that in future one certificate of honour, in addition to a bronze medal, be given at the end of the winter course of lectures on materia medica, and two certificates of honour, in addition to a silver medal, at the end of the session.

This report was as usual read and considered in committee.

On resuming, the report and recommendations were unanimously adopted.

SCHOOL OF PHARMACY EXAMINATION QUESTIONS.

CHEMISTRY.

PROFESSOR DUNSTAN.

EXAMINATION FOR A BRONZE MEDAL AND TWO CERTIFICATES OF HONOUR.

Session, 1891–92.—*Winter Course. Friday. April* 1. *Time allowed*—10 *a.m. to* 1 *p.m.*

1. State the chief characteristics of chemical action. Discuss the question as to whether solution is mainly a chemical or a physical effect.

2. Give a short account of the preparation and principal properties of ethyl nitrite. How may it be converted into alcohol?

3. Describe how a mercurial thermometer is graduated and calibrated.

4. What methods are used on the large scale for obtaining metals from their native oxides and sulphides? Mention some examples.

5. Describe the methods of estimating the molecular weight of acetic acid.

6. How are the following substances prepared, viz., fluorine, carbonic oxysulphide, sodium hypophosphite and chloral.

The total number of marks gained by each candidate at the revision classes will be taken into account when awarding the medal and certificates.

MATERIA MEDICA.

MR. H. G. GREENISH.

Prize Examination.

BRONZE MEDAL.

Session, 1891–92.—*Winter Course. Saturday, April* 2.—*Hours from* 10 *till* 1.

1. Give a short account of cochineal and cantharides.

2. Describe briefly the life history of ergot.

3. What is wormseed? Describe its structure. Give the name, natural order and habitat of the plant yielding it. To what principle does it owe its activity?

4. Give the names, natural orders and habitats of the plants yielding the following drugs:—Huile de Cade, araroba, storax, aloes, lactucarium, galls, squill, benzoin. Describe the methods of collection or production of each, and name the active constituents.

5. By what characters would you recognize the fruits of *Piper cubeba* and distinguish them from substitutions or adulterations?

PRACTICAL CHEMISTRY.

PROFESSOR ATTFIELD.

Session, 1891-92.—*Winter Course.*—*Monday, April* 4. *Hours*—10.30 *to* 1 *and* 2 *to* 4.30.

Books and memoranda permitted. Standard number of marks, 100.

1. State the composition of "The Powder."

2. Is the "Sulphate of Copper" pure?

3. What impurity is present in "The Proof Spirit?"

4. Name "The Organic Salt, A" and "The Organic Salt, B."

5. Ascertain, by volumetric analysis, the proportion of iron, reckoned as metal, in "The Solution."

NOTE.—*Manipulation as well as results will be scrutinized.*

BOTANY.

PROFESSOR GREEN.

Prize Examination.

BRONZE MEDAL AND TWO CERTIFICATES OF HONOUR.

Session, 1891–92.—*Winter Course.—Tuesday, April* 5.—*Time allowed*—10 *a.m. to* 1 *p.m.*

1. Give an account of the various modes of branching met with in plants. Show how these lead to the formation of branch systems. Classify the chief forms of the latter and illustrate them by references to inflorescences.

2. Give some account of the composition of the cell-wall in a young vegetable cell. What reactions will enable you to identify the material of which it is composed? What are the more commonly occurring modifications of this material?

3. Describe the structure of two typical kinds of secreting structure found in plants.

4. What is a seed? Describe such a seed as that of the castor oil plant (Ricinus). How does this form differ from that of the bean?

5. Give a general account of the processes of reproduction known in plants.

PRACTICAL BOTANY.

PROFESSOR GREEN.

Prize Examination.

BRONZE MEDAL AND TWO CERTIFICATES OF HONOUR.

Session, 1891-92.—*Winter Course. Tuesday, April* 5.—*Time allowed*—2.30 *p.m. to* 4.30 *p.m.*

1. Make such microscopic preparations as you think necessary to exhibit the structure of a fibro-vascular bundle from the stem of a fern.

Leave lettered sketches with your preparations calling attention to the points you consider important.

2. Identify the microscopical preparations A, B, C. Write a few lines of description of each.

3. What are D, E, F? What features of morphological importance can you recognize in each?

EVENING MEETING IN EDINBURGH.

Wednesday, March 30, 1892.

MR. J. LAIDLAW EWING IN THE CHAIR.

The fifth evening meeting in Edinburgh of the present session was held in the Society's House, 36, York Place, on Wednesday, March 30, at 8.30.

The minutes of last meeting having been read and approved the following communications were read:—

NOTES ON KOLA AS A DIETETIC.

BY PETER BOA.

For several years kola has been kept prominently before the public by certain enthusiasts who have attributed to it virtues which have been scarcely

credited, even by those possessed of a minimum of independent judgment. In fact, many of the statements made in regard to it savour a good deal of the patent medicine business. Personally, I believe that kola has considerable merit, and may in time, as it becomes understood, be extensively used in our dietary. To label it with properties which are not possessed by any plant that we know on earth is not, however, the surest way to establish it on a sound footing with the public.

One of the claims advanced for kola is that it is unusually sustaining. In this connection I was questioned thus: What is the caffeine value of kola as commonly sold, compared with a good tea? In order to answer this question, I assayed the caffeine in several samples of powdered kola nuts as commonly supplied in commerce. The method of assay adopted was a modification of Squibb's process for the assay of caffeine in guarana. The admirable process of Messrs. Paul and Cownley, for the estimation of caffeine in tea, was not found suitable for this, on account of the starch present. Five grammes of kola powder were boiled with 1 gramme of calcium hydrate and 50 c.c. of water for a few minutes; 25 c.c. absolute alcohol was added, the whole stirred and filtered, the residue again heated to boiling with 25 c.c. proof spirit and finally percolated to exhaustion with proof spirit. The percolate was evaporated till all the spirit was removed, transferred to a separator, and the caffeine shaken out with three successive portions of chloroform. Three samples of kola powder from different sources were assayed. The results were as follows:—

Sample.	Assays. 1	2		Average.
A	2·0	1·95	=	1·975
B	1·4	1·7	=	1·550
C	1·73	1·85	=	1·790

The caffeine value, therefore, of kola as ordinarily sold, may be taken as slightly under 2 per cent., tea containing from 2 to 4½ per cent.

The next question which was put to me was this: It is evident that the amount of caffeine contained in kola does not account for the prolonged stimulus which it yields. Assuming that it does sustain under prolonged fatigue, can you offer any feasible explanation? This question was not so readily answered as the first. My own experience of kola is that as a beverage, say for breakfast use, its effect lasts longer than the effect of tea or coffee similarly taken. Reasoning by analogy I should say that the longer duration of the stimulus of kola is due to the large amount of starch (about 35 per cent.) and other soluble matter which it contains, so entangling, as it were, the active principle, that its absorption is less rapid than in the case of other substances such as tea, where there is little starch or albumenoid matter. We have parallel examples in whiskey and beer. The effect of whiskey is prompt but fugitive; that of beer is slower but more lasting.

Kola has been specially recommended for use by those who are bilious or dyspeptic. A number of such persons reported that they had found it heavy, and that it apparently aggravated their complaint instead of ameliorating it, as they had expected. A question consequently arose as to the reason for this. On inquiry it was ascertained that some prepared form of kola had been used. Kola itself has a peculiar and to most people a not agreeable flavour, which may most accurately be described as "earthy." To cover this taste all commercial preparations of kola (kola pastes, kola cocoas, etc.), are flavoured with cocoa. Two samples of kola paste were treated with petroleum ether and yielded respectively 5 per cent. and 6·4 per cent. of solid fat, evidently cocoa butter. Not being aware of the amount of fat contained in the so-called "soluble" and "homœopathic" cocoas I treated samples of two different makes with petroleum ether, and obtained from one, as a mean of two estimations, 15·275 per cent. of solid fat and from the other 14·0 per cent. A specimen of a preparation sold as kola cocoa yielded 8·3 per cent. of fat, indicating about equal proportions of kola powder and cocoa powder as its composition. Pure kola powder contains practically no fat—from 0·3 to 0·6 per cent. It was evident, therefore, that any "heaviness" that was attributed to kola was more likely due to the additions which were made to it than to itself. It seems scarcely consistent to add to kola the very thing for which it is lauded as not containing. Such an addition can only be justified on the principle observed in cookery operations of serving a lean food with a fat one, as, for example, in bacon and beans.

The fourth and final problem presented for solution was to suggest a method of preparing kola in a palatable form and without any admixture of diluent or flavouring. After numerous trials of it in various forms of infusion and decoction it struck me that boiled samples tasted least earthy. The directions for use accompanying kola preparations commonly sold are to the effect that they are to be made ready by the addition of boiling water. A careful comparison of it prepared in this way and by boiling conclusively demonstrated that the boiled preparations were most palatable. Owing to the large quantity of starch present the liquor obtained by boiling had considerably more body than the infusion. It was not clear to me whether the earthy flavour was merely modified by the dissolved starch or dissipated by the boiling. I therefore prepared an infusion of which one half was reserved and one half boiled for three minutes. The two portions were then tasted comparatively; the reserved portion retained the characteristic earthy flavour, while the boiled portion was almost free from it. Next I took a new quantity of kola and boiled it in an equivalent quantity of water for the same time. The earthy flavour was more pronounced than in the boiled infusion. This it was supposed might be due to the increased thickness of the liquor preventing the volatile flavour from being so rapidly driven off. As the boiling was continued the flavour became gradually less, showing that this supposition was correct. It would appear then that a palatable beverage may be obtained from pure kola powder by boiling, and I would suggest a procedure as follows:—Take about a teaspoonful of kola powder for each breakfast cupful of water used; mix the powder evenly with a little cold water (if hot water be used for this purpose the swelling of the starch leads to the formation of lumps); add the remainder of the water, hot or cold, as may be convenient, and boil for five or six minutes in an open pan. Finally, pour into a jug or pot, allow a few minutes for settling and use as required.

If any addition be made I would suggest a little freshly roasted coffee as yielding a large quantity of flavour from a very small quantity of substance.

The Chairman said kola was a substance which seemed to have engaged the energies and attention more particularly of homœopathic chemists, who had attributed to it many virtues. He was afraid its reputation had suffered somewhat from the exaggerated statements that had been made concerning it. With regard to the musty, earthy odour referred to by Mr. Boa, he had observed in making pastilles that when they were made from the tincture they possessed this peculiar odour, which was entirely absent when they were made from a decoction.

Mr. Stephenson said they were indebted to Mr. Boa for this reliable and practical paper, by which he had exploded the extraordinary statements that were made

about kola, and had done much to expiscate the subject, so that the real truth might be established.

Mr. Hill said kola might be taken as a typical instance of a substance possessing undoubted virtues, which ran great risk of discredit through being exploited by enterprising manufacturers whose whole aim was a financial one. Many of the much lauded preparations at present in the market would be more correctly described as a preparation of something else with a little kola added to salve the conscience of the maker. Mr. Boa's paper would tend to secure a really serviceable preparation of kola and save it from undeserved opprobrium.

Mr. Henry said he had had some experience of the stimulating and sustaining effects of kola during walking expeditions and similar prolonged physical exercise. Its effects were similar to coca, but it possessed the advantage of warding off the pangs of hunger. The fluid extract he had found was the best preparation to use. Two drachms of this with half-a-drachm of sal volatile and flavoured with saccharine elixir made a most pleasant, stimulating and sustaining draught, so that continuous exertion could be maintained for fully eight hours w :hout any feeling of fatigue.

Mr. Boa, in reply, said he shoulu make it plain that he did not propose to make an infusion and then boil it. He suggested that they should make a decoction, for by this means the starch was dissolved and gave body to the liquor. About five minutes boiling was required to dissipate the earthy flavour. He could quite confirm what Mr. Henry said as to the effect of kola. He had recently been trying it as a breakfast beverage, and had noted that when he used it the feeling of hunger was longer in asserting itself, and the luncheon hour had to be postponed.

The next communication was on—

Liquor Strychninæ Hydrochloratis, B.P.

BY WILLIAM DUNCAN.

During the past month a discussion has been carried on in the *Pharmaceutical Journal*, on the instability of this preparation; and at an early stage it was suggested to me by Mr. Rutherford Hill that I might make some experiments with the liquor, and report at one of our evening meetings. He desired especially an answer to a query put to him by Mr. Hugh Kerr, who had observed that the addition of dilute hydrochloric acid to liquor strychninæ hydrochloratis caused precipitation.

Five years ago, Mr. Farr, in a paper read before the School of Pharmacy Students' Association (*Pharm. Journ.*, [3], vol. xvii., p. 580), drew attention to the fact that deposition of crystals of strychnine hydrochloride was apt to take place in this solution when exposed to cold, and from his experiments he suggested that this was possibly due to the spirit; and recommended that the liquor should be stored in places where it would not be exposed to low temperatures. Since the publication of this paper, reprints of the 1885 Pharmacopœia have been issued, and under this preparation have been added the words, "This solution should not be kept in a cold place," implying that the editors believe lowering of temperature to be the cause of crystallization. The subject was again brought forward by Mr. Lewis Ough (*Pharm. Journ.*, [3], vol., xxii., p. 688), and the numerous complaints published the following week induced an editorial, the writer of which—taking for granted that these complaints and the reason for them were well founded—suggested that the solution might be made half strength. Personally, I have never seen separation take place in the official solution, and after inquiry at over seventy pharmacists', have not met with any one who has. In all cases, however, the experience of these men—like my own—has been confined to the manufacture of small quantities, rarely exceeding a pint at a time. Reference to the back numbers of the *Pharmaceutical Journal* also shows that the complaints which have been made all refer to the present official preparation; no fault being found with the liquor made according to the 1867 Pharmacopœia. On comparing the two formulæ, doubling the quantities of the 1867 one to make the comparison clearer, it will be seen that while the alkaloid has been increased, the acid—to make whole numbers—has been even more so; the present formula containing about 5 minims more than is required to form a neutral hydrochloride, and in the "part" formula about double.

	1867.	1885.
Strychnine . . .	8 grains	9 grains or 1 part
Dilute hydrochloric acid . . .	12 minims	14 minims 2 fl. parts
Rectified spirit .	½ fl. ounce	½ fl. ounce 24 fl. parts
Distilled water .	1½ fl. ounce	1½ fl. ounce 73 fl. parts

In beginning the investigation the following solutions were made and numbered :—

No. 1. B.P. Liquor made by first formula on page 256.

No. 2. Same, but without spirit.

No. 3. Same, but only 10 min. dilute acid, sufficient to form hydrochloride.

No. 4. Half official strength, as suggested in Journal.

No. 5. B.P. strength, but with double the quantity of spirit.

No. 6. B.P. liquor made by alternative formula in parts.

These solutions have been allowed to stand for four weeks in the laboratory, the temperature of which has varied from 6° to 12° C., and in none has there been any separation of crystals. The following series of experiments were also carried on at the same time :—

I. One fluid drachm of each solution put in a test tube and immersed in melting ice (0° C.) on examination showed :—

	After 1 hour.	After 6 hours.	After 24 hours.	After 6 days.
No. 1.	No change	No change	No change	No change
No. 2.	No change	No change	Crystals very slight	Crystals increasing
No. 3.	No change	No change	No change	No change
No. 4.	No change	No change	No change	No change
No. 5.	No change	No change	No change	No change
No. 6.	Minute crystals	Crystals more distinct	Crystals increasing	Crystals abundant

II. One fluid drachm of each solution put in a test tube and immersed in a mixture of snow and salt (—17° C.) showed :—

	After 5 minutes.	After 15 minutes.	After 30 minutes.	After 1 hour.	After 2 hours.
1	No change	Crystals slight	Crystals distinct	Crystals abundant	Crystals abundant
2	Solid	Solid	Solid	Solid	Solid
3	No change	No change	No change	No change	No change
4	No change	No change	No change	No change	No change
5	No change	No change	No change	No change	No change
6	No change	Crystals distinct	Crystals abundant	Crystals abundant	Crystals abundant

III. One fluid drachm of each solution put in a test tube with two drops of dilute hydrochloric acid added, and kept at a temperature of about 11° C. showed :—

	After 15 minutes.	After 1 hour.	After 24 hours.	After 6 days.
No. 1.	Crystals very slight	Crystals increasing	Crystals abundant	Crystals abundant
,, 2.	Crystals distinct	Crystals abundant	Crystals abundant	Crystals abundant
,, 3.	No change	Crystals slight	Crystals increasing	Crystals abundant
,, 4.	No change	No change	No change	No change
,, 5.	No change	No change	No change	No change
,, 6.	Crystals slight	Crystals increasing	Crystals abundant	Crystals abundant

IV. One fluid drachm of each solution put in a test tube with two drops of dilute hydrochloric acid added and immersed in melting ice (0° C.) showed :—

	After 30 minutes.	After two hours.
No. 1.	Crystals distinct	Crystals abundant
,, 2.	Crystals distinct	Crystals abundant
,, 3.	Crystals slight	Crystals increasing
,, 4.	Crystals very slight	Crystals increasing
,, 5.	No change	No change
,, 6.	Crystals abundant	Crystals abundant

The results of these experiments point to the following conclusions :—

1. The official solution is stable at ordinary temperatures, and even at 0° C. if made by the first formula.

2. The solution made by the alternative or "part" formula is not stable when the temperature falls much below the normal.

3. The addition of rectified spirit checks the liability of acid solutions to crystallize, when the temperature falls.

4. The separation of crystals at normal and especially at lower temperatures, is due entirely to the presence of free hydrochloric acid, and the degree to which crystallization proceeds, is proportional to the excess of acid present within certain limits.

Having no doubt now that the hydrochloric acid was the sole offending agent, 10 ounces of the official liquor were made and 2 drachms of dilute acid added, the mixture being kept at zero for twelve hours. Abundant crystallization followed. These crystals were filtered out and the experiments repeated on the filtrate. Again crystallization was the result. This was repeated four times, and in every case deposition of alkaloid took place. These results could only be explained in one of two ways. Either strychnine hydrochloride was more soluble in water than in dilute acid or a less soluble acid hydrochloride was formed. Reference to standard works showed that only one hydrochloride was known, $C_{21}H_{22}N_2O_2,HCl,2H_2O$; which fact suggested the first explanation to be the correct one. This salt contains 8·97 per cent. of hydrochloric acid. The deposited crystals after washing and drying I found to yield 9·1 per cent., which is slightly over the theoretical yield. This difference may be accounted for by experimental error, or possibly overdrying of the salt. The results of these experiments explain the cause of crystallization, answer Mr. Hill's query, and at the same time prove that the separation of crystals is due to excess of acid, which should be avoided in the preparation of this liquor, as strychnine hydrochloride is less soluble in acidulated water. Similar results follow the substitution of sulphuric or nitric acids for the hydrochloric. In all cases where crystals have formed these can be redissolved by a gentle heat. It is some time before they again appear, due no doubt to loss of acid mechanically carried off by the volatilizing spirit. They are, however, readily reformed by the addition of more acid, especially when the heat applied has been sufficient to drive off much spirit.

Those who have observed deposition in this solution have done, I believe, one of two things; either used an acid not strictly of B.P. strength (10·58 per cent.), or else followed the alternative formula given in parts for the manufacture of large quantities. This "part" formula—as already indicated, and as shown by Mr. Macpherson in a paper read some years ago before the North British Branch (*Pharm. Journ.*, Dec. 1, 1888)—is incorrect, round numbers being given for convenience. The formula in parts should be:—Strychnine 1 part, dilute hydrochloric acid 1·41 fluid parts, rectified spirit 24·30 fluid parts, and distilled water 72 91 fluid parts.

I cannot agree with any of the numerous correspondents on the advisability of changing the acid or salt, or in lowering the strength of the liquor. Before such sweeping changes are made in a well known preparation, it must be proved that the present one is quite unworkable. I have shown that liquor strychninæ, when accurately prepared, is stable down to 0° C., and few laboratories ever fall below this; but if there be any risk of exposure to lower temperatures, any danger may be overcome by using the theoretical quantity of hydrochloric acid to form a neutral salt, or an equivalent quantity of strychnine hydrochloride, without the addition of acid. Thus—

Take of—

Strychnine	9 grains	or 1	part.
Dilute hydrochloric acid	10 minims	,, 1·01	,,
Rectified spirit . .	$\frac{1}{2}$ fl. oz.	,, 24·30	,,
Distilled water . .	$1\frac{1}{2}$ fl. oz.	,, 72·91	,,

or

Take of—

Strychnine hydrochloride	9 grains	or 1	part.
Rectified spirit . .	$\frac{1}{2}$ fl. oz.	,, 24·30	,,
Distilled water . .	$1\frac{1}{2}$ fl. oz.	,, 72·91	,,

The second formula will of course give a solution somewhat weaker in alkaloid than the official one; but it follows out the intention of the Pharmacopœia in adopting the 1 per cent. standard for alkaloidal solutions.

I have made 10 ounces of solution by each formula and subjected them to a temperature of —17° C. for twenty-four hours, the temperature gradually rising to —5° C., and no sign of crystallization was apparent in either. Reduced to —22° C. both became solid, but this was due to the water solidifying, as the same occurred with a mixture of spirit and water.

Strychnine hydrochloride is not such a sparingly soluble salt as is generally supposed. In Gmelin's chemistry it is stated to be soluble 1 in 50 at 22° C. I find that one part by weight of the commercial salt is soluble at 15°·5 C. in 37 parts of distilled water, in 32 of diluted spirit (spirit 1, water 3), in 50 of rectified spirit, in 200 of B.P. dilute hydrochloric acid, and in 39 of liquor strychninæ menstruum.

Personally, I am in favour of the first formula, as I think it is a mistake introducing salts of alkaloids as official, when solutions of these can be so easily and economically prepared by pharmacists with ordinary care.

Since the above was written my attention has been drawn to an abstract of a paper on the sparing solubility of strychnine in acids in the 1884 'Year-Book of Pharmacy,' by MM. Hanriot and Blarez. They point out the fact that while this alkaloid is soluble in very dilute acid, its solubility is markedly lessened when the acids are in a less diluted form; especially is this the case when the acid employed is the same as that contained in the salt of strychnine experimented with. It has also been suggested to me by Mr. C. A. Macpherson that the following formula would give more accurately a 1 per cent. solution of the alkaloid :—Take of strychnine 35 grains or 1 part, diluted hydrochloric acid 38 minims or 1 fluid part, rectified spirit 2 fluid ounces or 25 fluid parts, and distilled water to make 8 fluid ounces or 100 fluid parts. It may be considered that the present official formula is sufficiently accurate for practical purposes, but where absolute accuracy is easily attainable it is certainly better that it should be adopted, and therefore the above suggestion is worthy of careful consideration.

The Chairman said they were much indebted to Mr. Duncan for the exhaustive and conclusive manner in which he had treated this subject. He must say that during his experience he had never met with an instance of crystallization taking place in this liquor when made by the 1885 formula.

Mr. Stephenson said he had listened with particular interest to this important and valuable paper. He had once observed crystallization in this liquor when made by the 1867 Pharmacopœia, but he had no doubt now that the cause must have been that the hydrochloric acid was too strong. It must now be held as proved that the theory of cold as the cause of crystallization was entirely exploded, and that the result was due entirely to excess of acid. It was a remarkable thing that the addition of more acid should lessen the solubility of the salt. They would rather have expected it to have the opposite effect. Since hearing of the matter he had tried the experiment and found that the addition of a few drops of acid to the liquor caused the separation of crystals in a very few minutes. He quite agreed with the author that it would be a great pity to reduce the strength of the liquor as 1 in 100 possessed many advantages for practical purposes.

Mr. Dott said there had been considerable discussion on the formation of crystals in this liquor. His attention was called to the matter in October, 1889, when he found that the crystallization was due to excess of acid, and to no other cause. The sample in which crystals had formed contained the exact amounts of strychnine and alcohol, but 0·82 per cent. of hydrochloric acid. As Mr. Duncan had observed, the B.P. proportion of acid is slightly in excess; but not sufficient to cause crystallization. Assistants in general have the idea that because acid is required to dissolve, an excess of acid will make doubly sure; but that is a mistake. The formation of crystals in liq. strychninæ is the same phenomenon which is well-known to many students. When they test for sulphate, after adding barium chloride in considerable amount, a good excess of hydrochloric acid is added, whereby a precipitate of barium chloride is caused, and sometimes mistaken for something else. Mr. Duncan was to be congratulated on having so thoroughly worked out this subject.

Mr. Coull said he had been working at strychnine salts recently, and could corroborate what was said as to the effect of free acid in causing crystallization. He had brought a quantity of the mother liquor from the crystallization of normal strychnine sulphate, and on adding a small quantity of dilute sulphuric acid they would see that crystals began to form almost immediately, and in a few minutes the bottle would be filled with a dense mass of small acicular crystals of acid sulphate of strychnine. It would be observed that in the official "parts" formula for liquor strychninæ hydrochloratis the quantity of acid was more than double what was required to form neutral hydrochloride. He showed a solution which had been made by using half the quantity of acid ordered in the "parts" formula, and which was acid to test paper and remained perfectly stable after standing over night in a place where the temperature must have been pretty near the freezing point. It was rather curious that so much discussion had taken place without striking upon what Mr. Duncan had proved to be so simple an explanation.

Mr. Boa said he had kept his eye on the liquor strychninæ stock bottle ever since correspondence appeared regarding separation of crystals, but he had never seen such a thing. They were much indebted to Mr. Duncan for the great trouble he had taken to work out this subject.

Mr. C. A. Macpherson said he thought Mr. Duncan had proved that the acid caused the separation of crystals. He had himself had no doubt this was the case ever since he conducted some experiments in 1888. Mr. Farr's suggestion as to the proportion of spirit being the cause was untenable, because the hydrochlorate was sufficiently soluble in spirit. On Saturday last a write in the Journal suggested that the age of the strychnine had something to do with its insolubility. He did not think there could be anything in that, for he had just prepared some liquor with strychnine which must be at least fourteen years old and it showed no tendency to crystallize. It might be worth noting that Dr. Attfield had stated that there was sufficient elasticity in the official interpretation of formulæ to justify the present adoption of the formula he (Mr. Macpherson) had suggested in the communication read at the Newcastle Conference.

Mr. Lothian said he had observed that in making Easton's syrup if the strychnine were added to the phosphoric acid of 1·5 sp. gr. there was great difficulty in getting it dissolved. He quite agreed with the statement that if acid of B.P. strength were used and the official quantities strictly followed there was no difficulty in making a permanent solution.

Mr. Forret said he had never had any difficulty from separation of crystals in this liquor. There was one point that struck him. This liquor was frequently prescribed with liquor arsenicalis, and as Mr. Duncan's formula contained less acid it would be rendered alkaline, and, consequently, precipitated with a smaller quantity of Fowler's solution than the present B.P. liquor. He would like to ask Mr. Duncan if he could throw any light on the occasional solidification of Easton's syrup.

Mr. Stephenson said he forgot to mention that it occurred to him that in mixtures in which liquor strychninæ was frequently prescribed with dilute mineral acids, there would be a deposit of crystals; but on trying the matter he found that the crystals re-dissolved in the water added to make up the mixture.

Mr. W. G. Mackenzie said he had been associated with Mr. Duncan in all the work required for this communication, and could entirely corroborate the results he had stated.

Mr. Hill said he had to acknowledge a personal obligation to Mr. Duncan, for having so thoroughly carried out this investigation, at a time when he himself was unable to do so from pressure of other work. He would also say that Mr. Hugh Kerr deserved much credit for the acute observation which had set them on the right road to a solution of this interesting phenomenon. It was worthy of note that all the writing which had taken place in the Journal on this subject was pervaded by the fallacy that the official liquor was near the border land of saturation, and that a slight reduction of temperature must cause a separation of crystals. It was apparently assumed that the solubility of the hydrochloride in the official menstruum was about 1 in 100; whereas it was much nearer 1 in 40. This showed the importance of taking nothing for granted in the matter of solubilities. He thought the hydrochloride of strychnine should be added to the Pharmacopœia as an official salt, and the liquor ordered to be made from it without the addition of any free acid.

Mr. Duncan, in reply, said with regard to the solubility of strychnine hydrochloride in the official menstruum, of course 1 in 40 applied to the solution made by the first formula, but the same could not be said of the alternative or "parts" formula. He could quite confirm what Mr. Stephenson said as to the ready solubility of the crystals in additional water. It had been noticed by Dr. Lyons, in the case of a prescription containing bromide of potassium and strychnine, that the latter had crystallized out, thus showing that the bromide of potassium acted in the same way as free acid. With regard to prescriptions for liquor arsenicalis and liquor strychninæ combined, it was usual to instruct students that in such cases the hydrochloric solution of arsenic should be substituted for the alkaline solution to prevent precipitation of alkaloid. On mixing equal quantities of the liquor arsenici hydrochloricus and liquor strychninæ he discovered that

crystals speedily separated. On repeating the experiment with a hydrochloric solution of arsenic made carefully by the official standard he failed to obtain them. It was therefore evident that in the first instance the hydrochloric solution contained too much acid, and hence it was necessary that other solutions besides that of strychnine should correspond accurately with the official standard. He was of opinion that it was very undesirable that such potent remedies should be dispensed in such a concentrated form. He could not explain the solidification of Easton's syrup, but thought a good deal depended on the purity of the sugar and the strength of the phosphoric acid. Mr. Mackenzie had directed his attention to a statement in Gmelin's 'Chemistry,' to the effect that the presence of lime favours the formation of crystals, and as this is a frequent impurity in sugar it may to some extent contribute to crystallization. He did not agree with Mr. Hill's suggestion to make hydrochloride of strychnine official, and thought it was better that each pharmacist should prepare the liquor from the alkaloid.

The next communication was on—

Solubility of Acid Sulphate of Strychnine.

BY GEORGE COULL, B.SC.

About a year ago I had occasion to examine a sample of hypodermic injection of strychnine, prepared by dissolving 1 grain of acid sulphate of strychnine in 40 minims of distilled water, as recommended by Martindale ('Extra Pharmacopœia,' p. 356).

The solution had been returned, on account of the formation of a crystalline deposit. Martindale states the solubility of this salt in water as 1 in 36, which is equivalent to 1 grain in 39·5 minims. The above circumstance appeared, however, to indicate that the stated solubility required verification.

This was further indicated by evaporating to dryness a weighed portion of the supernatant liquid, when it was found that the solubility was 1 in 54·6 at the ordinary temperature of the laboratory (about 10° C.).

With a view to further elucidating this point, four commercial samples of acid sulphate of strychnine were examined. Before proceeding to determine the solubility, it was thought desirable to ascertain if these samples were really acid sulphate of strychnine, corresponding to the formula $C_{21}H_{22}N_2O_2,H_2SO_4,2H_2O$.

The sulphuric acid was estimated volumetrically by titration with decinormal soda solution, using phenolphthalein as indicator. Strychnine does not react with the latter, and therefore the acid can be estimated directly as if it were free. The accuracy of the method was tested by estimating a known quantity of sulphuric acid, and a similar quantity, to which a considerable proportion of strychnine had been added, and the results were found to agree. The four samples yielded the following results:—

No. 1	19·48 per cent.
No. 2	19·39 „ „
No. 3	20·32 „ „
No. 4	19·21 „ „

Rammelsberg ('Year-Book,' 1882, p. 43) states that acid sulphate of strychnine parts with its water at 150° C. A preliminary experiment suggested that the whole of the water of crystallization was expelled at the temperature of a water-bath. A weighed portion of each sample was therefore heated on a water-bath till constant with the following results:—

No. 1 lost	8·119 per cent.
No. 2 lost	7·891 „ „
No. 3 lost	7·847 „ „

The supply of No. 4 ran short and the water in it was not determined. The salt contains theoretically 7·69 per cent. of water of crystallization. The above results, therefore, prove that the whole of the water is driven off even at the temperature of a water-bath. According to the formula $C_{21}H_{22}N_2O_2,H_2SO_4,2H_2O$ theory requires 20·94 per cent. of sulphuric acid and 7·69 per cent. of water. It may, therefore, be taken as proved that practically the salt of commerce is acid sulphate of strychnine corresponding to the above formula.

The solubility of the samples was then determined by digesting an excess of the salt in distilled water at 15°·5 C. for several hours, evaporating a weighed portion of the filtered liquid to dryness on a water-bath, weighing the residue, adding the necessary percentage of water as above determined, and calculating the solubility in the usual way. The results were as follows:—

No. 1.	1 in 44·9
„ 2.	1 in 44·2
„ 3.	1 in 44·0
„ 4.	1 in 54·6

In the case of No. 4 the temperature was not noted, but would be about 10° C. It occurred to me that these results might be checked by estimating the sulphuric acid in a weighed portion of the saturated solution by the volumetric process above referred to. The results came out as follows:—

	1st determination.	2nd determination.	Mean.
1	1 in 33·7	1 in 34·14	1 in 33·92
2	1 in 33·93	1 in 33·55	1 in 33·74
3	1 in 32·58	1 in 32·53	1 in 32·56
4	1 in 40·44	1 in 40·26	1 in 40·35

To eliminate possible error a further supplementary experiment was made. A portion of No. 2 was estimated in the usual way at 4°·5 C., and the solubility was found to be 1 in 51. By dissolving the residue and estimating by the soda and phenolphthalein process the solubility was found to be 1 in 40·2, thus showing that the manipulation was not at fault. The remarkable discrepancy between these results and those obtained by the ordinary method at once presented a difficulty, the explanation of which would require a fuller investigation than I have had time for. I might suggest as a possible explanation that there may be dissociation when an excess of the acid salt remains in contact with water, and that therefore the residue left on evaporating a portion of the supernatant liquid contains free sulphuric acid. This theory is supported by the facts. The acid sulphate used indicated nearly the theoretical percentage of sulphuric acid in the dried salt, namely, 22·7, but the residue from evaporation indicated 28·58, being an excess of 5·88.

A solution in the proportion of 1 in 36 was prepared by gentle heat. This was allowed to cool, and after standing for some hours at the temperature of the laboratory it was noted that crystals had formed, which appeared, from their shape, to consist mainly of the neutral sulphate, $(C_{21}H_{22}N_2O_2)_2H_2SO_4{\cdot}6H_2O$, along with a few acicular crystals of the acid sulphate. But this theory must be taken as only tentative. Many circumstances noted during the experiments showed that there were still several points which required investigation. Lack of time prevented this being done, but they may be reserved for a future occasion. In a letter in the *Pharm. Journ.*, [3], vol. xxii., p. 767, Mr. Martindale repeats his statement as to the solubility of acid sulphate of strychnine and suggests that, owing to its greater solubility, it should take the place of the hydrochlorate in the official liquor strychninæ. My results tend to show that this recommendation is not well founded, and prove that the acid sulphate is really less soluble than the hydrochlorate as given by Mr. Duncan. Even on Mr. Martindale's own showing the formula he gives for the injection is a saturated solution at 15°·5 C. The solubility of the salt diminishes very rapidly on a reduction of temperature. There is, therefore, great danger that crystallization will take place under ordinary conditions, with

the result that a serious error in the strength of the solution may arise. It is, in short, extremely undesirable that any alkaloidal salt should be dispensed in the form of a saturated solution at 15°·5 C. For practical purposes the solubility of acid sulphate of strychnine may be set down at 1 in 50, so as to remain without crystallizing, under ordinary conditions, the solubility at 15°·5 C. being 1 in 44·5.

Mr. Dott said he agreed with Mr. Coull that the solubility 1 in 36 was incorrect, and readily accepted his determination as being much nearer the truth. He thought it was highly probable that the acid sulphate suffered a certain amount of decomposition on dissolving in water. If so, its exact solubility was hardly capable of determination. The fact mentioned by Mr. Coull that the salts of strychnine may be titrated with standard alkali when phenolphthalein is used as indicator, is a property possessed by many other alkaloids, for instance by such a strong base as codeine. Surely it is possible to get a better salt of strychnine for hypodermic purposes, than the acid sulphate. He would suggest the neutral tartrate, which was fairly soluble.

Mr. Macpherson said the varying solubility of the acid sulphate might be due to the presence of a small percentage of uncombined sulphuric acid.

Mr. Hill said this note represented a large amount of very tedious detail work. The subject was beset with difficulties and there were still many points that required to be cleared up. It seemed pretty clear that decomposition took place in an aqueous solution of the salt, and it was probable that neither the figure obtained by the evaporation method nor that obtained by the volumetric method represented accurately the solubility of the salt. This would most likely be accurately determined by the method of adding to a definite quantity of the salt a sufficient weight of water to dissolve it at the normal temperature. At the same time the results obtained by Mr. Coull were sufficient to prove that the solubility given by Mr. Martindale, namely, 1 in 36, could not be correct. He thought Mr. Coull should pursue the subject still further, and give his results in a further communication.

Mr. Coull, in replying, said he did not know how Mr. Martindale had obtained his figures, but the results obtained by the volumetric method must be too high, as the residue when estimated gave more sulphuric acid than theory required. So far as manipulation was concerned he was quite sure of his results, but the solubility got by evaporation might not be strictly correct, and could only be made so by the method indicated by Mr. Hill. He was convinced that the volumetric results must be discarded as unreliable.

The next communication was a—

Note on Sodium Arseniate.

BY GEORGE COULL, B.SC.

This compound has two formulæ assigned to it in the Pharmacopœia, namely, $Na_2HAsO_4,12H_2O$ and $Na_2HAsO_4,7H_2O$. Wishing to ascertain which of these two the commercial salt more nearly approached in composition, four typical samples were obtained and the percentage of water in them determined by heating weighed portions of each to 149° C. till they ceased to lose weight:—

No. 1 lost	. . . . .	48·32 per cent.
„ 2 „	. . . . .	45·66 „ „
„ 3 „	. . . . .	47·26 „ „
„ 4 „	. . . . .	42·50 „ „

It is thus seen that the salt varies considerably in the amount of water it contains. The salt $Na_2HAsO_4,12H_2O$ contains 53·73 per cent., and the salt $Na_2HAsO_4,7H_2O$ contains 40·38, and this indicates that a considerable proportion of the commercial salt consists of the latter.

To make a uniform liquor the Pharmacopœia orders the salt, rendered anhydrous by a temperature not exceeding 149° C., to be used; or as Attfield puts it, "To avoid the possible employment of a mixture of these bodies, the invariable anhydrous salt is officially used, constancy in the strength of a powerful preparation being thereby secured" ('Chemistry,' 11th ed., p. 191). After estimating the water in the above salts the residues were allowed to stand for a few days. Curiosity prompted me to reweigh them, when I found that all of them had increased in weight, the increase being proportionally the same in each case. This shows that the anhydrous salt is not unvarying, but reabsorbs water by exposure, and ought not to be used for making liquor sodii arseniatis unless freshly dried.

The Pharmacopœia under "preparation" states that the liquor contains 7·4 grains of the crystals or 4·5 grains of the dried salt in 1 fluid ounce. This quantity, 7·4 grains, refers to the salt with 7 molecules of water. If any one uses the commercial salt and calculates on the basis of 7·4 grains to the ounce, he makes his liquor too weak, and with such a potent remedy this should not be. In the 1867 Pharmacopœia the salt with 7 molecules of water alone was official; the dose is the same in both, and there seems no good reason for allowing the 12 molecule salt to become official at all. It is very unstable, losing water till 5 molecules are gone; when, according to Attfield, it leaves a stable salt. Gmelin and Watts state that the 7 molecule salt does not effloresce; Wood and Bache say it is slightly efflorescent; Stillé and Maisch make the statement—for which I can find no corroboration—that it loses $5\,H_2O$ and leaves $Na_2HAsO_4,2\,H_2O$.

If, as most authorities are agreed, the salt $Na_2HAsO_4,7\,H_2O$ is stable, it alone should be official. We would then get uniformity in the salt, which is not infrequently prescribed in the form of a pill; and we might also dispense with the necessity for drying it to make the liquor.

The conditions under which the salt crystallizes with 7 molecules of water are that the solution be hot and concentrated. Some experiments intended to confirm the statements as to the stability of the salt, are not yet completed and must be reserved for a future communication.

I have to thank Messrs. Raimes, Clark and Co. for permission to conduct the experiments for this and the preceding note in their laboratory.

Mr. Dott said he quite agreed that the Pharmacopœia system of giving what appear to be alternative formulas for this potent preparation was not to be commended. He could also confirm Mr. Coull's experience as to the great readiness with which this salt effloresced. It never contained the 12 molecules of water; therefore it would be advisable to fix the standard at 7 molecules, or at a certain percentage of water, as in the case of potassii carbonatis.

Mr. Macpherson said he took it that the intention of the Pharmacopœia was that the freshly dried salt only should be used in preparing the solution; and if that were done there should be no difficulty about having a uniform solution.

Mr. Duncan also thought that this was the intention of the Pharmacopœia. There was still some work to be done to decide as to the stability of the 7 molecule salt.

Mr. Hill said he had no doubt both Mr. Macpherson and Mr. Duncan were correct in their interpretation of the Pharmacopœia. It was, however, not convenient for ordinary pharmacists to dry the salt themselves, and they were tempted to purchase it already dried. It was important that, by such a note as this, they

should be made aware of the objection to such a procedure. They were all interested in having the Pharmacopœia made as thoroughly complete as possible, and such notes as these brought before various meetings in different parts of the country could not fail to be useful when the time came for the preparation of a new edition.

Mr. Coull, in replying, said he quite agreed that the Pharmacopœia intended the freshly dried salt to be used, but he believed very few were in the habit of doing so.

The next communication was on an—

Improved Formula for Injectio Morphinæ Hypodermica.

BY JOHN GORDON SHARP, M.B., EDIN.

The delay and annoyance which the dried piston of a hypodermic syringe occasions is well known to every medical man. Not infrequently he is called, probably in the night, to a patient suffering perhaps from intense spasm of the stomach. Pocketing his syringe and injection or tablets he hurries to the sickroom, but finds the former will not work from shrinkage of the piston. This necessitates a waste of ten minutes pumping warm water in and out to remedy the defect. During this awkward interval the thoughts and sometimes the words of his patient regarding him are anything but complimentary, and even after all this his syringe is far from satisfactory in its working.

To obviate this difficulty I have been employing, during the past eight months, what I believe to be an improved injectio morphinæ hypodermica, the formula for which is as follows:—

Take of—

Acetate or hydrochlorate of morphine.	24 grains.
Glycerine	3 fluid drachms.
Rectified Spirit	1 fluid drachm.
Distilled water, sufficient to make	1 fluid ounce.

Mix, dissolve in the cold, and filter.

This makes a preparation of the strength of 1 grain in 20 minims, or one half the strength of the present official injectio morphinæ hypodermica. Five minims, therefore, represent ¼ of a grain, and this is just the proper amount, and a convenient quantity for ordinary injection. In the above preparation the glycerine, being a hygroscopic body, keeps the piston moist. Hence the syringe is always in working order, for, although it may be washed out once in antiseptic lotion after use, there is still enough glycerine left on the piston to keep it in a hygroscopic state. It possesses the further advantages of being perfectly neutral, uniform in strength, and keeping well for months. I have some by me which was prepared four months ago, and it is as good as on the day it was made. I would also suggest that glycerine in the proportion of 3 fluid drachms to each fluid ounce be added to all other hypodermic injections in common use. There is no practical objection to the small percentage of alcohol in the above formula, and it is added to facilitate diffusion of the injection.

I have said either acetate or hydrochlorate of morphine may be used, but I prefer the latter because it is more stable and can always be procured without delay. Some practitioners say it causes more irritation than the acetate, but this has not been my experience, and I have used about one ounce of the injection. In order to be able to speak from personal experience of its use I injected in two places, in the calf of my leg, about 2 minims altogether, and found that the smarting only lasted a few seconds, and was no more than might be set down to the prick of the needle. It is true that the acetate is not so likely to cause nausea as the hydrochlorate, but this is a simple matter in the case of a hypodermic injection. This diminished tendency to produce nausea in the case of morphine acetate may account for the glowing testimonials to the efficacy—after failure of liquor morphinæ hydrochloratis, etc.—of those proprietary preparations bearing classic names, and which on analysis I have found to be morphine acetate dissolved in sherry wine. On the whole, I think the hydrochlorate is to be preferred for hypodermic injection.

On exposure to an unusually low temperature during several nights I observed a slight separation of crystals in the injection. On testing its stability by exposure to a temperature of 0° C. for eight hours it was found to remain perfectly bright. There is therefore not much risk under ordinary conditions, but if considered necessary all chance of separation would be avoided by adding another fluid drachm of glycerine to the ounce.

The Chairman said this was a note by a former member of the Edinburgh Chemists' Assistants' Association, who was now in practice as a medical graduate in England. It was specially interesting from the fact that his suggestion was based on practical experience gained in the pursuit of his professional work.

Obituary.

Notice has been received of the death of the following:—

On the 8th of February, James Kathro, Chemist and Druggist, Mitcheldean. Aged 75 years.

On the 6th of March, Silas Coleman, Chemist and Druggist, Cinderford. Aged 43 years.

On the 20th of March, William Parish, Chemist and Druggist, Cleator Moor. Aged 32 years.

On the 20th of March, Frederick George Edgar, Chemist and Druggist, Petworth. Aged 34 years.

On the 22nd of March, Hervey Arthur Pimm, Chemist and Druggist, late of Torquay. Aged 31 years.

On the 23rd of March, George Vincent Ball, Pharmaceutical Chemist, Banbury. Aged 68 years.

On the 23rd of March, Joseph Barker, Chemist and Druggist, Yarmouth. Aged 64 years.

On the 24th of March, William Goldsmith, Chemist and Druggist, Hull. Aged 71 years.

Correspondence.

The Coca Plants in Cultivation.

Sir,—The article on "The Coca Plants in Cultivation" in the *Pharmaceutical Journal* for April 2, which is stated to be an abstract from a paper by Dr. Burck, does not refer to the article on the same subject, which appeared in the Kew *Bulletin* for January, 1889. It obviously, however, derives a good deal of information from this source and gives the credit of it to me. It is only right, therefore, to say that the article was almost wholly the work of Mr. Morris, the assistant-director of the Royal Gardens, and the discrimination of the cultivated forms of coca is due to him.

Kew. W. T. Thiselton Dyer.

P.S.—Mr. Morris's results are published under his own name in the *Journ. Linn. Soc.*, vol. xxv., pp. 381-384, and the variety *Novo granatense*, Morris, not Dyer, is duly described on p. 384.

Erratum.—In Mr. Martindale's letter on 1 per cent. solutions, appearing on page 828, the word *grammes* should be read *grains*.

A. E. Button.—Your query would be most satisfactorily answered by a solicitor.

Communications, Letters, etc., have been received from Messrs. Blount, Allen, Stead, Hill, Nosworthy, Buck, Gill, Blackburn, Maben, and Lambert.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, APRIL 16, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE GLASGOW PROSECUTIONS.

THE report of the cases heard before Sheriff BIRNIE last week is so full that it would have been unnecessary to make any reference to them in this place had it not been for a letter which Dr. LEES, one of the defendants, claims the publication of as a matter of justice. In complying with his request we do not acknowledge the ground upon which it is made, and have acceded to it rather that our readers may have an opportunity of appreciating the mode in which Dr. LEES seeks to justify his position. The charge made against him, under the 17th section of the Pharmacy Act, was that of having sold poison unduly labelled through the hands of an unqualified person, acting apparently as assistant in a shop with which Dr. LEES' name was so associated that the shop was regarded as his. The defence he offered to the charge was that the shop did not belong to him, and consequently the charge could not be sustained. But it necessarily follows from the nature of this defence that Dr. LEES must have been, intentionally or otherwise, covering an unregistered person committing offences under the Pharmacy Act and helping to shield him from the consequences of his illegal acts. Whether or not such a position is consistent with existing law or with ethics need not now be considered; but it is evident from the remarks of Sheriff BIRNIE that he regards the practice of carrying on a chemist's business under such conditions as being contrary to the spirit and intention of the Pharmacy Act. Dr. LEES attempts to justify that practice, so prevalent in Glasgow, by the assertion that the great majority of chemists throughout the country are employing unregistered assistants for the sale and dispensing of poisons. But if that statement were true it would be only a poor excuse for himself or for the other defendants who were found guilty of breaches of an Act of Parliament which has been passed in the interests of the public.

We venture, however, to think that the practical effect of the prosecutions instituted in Glasgow will be to inspire some greater respect for the Pharmacy Act and its provisions than is professed by Dr. LEES and the others who like himself set little value upon them. Though the difficulty of obtaining evidence of infringements of the Act in such cases as those tried at Glasgow is very considerable and the administration of the Act is impeded by arrangements for covering unqualified persons, these convictions will awaken a sense of the risk attending systematic evasion of the law which will have a wholesome influence.

INTERNATIONAL PHARMACEUTICAL CONGRESS.

A CIRCULAR letter, in English, French and German, relating to the proposed Congress in Chicago next year, has been issued on behalf of the American Pharmaceutical Association. It bears the signature of Mr. A. R. FINLAY, the President, and that of Professor MAISCH, the Secretary, and the pharmaceutical societies of all countries are invited to appoint delegates and take such other steps as they may desire in suggesting subjects suitable for discussion by the Congress. Further steps for deciding the date at which the Congress is to take place and for promoting its objects will be taken at the meeting of the American Pharmaceutical Association in July. Meanwhile the assurance of a cordial reception is offered, on behalf of the pharmacists of the United States of America, to all who attend the Congress, either as delegates, members, or visitors.

By the recent death of Dr. Hermann Kopp there has been removed another of the group of distinguished men who supported Liebig in giving prominence to the University of Giessen at the time when it was the leading school of chemistry in the world. Kopp was born in 1817, and after passing through the gymnasium in his native town, Hanau, he studied at Heidelberg, Marburg and Giessen until 1839. In 1841 he took the Degree of Doctor of Philosophy at Giessen, and two years afterwards he was appointed Extraordinary Professor at that University. Subsequently he was promoted to the position of Professor, and was afterwards transferred to Heidelberg. Kopp's work as a chemist was chiefly directed to physical subjects, and to him we are mainly indebted for directing attention to the relations existing between the physical characters and chemical nature of compounds. His 'History of Chemistry' gained for him a high repute, and for several years he edited in conjunction with Liebig, Wöhler, and A. W. Hofmann the *Annalen der Chemie*, and with Liebig and Will the *Jahresbericht über die Fortschritte der Chemie*. An excellent biographical notice of Kopp from the pen of Professor E. T. Thorpe, a former pupil of his, appeared recently in the pages of *Nature*, and to those who knew the genial nature of Kopp its perusal cannot fail to recall pleasing reminiscences.

* * *

The Honorary Secretary of the Nottingham and Notts Chemists' Association intimates that arrangements have been made for a course of lectures on "Physics," by Professor Heaton, M.A., commencing May 3, and a course of lectures and class work on "Organic Chemistry," commencing April 28. These courses are specially suitable for pharmaceutical students, having been arranged to meet the requirements of the extended syllabus for the Minor Examination, and the fees are very moderate.

REPORT OF THE GOVERNMENT VISITOR UPON THE EXAMINATIONS IN LONDON.

The following communication has been forwarded by order of the Lord President of the Privy Council to be laid before the Pharmaceutical Society:—

"Privy Council Office,
"*April* 7, 1892.

"Sir,—I am directed by the Lord President of the Council to transmit to you, for the information of the Pharmaceutical Society, a copy of Dr. Thomas Stevenson's report on the examinations held by the London Board of Examiners of the Society during the year ending March 31, 1892.

"I am, sir,
"Your obedient servant,
"C. L. PEEL.

"The President, Pharmaceutical Society,
"17, Bloomsbury Square, W.C."

"*Report on the Examinations held by the London Board of Examiners of the Pharmaceutical Society of Great Britain, during the year ending March* 31, 1892.

"To the Lords of the Council,

"My Lords,—I have to report that during the year ending March 31, 1892, I attended twelve examinations of the London Board of Examiners of the Pharmaceutical Society of Great Britain.

Preliminary Examination.

No. of candidates examined	1442
„ „ „ who passed	681
„ „ „ „ failed	761
Percentage of failures	52·8
Failed in Latin	477
„ „ English	416
„ „ Arithmetic	701

"There was an increase in the number of candidates this year, and the rejections were 2·1 per cent. more than in the preceding year. It is evident that many young men of defective education still unsuccessfully attempt to enter upon the business of pharmacy, most of them failing in simple arithmetic, and many in the other subjects also.

Minor Examination.

"This, the qualifying examination, has during the year under review been altered and amended. More time is allowed for the examination, and practical pharmacy, *i.e.*, the actual making of some pharmacopœial preparation, is demanded. I am of opinion that the capabilities of the candidates will be better tested by the new examinations, and that it will be less possible for a candidate to pass on the strength of mere book knowledge.

"It is impossible, as yet, to speak definitely as to the working of the new scheme, on account of its recent introduction; and the subjoined statistics are not strictly comparable with those of preceding years, in consequence of there being included candidates examined under both the old and new regulations:—

No. of candidates examined	993
„ „ „ who passed	396
„ „ „ „ failed	597
Percentage of failures	60·1
Failed in Chemistry	120
„ „ Botany	29
„ „ Materia Medica	68
„ „ Pharmacy	101
„ „ Reading and Writing Prescriptions	68
„ „ Dispensing	200

Such a large proportion of failures points to great defects in pharmaceutical education, defects which the Pharmaceutical Society is making strenuous efforts to remedy. The ill-effects of attempts to acquire knowledge haphazard, and without systematic teaching, are painfully apparent at the examinations.

Major Examination.

"Here, again, the examination has been modified and the statistics are not strictly comparable with those of recent years.

Number of candidates examined	153
„ „ who passed	85
„ „ „ failed	68
Percentage of failures	44·4

"There was an increase in the number of candidates examined as compared with those of the previous year (137), but the proportion of rejections was almost the same in the two years.

"Since the new examinations are not as yet in full and complete operation, it is inadvisable to further comment upon them, except to state that the examiners seem anxious to render the transition as equitable as possible.

"I am, my lords,
"Your obedient servant,
(Signed) "THOS. STEVENSON.
"45, Gresham Road, S.W., March 31, 1892."

Transactions of the Pharmaceutical Society.

FIRST OR PRELIMINARY EXAMINATION.

April 12.

The following are the questions that were set for this examination on the 12th inst.:—

LATIN.

(*Time allowed—from* 11 *a.m. to* 12.30 *p.m.*)

I. (*For all Candidates.*) *Translate into Latin:*—

1. The father does not always praise his children.
2. Shall the wicked sons of the king be praised?
3. I know not what to say or do.
4. An orator ought to speak with a clear voice.
5. Calling all his men together, he said they must fight or die.

II. Translate into English either A. (Caesar) or B. (Virgil).

(*Candidates must not attempt both authors.*)

A. CAESAR.

1. Hic pagus unus, quum domo exisset, patrum nostrorum memoria, Lucium Cassium consulem interfecerat, et ejus exercitum sub jugum miserat. Ita, sive casu sive consilio deorum immortalium, quae pars civitatis Helvetiæ insignem calamitatem Populo Romano intulerat, ea princeps poenas persolvit. Qua in re Caesar non solum publicas, sed etiam privatas injurias ultus est, quod ejus soceri Lucii Pisonis avum, Lucium Pisonem legatum, Tigurini eodem proelio, quo Cassium, interfecerant.

2. Futurum esse paucis annis, uti omnes ex Galliae finibus pellerentur, atque omnes Germani Rhenum transirent; neque enim conferendum esse Gallicum cum Germanorum agro, neque hanc consuetudinem victus cum illa comparandam. Ariovistum autem, ut semel Gallorum copias proelio vicerit, quod proelium factum sit ad Magetobriam, superbe et crudeliter imperare, obsides nobilissimi cujusque liberos poscere, et in eos omnia exempla cruciatusque edere, si qua res non ad nutum aut ad voluntatem ejus facta sit.

Grammatical Questions.—For those only who take Caesar.

1. Decline in the singular *hic unus pagus*, in the plural *ea princeps* (Par. 1).
2. Give the first person singular of the present indicative of all verbs in the perfect tense in Paragraphs 1 and 2.
3. Write in Latin—17, 56, 103, 19*th*, 38*th*, 200*th*, *four a-piece.*
4. Distinguish between *is* and *ille*; *qui* and *quis*; *alius* and *alter.*

B. VIRGIL.

1. Sic Venus; at Veneris contra sic filius orsus;
Nulla tuarum audita mihi, neque visa sororum,
O—quam te memorem?—Virgo; namque haud tibi vultus
Mortalis, nec vox hominem sonat. O Dea certe!
An Phoebi soror? an Nympharum sanguinis una?
Sis felix, nostrumque leves, quaecumque, laborem,
Et quo sub coelo tandem, quibus orbis in oris
Jactemur, docens; ignari hominumque locorumque
Erramus, vento huc et vastis fluctibus acti.

2. Hic templum Junoni ingens Sidonia Dido
Condebat, donis opulentum et numine Divae;
Aerea cui gradibus surgebant limina, nexaeque
Aere trabes, foribus cardo stridebat aënis.
Hoc primum in luco nova res oblata timorem
Leniit; hic primum Aeneas sperare salutem
Ausus, et affictis melius confidere rebus.

Grammatical Questions.—For those only who take Virgil.

1. Decline in the singular *templum ingens*, in the plural *nova res* (Par. 2).
2. Give the first person singular of the present indicative of all the verbs in Paragraph 1.
3. Write in Latin—17, 56, 103, 19*th*, 38*th*, 200*th*, *four a-piece.*
4. Distinguish between *is* and *ille*; *qui* and *quis*; *alius* and *alter.*

ARITHMETIC.

(*Time allowed—from* 12.30 *p.m. to* 2 *p.m.*)

[The working of these questions, as well as the answers, must be written out in full.]

1. If, in a division sum, the divisor is eight times, and the quotient seven times, the remainder, what is the dividend when the remainder is 452?
2. The carriage of a parcel of goods, weighing 1 ton 8 cwt. 2 qrs., cost £2 14*s.*; what will be the charge of four other parcels, each weighing 17 cwt. 3 qrs. 7 lbs?
3. Simplify $\frac{17}{\frac{1}{2}+\frac{1}{8}+\frac{7}{8}+\frac{5}{12}} - \frac{7\frac{1}{5}}{3\frac{3}{5}}$.
4. Reduce 3 rds. 7 po. 28 yds. 2 ft. 36 ins. to the fraction of 1 ac. 31 po. 27 yds. 2 ft. 36 ins.
5. Find the value of

$\dot{0}0\dot{3}$ of £1 5*s.* + $0\dot{6}\dot{9}$ of £5 − $\dot{8}$ of 2*s.* 3*d.*

6. A man can dig 35 mètres in length of ground of a certain width in $2\frac{1}{2}$ days; in how many days will he be able to dig 31 mètres 50 centim. of the same description of ground of four times the width?
7. The receipts of a Company average £522 12*s.* on a weekday, and half that sum on a Sunday, and their weekly expenses are £1396 19*s.*; if, at the end of a year, a dividend of 5 per cent. be declared on their Capital, £2,000,000, how much can they carry to their Reserve Fund?

ENGLISH.

(*Time allowed—from* 3 *p.m. to* 4.30 *p.m.*)

1. Mention four words that can do duty for two or more parts of speech, and write sentences in illustration.
2. Analyse:—

"I would not enter on my list of friends
(Though graced with polished manners and fine sense,
Yet wanting sensibility) the man
Who needlessly sets foot upon a worm."

3. Parse fully the words in italics in the following sentence:—

"*There* heard we, *halting* in the shade,
Flung from a *convent-tower*,
A harp, *that* tuneful prelude made
To a voice of *thrilling* power."

4. In the following passage supply the necessary capital letters, and put in the stops and inverted commas where necessary:—all of a sudden a door opens and a young woman pale and with haggard eyes makes towards us and cries out i am french save me it was a parisian milliner a bright idea came into my head and i thought we might turn this meeting to account do you know where the bridge is i said certainly well show us the way what in the midst of this fire i am dying of fright and came to ask you to let me have some soldiers to defend my house

*5. Write a short biography of some distinguished statesman or writer of the present century; *or*, Give an outline of the reign of one of the Stuart sovereigns.

DONATIONS TO THE LIBRARY AND MUSEUM.

At the meeting of the Library, Museum, School and House Committee, held on Wednesday, the 13th inst., the undermentioned donations were reported, and it was ordered that the thanks of the Society should be communicated to the respective donors:—

To the Library in London—

College of Preceptors, Calendar, 1891. From the COLLEGE.
Royal Medical and Chirurgical Society, Medico-Chirurgical Transactions, vol. 74. From the SOCIETY.
Grierson (G. A.), Lessons from Fields and Lanes, 1892. From the AUTHOR.
Dymock, Warden, and Hooper, Pharmacographia Indica, part 5. From the AUTHORS.
Gaillard (A.), Le genre meliola, 1892.
From the ÉCOLE SUPÉRIEURE DE PHARMACIE DE PARIS.
Syme (D.), On the Modification of Organisms. From the AUTHOR.
Thompson (C. J. S.), Practical Dispensing, 2nd ed., 1891. From the AUTHOR.
Royal Institution, List of Members, 1891.
— Proceedings, No. 85. From the INSTITUTION.
School of Pharmacy Students' Association, Papers read, Session 1890–91. From the ASSOCIATION.
Reagents and Volumetric Solutions proposed for the U. S. Pharmacopœia, 1892. From Mr. C. O. CURTMAN.
Victoria, Pharmacy Board, Report, 1891. From the BOARD.
Dentists' Register, 1892.
Medical Register, 1892.
From the GENERAL MEDICAL COUNCIL.
Royal Society of New South Wales, Journal and Proceedings, vol. 24, part 2. From the SOCIETY.

To the Library in Edinburgh—

Grierson (G. A.), Lessons from Fields and Lanes, 1892. From the AUTHOR.
Victoria, Pharmacy Board, Report, 1891. From the BOARD.

---

* This must be attempted by every candidate.

For the Museum in London—

Nine specimens of Cinchona Barks and three Herbarium specimens of new species of Cinchona from New Granada.

From Mr. R. THOMSON, Bogota.

Specimens of Aden Senna Leaves.

From Mr. J. MOSS.

Specimen of Oil of *Eucalyptus citriodora* and of Tasmanian Oil of *Eucalyptus globulus*.

From Messrs. EVANS, LESCHER, and WEBB.

Specimens of Algerian Oil of Peppermint, Oil of *Eucalyptus globulus*, and Oil of Petit Grain.

Specimen of the oils of *Melaleuca Leucadendron*, *Eucalyptus alba*, and *Eucalyptus citriodora*.

From Mr. H. T. S. MONNINGER.

To the Herbarium—

Living specimen of Pernambuco Jaborandi in flower.

From Mr. R. J. LYNCH, F.L.S., Cambridge.

To the Museum in Edinburgh—

Specimen of gum of *Prunus avium*.

From Mr. HUGH KERR, Kircudbright.

Small specimen of crystallized cathartic acid and solution of cathartate of lime.

From Mr. THOMAS SMITH, F.R.C.S.E., Edinburgh.

EVENING MEETING IN EDINBURGH.

At the close of the meeting at Edinburgh on the 30th ult. the Assistant Secretary directed attention to the following donation to the Museum :—

Specimen of Gum from the Wild Cherry or Gean Tree, *Prunus avium*.

From Mr. Hugh Kerr, Buittle, Kirkcudbrightshire.

He also showed a small specimen of cathartic acid separated from a strong alcoholic solution, in fine colourless acicular crystals. The specimen was sent for exhibition by Mr. Thomas Smith, F.R.C.S.E., who had been working at the active principle of senna leaves for between forty and fifty years. This was the first time a crystalline principle had been obtained. Mr. Smith was still engaged in the investigation, and though he had obtained considerable evidence that this crystalline acid body was the true cathartic acid, he desired to reserve a final opinion till he had carried the investigation further. The acid was precipitated as a lime salt, of which about 230 grains were obtained from 45 ounces of the leaves. He had also sent a solution of the lime salt of such a strength that 1 fluid ounce corresponded to 1 ounce of leaves, and this was found to act as an efficient purge in doses of 60 minims without causing the slightest griping.

The Chairman, in proposing a vote of thanks for the donation to the Museum, said he had now to congratulate Scottish pharmacists on possessing a portrait of the late Mr. Jacob Bell, who was mainly the founder of the Pharmaceutical Society, to the advancement of which he devoted a great portion of his time, his talents, and his means. Jacob Bell was, in his day, well known and highly esteemed in Scotland, which he visited on several occasions in the interests of the Pharmaceutical Society. This portrait was a replica of Sir Edwin Landseer's picture, which now adorned the walls of the Pharmaceutical Society's House in Bloomsbury Square, and it was fitting that it should find a place in that room, not only as the likeness of one whom they held in veneration because of his life-long devotion to pharmacy but also to remind them of a life so eminently fitted to be an example and incentive to them all. They would allow him to add that the Society was indebted both for the original and this replica to an esteemed ex-President —Bell's partner and friend—Mr. Thomas Hyde Hills, whose death they had recently had to mourn. Some of them had been privileged to meet Mr. Hills, and none who had done so could easily forget that kind and genial English gentleman.

Mr. Stephenson said he could endorse all that the Chairman had said about Mr. Bell, whom he had the honour to meet as an examiner in the year 1858. He had also the pleasure of knowing Mr. Hills, whom he regarded as perhaps the most generous and kind-hearted man he had ever met. This was the last meeting of the session, and he had now much pleasure in proposing a cordial vote of thanks to their Chairman, for the able way in which he had presided at their meetings. He hoped it would not be the last occasion on which he would discharge such a duty.

The motion was passed with acclamation ; and the Chairman, in replying, said he thanked them very much. They had had a very successful series of meetings, which had been well attended ; and they owed most hearty thanks to Professor Balfour and the other gentlemen who had contributed papers during the session. He desired also to thank Mr. Hill for his unwearied attention to the interests of the Society.

The meeting then closed.

Parliamentary and Law Proceedings.

PROSECUTIONS UNDER THE PHARMACY ACTS.

On Wednesday, April 6, in the Glasgow Summary Court, Sheriff Birnie disposed of ten complaints against various parties in Glasgow and Govan at the instance of Richard Bremridge, 17, Bloomsbury Square, London, W.C., Registrar under the Pharmacy Acts, 1852 and 1868, with the concurrence of James Neil Hart, Procurator Fiscal of Lanarkshire.

Mr. Edward T. Salvesen, and Mr. T. B. Morison, advocates, instructed by Mr. P. Morison, S.S.C., conducted the prosecution.

The first case called was against John Neill, 65, Victoria Street, Govan, against whom there were five charges ; (1) of having sold oxalic on December 7, 1891, to Thomas Allan, (2) of having sold red precipitate to John Rutherford Hill on December 9, 1891, (3) of having sold laudanum to Thomas Allan on January 4, 1892, (4) of having sold ergot of rye to Thomas Allan on January 9, 1892, and (5) of having used the name "chemist and druggist," having "chemist" on his labels and entering himself as a "druggist" in the Govan Directory ; the said John Neill not being a duly registered pharmaceutical chemist or a chemist and druggist within the meaning of the said Acts.

Mr. Daniel Mackenzie, writer, Glasgow, appeared for the respondent.

The Sheriff : Are all these complaints under sections 1 and 15 of the Act, 1868 ?

Mr. Salvesen : My lord, all the complaints against John Neill are under sections 1 and 15, but there are two separate complaints, first of selling various drugs, and second of using the name "chemist and druggist" on his labels and entering himself as a "druggist" in the Govan Directory, he not being entitled to do so.

The Sheriff : But that is all under sections 1 and 15.

Mr. Salvesen : Yes, my lord.

The Sheriff : Am I right in saying that there are four cases of selling poison and one case of exhibiting the title "chemist" and sending out the labels ?

Mr. Salvesen : Yes.

The Sheriff : Is there any objection to relevancy.

Mr. Mackenzie : No objection, my lord.

The responded then pleaded not guilty.

The first witness called was John Rutherford Hill,

who, being solemnly sworn and examined by Mr. Salvesen, deponed as follows: I am a pharmaceutical chemist and Assistant Secretary to the Pharmaceutical Society. I reside in Edinburgh. I exhibit a printed copy of the Register kept under the Pharmacy Acts for the years 1891 and 1892. There is a provision under the Act which makes that evidence, and it is not necessary to prove it in any other way; a register is kept for each year in accordance with the provisions of the Act. It contains the names of all persons who are entitled to use the designation of "chemist." The name of the accused does not appear in the Register for either of these years.

Mr. Salvesen: The term is "chemist and druggist," and perhaps your lordship would take a reference to the 13th section which provides for the keeping of this annual Register.

Examination continued: On Monday, December 7, 1891, I accompanied Thomas Allan to the shop occupied by John Neill, at 65, Victoria Street, Govan. Thomas Allan, who went with me, was an assistant in our Edinburgh office at that time. I instructed Allan to purchase oxalic acid and gave him money to pay for it. I stood outside the door. I had a view of the counter from where I was standing and could see distinctly everything that was done in the shop. I saw Mr. Neill weigh out the oxalic acid or a white crystalline substance which I took to be oxalic acid from a bottle. He wrapped it up and handed it to Allan, and received the money in payment. Allan handed the packet to me immediately he came out of the shop. 2*d.* was the payment. Oxalic acid is one of the cheapest poisons. It is a very dangerous poison. I exhibit the packet which I received from Allan as he left the shop. I analysed the contents either that night or the following morning. I found it to be oxalic acid, which is a scheduled poison.

By the Sheriff: Do you mean scheduled by the Act?—Yes, my lord. It it a poison in the schedule attached to the 1868 Act.

By Mr. Salvesen: I put on a label immediately after the analysis, in presence of Allan, and both of us signed the label. The packet has remained labelled ever since, just as it is now, and I marked upon it the hour of the purchase at the same time. The hour was twenty minutes past five in the afternoon.

On December 9 I again went with Allan to Glasgow. I entered Neill's shop, 65, Victoria Street, Govan, Allan remaining outside. I saw the accused and he served me.

(Shown Respondent): Is that the man?—Yes; there was no one else in the shop either on this or on the previous occasion. I asked him for two pennyworth of lard and two pennyworth of red precipitate powder. Red precipitate is red oxide of mercury. It is a dangerous poison; because when taken internally it becomes converted into corrosive sublimate. It would be quite impossible to trace it by analysis to the original condition in which it was taken into the system, unless some of it remain unabsorbed. Neill supplied me with what I asked and I paid him 4*d.* for the purchase. I have got the packet of the red precipitate, which I now produce. I showed the packet to Allan, immediately on coming out. I did not open the packets at the time; they were sealed of course. It was labelled "red precipitate" by Neill, and had all the appearance of red precipitate, with which I am familiar. I came out of the shop with it and showed it to Thomas Allan, and then I returned to Edinburgh, when I opened it and analysed the contents of the packet in presence of Allan on the same day, and found it red precipitate, which is also a poison in the schedule attached to the 1868 Act. The packet was identified by means of the label, comparing the name and address of the respondent, and having written upon it in manuscript "red precipitate."

On January 4, 1892, I again accompanied Allan to Neill's shop. Thomas Allan went in on that occasion, and as before I stood at the door. There was nobody else in charge of the shop, except the respondent. I entered the shop a minute or two after Allan, and we were together in the shop when the sale was made. Allan entered first, and a minute or two afterwards I entered also. There was a woman being served, and we waited till she was served, and when she left the three of us were alone in the shop. I instructed Allan to ask for two pennyworth of laudanum, and gave him the money to pay for it. I heard him ask the respondent for the laudanum, and saw him get it in the bottle which I now produce. I got it from Allan immediately on coming out of the shop. I analysed it either that same day or next morning. I opened it in the presence of Allan, and found it contained laudanum. I then labelled it, and both he and I signed the label. I marked the hour at which I made the purchase—twenty minutes past four—I marked the hour at the time of the analysis in all cases. I took a note of the purchase in a note-book and I transferred that note to the label after I completed the analysis. Laudanum is not itself scheduled by the name of laudanum; but it is a tincture or preparation of opium. And opium and its preparations are scheduled poisons.

On January 9, 1892, I again paid a visit to the respondent's shop along with Allan. I gave Allan a prescription which I now produce. The prescription was for liquid extract of ergot of rye. I gave Allan money to pay for the prescription, and waited at the shop door where I could see all that passed. I saw Allan hand the prescription to Neill who proceeded to pour some liquid from a bottle into this small one which I have here, and write this label which is upon the bottle with the directions "ten drops every three hours." He attached the label, wrapped the bottle up in paper, and handed the bottle to Allan, and received from him 7*d.* Allan came out and handed the bottle to me. When I came home, I analysed the contents, and found them to be a preparation of ergot of rye, which is a scheduled poison. On the bottle containing the ergot of rye there are the words "H. K. Neill, Family and Dispensing Chemist, 65, Victoria Street, Govan." There is no such name on the Register of chemists and druggists or pharmaceutical chemists. I produce a copy of the Govan Directory for 1891–1892. On page 45 of that Directory I find the heading "chemist and druggists—consulting rooms." There is an entry under that heading of the respondent's name, "John Neill, 65, Victoria Street." The same name appears on p. 174 in the General Directory, "John Neill, druggist, 65, Victoria Street."

The Sheriff: You are not proving the labels.

Mr. Salvesen: We prove one. I believe that the explanation is that it was a brother of the accused's, and that his labels are still being used.

The Sheriff: Was that brother certificated?

Witness: No, my lord.

Cross-examined by Mr. Mackenzie: Did you make any inquiries to ascertain who had ordered that insertion in the Directory?—No.

Are you a qualified analyst?—Yes.

By the Sheriff: Is that a registered analyst?—Yes, my lord. I am a registered pharmaceutical chemist.

And as such entitled to be called an analyst?—Yes, my lord.

By Mr. Mackenzie: Are you on the list of certified or certificated analysts?—I am not aware of the existence of such a list.

Do you claim to be an analyst by virtue of being a pharmaceutical chemist?—Most distinctly.

You have no doubt whatever as to the accused?—None.

Was the shop lit by gas at the time of the various

purchases spoken to?—All of them except one, I think, and I am not sure even about that one.

By the Sheriff: Have you any doubt that that was the gentleman?—None whatever.

By Mr. Salvesen: Is the qualification of pharmaceutical chemist the highest qualification of chemist that exists?—Yes.

And you hold that qualification?—Yes.

In order to obtain that you have had to qualify by passing examinations?—Yes, and I have also had a course of study in the laboratory of a public analyst.

Thomas Allan, sworn and examined by Mr. Salvesen, deponed: I reside at 4, George Place, Edinburgh. Up to December last I was an assistant in the Edinburgh office of the Pharmaceutical Society, and since then I have been a law clerk. On Monday, December 7, I went to Glasgow along with the last witness and visited the shop of the respondent between 5 and 6 o'clock. I noticed Mr. Hill noting the hours in each case in his note book. I asked for two pennyworth of oxalic acid and recognize the packet now shown to me. I signed the label. Mr. Hill stood at the door and I went in. Mr. Neill was the only man in the shop besides myself and he served me. On December 9 I again went to Neill's shop along with Mr. Hill. He went into the shop while I stood at the door. I saw the respondent give Mr. Hill two parcels. One was labelled "red precipitate," and I saw that parcel opened afterwards and analysed by Mr. Hill, and signed the label attached to it. On January 4 Mr. Hill and I again visited Neill's shop. I went into the shop first and shortly afterwards Mr. Hill came in. I saw accused in the shop. He served me with two pennyworth of laudanum in this bottle which is now shown to me. I gave that bottle to Mr. Hill when I came out, and saw Mr. Hill tie it up and label it after it had been analysed. I was in Glasgow again on Saturday, January 9, along with Mr. Hill, and paid another visit to Neill's shop. I went in on that occasion and handed the prescription to Neill which I am now shown.

Mr. Mackenzie: I have suggested to Counsel that if he can see his way to accept a plea of guilty to the first four charges and drop the fifth charge, I would be disposed to give him that admission.

Mr. Salvesen: I am quite willing to drop the last charge on the respondent pleading guilty to the first four.

The Sheriff: Does the four mean four penalties?

Mr. Salvesen: Yes.

The Sheriff: I must ask the accused again, do you plead guilty or not guilty to any of the charges?

The Respondent: I plead guilty to the first four, but not guilty to the fifth.

Mr. Salvesen: I accept the plea.

The Sheriff: Does the title offence refer to the fifth?

Mr. Salvesen: Yes, my lord. That will be noted, and that disposes of this case. I have to ask your lordship to impose the full penalty of £5 for each offence. I beg your lordship's attention to section 15 of the Act, under which these prosecutions are brought. In the latter part of the section it is provided that any person "who shall sell or keep an open shop for retailing, dispensing or compounding poisons, not being a pharmaceutical chemist" and so on, "shall for every offence be liable to pay a penalty or sum of £5, and the sum may be sued for, recovered and dealt with," etc. Your lordship will notice that whereas in that section it is said that he shall be liable for every such offence to pay a penalty of £5, in the succeeding section it also embodies a penalty, but there is a distinct difference in the language used. About the middle of the 17th section your lordship will see that after describing the offence, it is provided that the accused shall, on conviction, be liable to a penalty not exceeding £5 for the first offence, and to a penalty not exceeding £10 for the second or any subsequent offence. The only other part of the Act that I should like to draw your attention to is that which deals with the question of expenses. I refer your lordship to section 13 of the 1852 Act, which provides in the second clause, that in every such action or proceeding the party who shall prevail shall recover his full costs. I do not dispute that it is in your lordship's power to modify the penalties, if you think that there is any good reason, but primarily the Act contemplates the imposition of a penalty of £5 for each offence, and that some very good reason should be given why the penalty to be imposed under the Act should not be imposed. It is a public Act, intended for the protection of the public against those who have not the necessary qualifications for taking precautions against poisons getting into improper hands. In England I see from the decisions reported that the full penalty of £5 is always imposed. Under the Summary Jurisdiction Act your lordship has power to modify the penalty, but I submit that this is not a case for modification, because it is quite obvious that the respondent here has been systematically violating the Act. He has sold almost every kind of poison scheduled in the Act—oxalic acid, red precipitate, laudanum, and ergot of rye—and he apparently has made no difficulty about selling to anybody who asked for these poisons, and that is a case of systematic and deliberate violation of a public Act, and therefore I submit that there is no reason why your lordship should impose anything but the full penalty upon this respondent of £5 for each offence. As regards the costs of the prosecution, these in England are given under the provision that I am referring to, in full as between agent and client, but the provisions of the Summary Jurisdiction Act make that impossible, and necessarily here in every one of these prosecutions in the public interest the Pharmaceutical Society has to bear a very large portion of the expenses, even although it has an award of full costs, because the maximum amount which your lordship is able to give is £3 and the witnesses' fees.

The Sheriff: Can you give me any indication how much your expenses are?

Mr. Salvesen: If taxed by the auditor we should only get £1, or 15*s.* and the witnesses' fees.

The Sheriff: Where does the penalty go to?

Mr. Salvesen: To the Pharmaceutical Society. My witnesses are the same in all the cases, and strictly I should only have one tenth of the fee of each witness in each case, and if the expenses were awarded in terms of the Summary Jurisdiction Act I should get about 25*s.* or 30*s.* against the respondent. There are other nine cases. This is not a matter which we have brought without warning, because a year ago cases of this sort were raised against people in Glasgow, which were fully reported. It has been found to be absolutely necessary to put this down, and the frequency of the offence is exemplified by the number of the prosecutions, and hence the necessity for the imposition of a high fine.

The Sheriff: Mr. Cumming, the clerk of court, has suggested four guineas and expenses.

Mr. Mackenzie: I am afraid that your lordship is restricted to three guineas.

The Sheriff: And witnesses. That is the reading that we have been in the habit of putting on it.

Mr. Mackenzie: At any rate, I submit that as far as the penalties are concerned, this is a case where they should be modified, and modified to a very considerable extent.

The Sheriff: Mr. Cumming now suggests three guineas, I suppose because there are so many cases. Assume that it is three guineas.

Mr. Mackenzie: I was going to suggest to your lordship that this was a case in which the penalty should be modified. The prosecution, I think, are hardly

entitled to lie by, after they have got sufficient evidence to enable them to bring a complaint, till they get four or five, and then come up and ask your lordship for a cumulative penalty amounting to a considerable sum of money. If the accused person is doing wrong he should be brought forward before your lordship, and not allowed to go on day after day till the penalty runs up to a tremendous amount. The prosecution might have allowed this to go on, and the penalty would have been ruinous. I think that is a course of conduct on the part of a public prosecutor which your lordship should not assist. Now, there have certainly not been many cases, so far as I am aware, under this Act, and I think that the accused here should not be subjected to the full penalty provided.

The Sheriff: Have there been cases in Glasgow?

Mr. Mackenzie: Only one case, and that is some years ago.

Mr. Salvesen: There was one case very recently, about a year ago, but there have been others.

The Sheriff: I quite follow the point. Is there any other point?

Mr. Mackenzie: In explanation of the respondent's conduct I ought to state that he has been labouring under an erroneous notion, that because there was a visiting doctor regularly at his place he was protected. He no doubt sees now after fully going into the Act and discussing the matter with his agent that that notion was wrong; but he was under the impression, however, that so long as he had a visiting surgeon regularly at the premises, which he had in this case sometimes two and sometimes three times a day, he was thereby protected.

The Sheriff: The laboratory did not belong to the doctor?

Mr. Mackenzie: No, my lord.

The Sheriff: It belongs to this gentleman.

Mr. Mackenzie: Yes, quite so. Then the other part of the charge having been dropped by my friend, I do not know that there is anything else I can suggest by way of mitigation, but I think under the circumstances, which I have brought under your lordship's notice, it is not a case in which the maximum penalty should be awarded, and I would strongly impress upon your lordship the view that I have stated, that it is hardly fair to allow a man like the respondent to go on in this way.

The Sheriff: I am with you there. I am quite familiar with the point. Will you give me some indication as to what was done on the last occasion in Glasgow?

Mr. Salvesen: The penalty of £3 was imposed for each offence, there being four offences. It was on October 27, 1890, before Sheriff Balfour, and it was defended by Counsel, and received very great publicity, the defence being the very one that my friend has indicated, or the excuse which he put forward for the respondent, namely, that he had a visiting doctor who was in the habit of superintending, to a certain extent, the making up of prescriptions, and that defence was held to be a bad defence. It was published in the various newspapers, and though it was the first time that the matter had to be dealt with by the courts here a penalty was imposed of £3 for each of the four offences. The reason why Mr. Bremridge did not bring the prosecution the moment that he had got evidence of one offence was because the accused would have said this is a mere accident, and he wanted to see whether the accused did make up prescriptions or was in the habit of selling these poisons, and all the cases were cases occurring within one month and two days. In these circumstances I submit that there should be no mitigation of the penalty.

Mr. Mackenzie: I could not object to my friend waiting till he had a sufficient number of instances to prove his case, but if he chooses to wait that time I rather think it is unfair to insist upon the maximum penalty in each case. I may say that my client has been greatly strengthened in his view that there are many persons in Glasgow who are acting under the same understanding. There is no doubt that it is an error, but he is not alone in the opinion.

The Sheriff: That is the very point which was decided before in a case I had before me in Hamilton three years ago. It went through every paper. The papers and remarks were all sent to me.

Mr. Mackenzie: It may have been unwillingness to learn on the part of the druggists, but my client does not stand alone in the opinion that a visiting doctor protected him. I think the expenses should be less than in the last case.

Mr. Salvesen: The reason that the Pharmaceutical Society did not insist upon the full penalty there was because it was regarded as a test case, supplying a plausible ground of justification under the Act.

The Sheriff: Can you tell me, Mr. Mackenzie, about the other cases: are they in larger businesses?

Mr. Mackenzie: Both larger and smaller. Principally in a small line.

The Sheriff: Your client in Govan was carrying on a very good business.

Mr. Mackenzie: Not very great. He certainly does not consider it very lucrative. There is no person in the shop but himself, so that it cannot be a very large business. It seems to me that where the penalty exceeds a certain sum of money the expenses must not exceed a certain amount exclusive of everything, because the section says that where the penalty or penalties imposed do not exceed £12, the total expenses should not exceed £3.

The Sheriff: Mr. Cumming is only suggesting £3. The only point is as to expenses. This respondent has been convicted of four deliberate breaches of the Act, and it is obvious that dealing with gentlemen in the position of respondent the penalties must be smart or the Act will become a dead letter. It is my duty to enforce that Act, and what appears to me a fair penalty is £5 for the first of the offences and £2 10*s.* for each of the other three. With £3 of expenses that comes altogether to £15 10*s.*

Mr. Mackenzie: I would ask your lordship some time to pay the penalty. He will not be able to pay it for some time. I asked him if a month would be sufficient, but he rather thinks not.

The Sheriff: It will be imprisonment if not paid within a certain time. Will two months do?

Mr. Mackenzie: Very well, my lord.

Mr. Salvesen: There is a doubt whether imprisonment can competently be put into a conviction of this kind. It is right that this should be brought under your lordship's notice, because it is as well that one should have an indication from the Bench as to what is the true meaning of the 1852 Act. I refer, your lordship, to the 1852 Act, page 56. A large part of this Act has been repealed, but section 12 is the one under which penalties are recovered. In Scotland the penalty may be recovered by an action in the Court of Session in ordinary form or by a summary action before the Sheriff of the county.

The Sheriff: Is this complaint brought under the Summary Procedure Act?

Mr. Salvesen: Yes.

The Sheriff: Is there anything in the Pharmacy Act which renders the form of the Summary Procedure Act inadequate?

Mr. Salvesen: No; but there is a provision that the penalty shall be recoverable by poinding, and it may be held that that is inconsistent with imprisonment.

The Sheriff: Is that in section 12 of the 1852 Act?

Mr. Salvesen: Yes, my lord. I think also the 1868 Act refers to it, and that it might be held to cover a case of this kind, and also in all cases where, under the

authority of any Act of Parliament, such penalty is, or shall be, recovered by civil process or a judgment of the Court unless recovery by imprisonment is excluded by the terms of the Act. Now the mention of one mode of recovery might be held to be an exclusion of the other mode of recovery, namely, by imprisonment.

The Sheriff: Without going into this question, if you are pleased with this, I presume there is no necessity for going further.

Mr. Salvesen: I think we would be safer in getting a conviction.

The Sheriff: That would not interfere with the respondent getting time to pay.

Mr. Salvesen: But as we have not a prospect of enforcing payment the time should not be as much as two months.

The Sheriff: I am not with you there.

Mr. Salvesen: A man may put away his property in two months.

The Sheriff: He will not put away his property for this. I think two months is fair. It may be recovered by poinding or sale.

The next case was against Daniel Smith, 443, Eglinton Street, Glasgow, who was charged with two infringements under sections 1 and 15 of the Pharmacy Act, 1868, in having sold red precipitate to Thomas Allan on January 30, 1892, and tincture of opium and chloroform as ingredients in a mixture to Thomas Allan on February 23, 1892, the said Daniel Smith not being a duly registered pharmaceutical chemist or a chemist and druggist within the meaning of the said Act.

The respondent pleaded not guilty.

The Sheriff: Have you any agent?

The Respondent: No, my lord. I have to submit the following statement, that it lies with the Pharmaceutical Society with the consent of the Privy Council according to the 25th section of the Pharmacy Act, 1868, to bring under your notice an infringement of the said Act. In my case the summons is made, not at the instance of the Pharmaceutical Society with the consent of the Privy Council, but at the instance of Richard Bremridge, the Registrar, who can only cite when certain titles are illegally used or assumed according to section 12 of the Pharmacy Act, 1852, and whose duty is defined in sections 8 to 14 of the Pharmacy Act of 1868, and which do not grant him the power of citing or suing for penalties for selling poison. Therefore the charge should be dismissed till it is preferred by the properly qualified authority. namely, the Pharmaceutical Society with the consent of the Privy Council.

The Sheriff: This is at the instance of the Registrar. Mr. Salvesen, can you tell me about that?

Mr. Salvesen: That is the Act of 1852, section 12. I do not know whether this is an objection to the relevancy. Your lordship will find about the middle of section 12, penalty and persons offending: "Such penalty may be recovered by the registrar to be appointed under this Act and in the name and by the authority of the said Society." It is to be recovered by the Registrar. I do not know where the Privy Council comes in at all.

The Sheriff: Does section 12 refer to selling poisons?

Mr. Salvesen: It refers to the recovery of penalties.

The Sheriff: Where is your power for recovering penalties for selling poison?

Mr. Salvesen: Section 15 of the 1868 Act, which incorporates the 1852 Act, where it says that the sum may be sued for and recovered and dealt with in the manner provided by the Pharmacy Act for the recovery of penalties under that Act. The penalties are for different offences. The 1868 Act imposed a penalty for the first time for selling poisons, and the penalties provided in the 1868 Act are to be sued for as provided in the 1852 Act.

The Sheriff: I did not follow your statement about the Privy Council, Mr. Smith. Tell me about that again.

The Respondent: That is according to section 25 of the 1868 Act.

The Sheriff: That is a certain power given to the Privy Council, and does not affect the right to sue.

The Respondent: Yes; I think so, my lord.

The Sheriff: No. Have you looked up the Pharmacy Act of 1868?

The Respondent: No, my lord, what powers are these?

Mr. Salvesen: These are powers to add to the scheduled list of poisons.

The Sheriff: These powers are given to the Privy Council, but the section does not refer to prosecution.

Mr. Salvesen: From time to time, by the order of the Privy Council, various preparations are added to the scheduled list in the Act of 1868, and there are certain examiners who have to be appointed and approved of by the Privy Council for the purpose of passing candidates for registration.

The Sheriff: I think that objection must be repelled. I shall note this, "The respondent objects to the relevancy that the complaint is not brought by the Pharmaceutical Society with the consent of the Privy Council. Objection repelled." Is that your only objection to the relevancy?

The Respondent: Yes, my lord.

The Sheriff: Do you plead guilty or not guilty of having sold a poison, not being entitled to do so?

The Respondent: I plead not guilty.

John Rutherford Hill, sworn, and examined by Mr. Salvesen, deponed as follows: I produce the Register of Chemists and Druggists for 1892. The respondent's name is not in this Register. On January 30 last I accompanied Thomas Allan to the shop of the respondent, No. 443, Eglinton Street, Glasgow, about four o'clock in the afternoon. I instructed Allan to purchase red precipitate and lard, and I gave him money to buy these articles. I saw him enter the shop, and I remained at the door. There was no one else in the shop but the respondent, and I saw him serving Allan with lard and red precipitate. The lard was not labelled, but the red precipitate was labelled in the handwriting of the respondent. Allan handed these to me as he came out of the shop. I analysed one packet and found it to be red precipitate. I produce the packet which was bought on that occasion.

On Tuesday, February 23, I again accompanied Allan to Smith's shop. I gave Allan a prescription, which I now produce, for tincture of opium and chloroform, which are both scheduled poisons. I saw Allan get a bottle containing these substances which, on analysis, I ascertained to be what they purported. I labelled the bottle and got Allan to sign it along with me, and I now produce the bottle. The prescription was not properly dispensed. The bottle contains only one-half of the quantity prescribed.

By the Respondent: Can you tell me the date of the first sale?—January 30.

What day was that?—A Saturday.

Can you tell me the date of the second?—February 23.

What day was that?—A Tuesday.

Might I ask to see the prescription; has that prescription been altered?—No.

Thomas Allan, sworn, and examined by Mr. Salvesen, deponed as follows: On January 30 I accompanied the last witness to Smith's shop, and on his instructions went in and asked for red precipitate. I received the packet now shown to me, and gave it to Mr. Hill when I came out of the shop. I received it from the

accused. There was no one else in the shop that I could see. I was present when the stuff was analysed and when it was labelled, and signed the label. On February 23 I again went back to the same shop. I handed in a prescription to Smith, the accused, and asked to get it made up. I got a bottle which I handed to Mr. Hill. I was present when it was analysed, and signed the label. It would be about a quarter to seven at night when I visited the shop. The time was marked on the label at the time I signed it. The time in January was about four o'clock.

By the Respondent: When did you get the prescription made up?—February 23.

What day was that?—I think it was a Tuesday.

May I ask the date of the first sale?—Saturday, January 30.

May I ask what Smith gave these things?—It was yourself.

The Sheriff: Have you any witnesses?

The Respondent: Yes, I have one.

Mary Susan Smith was then called by the respondent, and being sworn and examined, deponed as follows:—

By the Sheriff: What relative are you of this gentleman?—I am his sister.

By the Respondent: I would like you to state to the court the time I am in the shop during the day?—He goes away at nine o'clock in the morning, and does not come home till five or six at night.

By the Sheriff: What does he do when he is away?—He is studying as a student, and he is away at his classes all day.

But on Saturday he is not studying?—No.

The Sheriff: Any other questions?

The Respondent: That is all.

The Sheriff: Have you any other witnesses?

The Respondent: No, my lord.

The Sheriff: What have you got to say for yourself?

The Respondent: I have this to say. I propose to show that the things with which I am charged are not offences within the meaning of the Pharmacy Act, 1868. First of all, as the Act is one that restricts the liberty of the individual, I submit that its terms where it specifies offences should be strictly interpreted. Now, the parts of the Act from which the charges against me are grounded are contained in sections 1 and 15. Section 1 reads thus—"From and after 31st December, 1868, it shall be unlawful for any person to sell or keep open shop for retailing, dispensing, or compounding poisons." I invite your lordship's attention to the words "it shall be unlawful for any person to sell or keep open shop for retailing, dispensing, or compounding poisons." Analysed, the passage may be rendered, "It shall be unlawful for any person to sell, shop, or keep open shop for retailing, &c." "Shop" is the object nearest to "sell," and seems to be the object common to both verbs. Now, I have been charged not with keeping open shop, or retailing, dispensing, or compounding poisons, but with selling poisons. Therefore, I submit that if the Act be strictly interpreted, it will be seen that I have not been guilty of an offence within the meaning of the said Act.

The Sheriff: I follow that point. Second? Is that all? Have you any other objection?

The Respondent: No, my lord.

The Sheriff: Can any gentleman tell me about this business? Is it a large business?

Mr. Salvesen: I am told it is a large shop, and appears to be a flourishing business. So Mr. Hill says.

The Sheriff: How many assistants has he?

Mr. Salvesen: Apparently his sister.

The Sheriff: During the day?

Mr. Salvesen: Yes.

The Sheriff: Would you like to tell me, Mr. Smith, how many assistants you have, and about the size of your business?

The Respondent: I have no assistants. The shop not mine.

The Sheriff: Whose is it?

The Respondent: My brother's.

The Sheriff: Tell me this. Who is your brother Has he got a licence or is he certified?

The Respondent: No, my lord.

The Sheriff: Who takes charge of the shop?

The Respondent: I have charge of it.

The Sheriff: You do so when you are there, but who takes charge of it when you are not there?

The Respondent: A doctor is there part of the day superintending anything.

The Sheriff: What is your brother?

The Respondent: He is a musician.

The Sheriff: And the shop belongs to him?

The Respondent: Yes.

The Sheriff: And you and your sister take charge of it?

The Respondent: Yes.

The Sheriff: And none of you are certified?

The Respondent: No.

The Sheriff: How often is a doctor there?

The Respondent: Three times in the day.

The Sheriff: For how long?

The Respondent: For an hour at each time.

The Sheriff: Is it within your knowledge, Mr. Salvesen, that the brother is drawing the profit of that shop?

Mr. Salvesen: I know nothing about that, my lord. In the decided case that is of no moment, because the person who falls to be charged under section 15 is not the person for whom the profits are being made, but the hand that sells the scheduled poison. That is settled in a case that was decided in the Court of Queen's Bench.

The Sheriff: There is no doubt about that, I suppose.

Mr. Salvesen: I submit that there is no reason why the penalty should be mitigated in this gentleman's case. By the number of these cases it is evident there is a regular system of evading the Act in Glasgow.

The Sheriff: This is a very bad case, but I should like to get at the party who is pocketing the money.

Mr. Salvesen: I have no doubt that he will have to provide the funds. We have no means of getting behind the party in this case. We have to go against the person who sells. I am told that this respondent is entered in the Directory as the owner of the shop. Perhaps he will be able to explain whether that is so or not.

The Sheriff: I am not going to ask the accused to answer anything unless he likes.

The Respondent: I would like to make another remark, and that is, I served a full apprenticeship under John Mackay, Pharmaceutical Chemist, Edinburgh, and that I am now a registered medical student and have studied for nearly four years. Therefore I ask your lordship to give a lenient decision.

The Sheriff: Why did you not get a certificate after you served your apprenticeship?

The Respondent: Well, thinking that the medical profession was better I thought there was no use of getting registered for the other. There was no use of going in for both.

The Sheriff: I suppose I may accept these facts and that he served his apprenticeship and is trying to be a doctor.

Mr. Salvesen: I do not think that mitigates the case, because he ought to know better. He seems to be an intelligent man and he ought to know exactly what the result of his offence was. A man studying medicine is surely not to be allowed in the meantime to be making money by selling poisons as an unqualified chemist.

The Sheriff: Might he have passed after serving his apprenticeship?

Mr. Salvesen: Yes, if he had passed his examinations.

The Sheriff: I understand that they cannot pass without an apprenticeship.

Mr. Salvesen: Three years' apprenticeship is necessary, and they have to pass two examinations. If he had the requisite knowledge there seems to be no reason why he should not have subjected himself to the examinations. I understand that the fees are two guineas for the first examination and three guineas for the second, and after that they obtain their certificates free of expense. After the apprenticeship, apparently, this respondent intended to attend classes for the full period requisite to qualify him to pass as a doctor and to keep the shop in the meantime, I suppose.

The Sheriff: The objections are quite untenable. There is nothing in them at all either to the relevancy or to the merits. The only question is the penalty. I think I would do well to adhere to the last decision, £5 for the first offence, and £2 10*s.* plus £3 of expenses. Do you wish time to pay it?

The Respondent: I wish, say, a month.

The Sheriff: Might I venture to give you a caution? If you do not take care you will be back here, and the penalty will be very different. You are a little too apt to go on points which will not avail you. You had better get a qualified man there, or pass yourself.

The next complaint was against Mary Susan Smith, 443, Eglinton Street, Glasgow, who was charged with three infringements of the Act under Sections 1 and 15, in that she sold to Thomas Allan laudanum on 16th February, 1892, and oxalic acid to Thomas Allan on 17th and 23rd February, 1892, she not being a duly registered pharmaceutical chemist or a chemist and druggist within the meaning of the Pharmacy Act.

The Sheriff: Are you in the same shop as your brother?

The Respondent: Yes.

The Sheriff: Do not you think, Mr. Salvesen, that you could depart from that? I will give her a caution, but I think you may depart from it.

Mr. Salvesen: I am quite willing to depart from it. I do not want to be too severe on assistants.

Mr. Mackenzie: I was going to suggest that to your lordship, and I have done so to Mr. Salvesen. I have asked him if he would take a plea from the real owners of the shops and depart from the proceedings against the females.

The Sheriff: We had better dispose of this case. Allowing you, Miss Smith, to sell poisons is entirely out of the question. I will say what the result will be if you sell them again or if you sell them this afternoon. This case will be departed from. Take care what you do.

The next complaint was against James Paterson, residing at Muirpark Gardens, Partick, for two infringements under Sections 1 and 15, in that he sold laudanum to Thomas Allan on 9th December, 1891, and tincture of opium and chloroform as ingredients in a mixture to Thomas Allan on 29th January, 1892, within premises situated at 894, Govan Road, Govan, he not being a duly registered pharmaceutical chemist or a chemist and druggist within the meaning of the Pharmacy Act.

Mr. William Gibson, writer, Glasgow, appeared for the respondent.

The respondent pleaded not guilty.

John Rutherford Hill, sworn, and examined by Mr. Morison, deponed as follows: I produce the Registers of chemists and druggists for the years 1891 and 1892, and the respondent's name is not on either Register. I remember on 9th December, 1891, accompanying Thomas Allan to the shop, 894, Govan Road. I instructed Allan to purchase laudanum and castor oil. He entered and I stayed at the door. There was no one in the shop but Paterson. I saw Paterson take the tincture of opium bottle and put some of it in a small bottle, label it, and wrap it up and hand it to Allan, who paid him 3*d.* for the laudanum and 6*d.* for the bottle of castor oil. I afterwards analysed the contents of the bottle, and found it to be laudanum, a scheduled poison. I produce the bottle of laudanum. On January 29 I again went to the shop. I gave Allan a prescription which I now produce. It is for tincture of opium and chloroform. I saw Allan hand the prescription to Paterson, and I saw Paterson dispense the prescription, copy it, put a label on the bottle, and hand it to Thomas Allan, who paid him 1*s.* 8*d.* for it. When Allan came out he handed me the bottle, which I now produce. This was at five minutes past eight in the evening. I took the bottle to Edinburgh and on analysing it found it to contain tincture of opium and chloroform.

Cross-examined by Mr. Gibson: Did you visit several shops on these days?—Yes.

In Govan?—Yes.

Had you been in this shop of the accused's before?—Yes.

On what occasions?—Several previous occasions. One bottle is numbered by him. There is no writing on one bottle and no name.

On these previous occasions did you ask for any articles?—Yes.

Did you get them?—Yes.

Did you take a note of your visit on the same day that you visited the shop?—Yes, in this note-book.

May I look at it?—Certainly.

When did you make the notes?—On the following morning—either that night or the following morning. Some were made that night and some the following morning. These notes are written out from pencil jottings.

The Sheriff: It is labelled Govandale Medical Hall. Is that your client's place?

Mr. Gibson: Yes.

The Sheriff: And your client says he never sold it?

Mr. Gibson: So I believe.

The Sheriff: Surely you must have some other defences.

Mr. Gibson: I do not state the whole defence.

The Sheriff: Tell us the second part of it?

Mr. Gibson: The other part is that there was some other person present who was authorised to superintend and dispense the prescriptions.

The Sheriff: But this gentleman says that he saw your client dispense it.

Mr. Gibson: Yes, but I have nothing to do with that. (To witness) You were at the door?—Yes, outside the door.

Is that door partly obscured?—Yes; but it was open.

Could you see the whole interior of the shop?—The front shop.

Is there a back shop?—I believe there is. There is an entrance.

Is there a screen at each end of the counter?—Yes.

Is that where the dispensing is done?—Yes.

How many were in the shop?—Only James Paterson and Thomas Allan.

You saw no other person?—No.

Do you identify James Paterson?—Yes. (Identifies the respondent.)

Did you see him the whole time in the shop?—Yes, while he was serving the poison.

Did you see his movements?—Yes.

And you did not see any other person in the shop?—No.

Did you caution him at the time?—No; I was not in the shop.

Did you ever caution him?—No.

The Sheriff: He would never get the poisons if he did so.

Mr. Gibson: There has been no fatal result.

The Sheriff: That has nothing to do with it.

Mr. Gibson: Has there been any complaint against the accused?

The Sheriff: Nothing to do with it.

Mr. Gibson: It mitigates it, possibly.

The Sheriff: Not in the slightest.

Mr. Gibson: You cannot say who was present in the back shop?

The Sheriff: He said so.

By Mr. Morison: What do you mean by a person "dispensing" laudanum?—When he takes the bottle from the shelf, fills out a quantity into another bottle and labels it, and hands it to the patient or messenger.

Thomas Allan, sworn, and examined by Mr. Morison, deponed as follows:—I went with Mr. Hill to the respondent's shop at 894, Govan Road, Govan, on December 9, 1891, and Mr. Hill instructed me to buy 2*d*. worth of laudanum. I went into Paterson's shop. I saw Mr. Paterson there, and there was no one else that I could see. I asked for 2*d*. worth of laudanum and a 6*d*. bottle of castor oil, and he gave me the castor oil and poured out the laudanum. I saw it analysed afterwards and found it to be laudanum. On January 29 I returned to the same shop. I got a prescription from Mr. Hill to give to Mr. Paterson. That is the prescription. Mr. Paterson gave me this bottle. I saw its contents analysed, and it contained tincture of opium and chloroform.

Cross-examined by Mr. Gibson: Whose employment are you in?—I am a law clerk with Mr. Morison.

Is that the agent for the pursuers?—Yes.

At the time of this occurrence where were you?—I was in Mr. Morison's employment also.

How old are you?—16.

Past?—No, but I am nearer 16 than 15.

Did you take any notes of your visits to the shops?—I did not personally. Mr. Hill took notes along with me. He wrote them.

On all occasions?—Yes.

Had you been in several shops that day?—Yes, I think I was in two or three shops.

Could Mr. Hill see what was done in the shop?—Yes.

The Sheriff: Have you really a certificated gentleman?

Mr. Gibson: I understand that he was present.

The Sheriff: Is he to be produced?

Mr. Gibson: Yes.

The Sheriff: And he will say that he was present at the time.

Mr. Gibson: He will say that he is usually present.

The Sheriff: That is your defence?

Mr. Gibson: Yes.

Alexander Kilpatrick, M.B., C.M., sworn, and examined by Mr. Gibson, deponed as follows: Do you consult daily at the Govandale Apothecary Hall?—Yes.

Mr. Paterson is in that shop?—Yes.

Do you practise in the vicinity?—I do.

Are you very frequently in the shop during the day? Yes, pretty often out and in.

And besides that you are there twice a day?—Yes, specially.

For how long?—For an hour or an hour and a-half, or two hours.

By the Sheriff: Are you in the open shop or in a room behind it?—I am out and in.

Have you a consulting room behind the shop?—I have.

By Mr. Gibson: But you are frequently in the front shop?—I have to pass out and in.

By the Sheriff: Do you dispense poisons?—Yes.

Did you dispense the poisons to this gentleman?—I cannot tell.

Did you take the superintendence of them?—I cannot tell.

Is the shop yours?—No.

By Mr. Gibson: As far as you can, do you dispense all the poisons?—I dispense all the poisons that I give a prescription for.

Have you ever heard of any poison being dispensed without your acquaintance?—No.

Do you understand that the accused never dispensed poisons without your being present?—I am under that belief.

Would you be in the shop on December 9 and January 29?—Yes, more than likely.

You have been there every day during the last three months?—Yes.

Would you probably be in the shop when these poisons were dispensed?—I cannot say that I remember.

Can you remember the witness Allan being there on that day?—I cannot remember.

But he may have been there?—He may.

And you may have been there when he was there?—Yes.

Is laudanum frequently dispensed in that shop?—I cannot say that.

You have always found the medicines prescribed by you correctly made up by the accused?—Yes, without exception.

Mr. Salvesen: No questions.

The Sheriff: Any other witnesses?

Mr. Gibson: No, my lord.

The Sheriff: Anything to say?

Mr. Gibson: Your lordship will see that it has not been proved that these poisons which are mentioned here are poisons. There is only one witness to prove that; that is the first witness examined by the Pursuer. I submit that it requires two witnesses to prove the fact. There is one witness Allan who bought these articles, and he is corroborated by Mr. Hill to this effect that he was standing outside. He cannot prove that the accused here did not consult Dr. Kilpatrick, and Dr. Kilpatrick cannot at this time remember that on these occasions he was consulted, but he can prove that he has been invariably consulted, and I think that the prosecution have not proved that these poisons were sold on these occasions. That is all I wish to say to your lordship as regards the question of proof. As regards the penalty I say that apparently the prosecution here has endeavoured on more than these two occasions to get the accused to sell them poisons.

The Sheriff: They had been in the shop, but you did not ask if they had purchased poisons. If you had proved that it would have had an effect on the penalty.

Mr. Gibson: The other point is that there have been no complaints against the accused formerly, that he has never been cautioned by the Society, and that he believed, as has been put before you in a former case, that if there was a doctor who was constantly visiting and who was superintending the dispensing of poisons, he was within his duty and not doing anything wrong It is the first time the accused has been charged, and I think, on that ground, he is entitled to a very considerably mitigated penalty.

The Sheriff: I see no reason whatever for mitigating the penalty in this case. In fact the defence has not been conducted in such a way as one likes to see it conducted. I quite follow the argument that the shop belongs to a doctor, but to bring a gentleman who has got a consulting room in the back in order to say that he could have done this or that is no way of conducting a defence. I think it is a perfectly right thing to

say to a prosecutor, "prove your case," but I do not like the way in which this is conducted. You must bear the penalty as in the previous case, £5 for the first offence and £2 10s. for the others, and £3 for expenses.

Mr. Gibson: Will your lordship give two months to pay?

The Sheriff: Yes.

The next case called was against John Finlay Stevenson, 176, Castle Street, Glasgow, who was charged with an infringement of sections 1 and 15, in that he sold to Thomas Allan red precipitate on January 29, 1892, he not being a duly registered pharmaceutical chemist and druggist within the meaning of the Pharmacy Act.

The respondent pleaded guilty, and was represented by Mr. R. A. Rennie, writer, Glasgow.

Mr. Rennie: I may state some extenuating circumstances, and I think they are so strong that in ordinary circumstances there would have been a plea of "Not guilty." This man was acting under immediate supervision of Robert Twaddle. Unfortunately, that gentleman has since died.

The Sheriff: What is the date?

Mr. Rennie: January 29.

The Sheriff: Had he acted up till that time?

Mr. Rennie: He died about a fortnight thereafter. He was a qualified chemist.

The Sheriff: Was he unwell at that time?

Mr. Rennie: No, he was in the shop and saw this done. He was behind the counter. I believe I am unable to prove it in consequence of the death of Twaddle, but if he had been alive it would have been a different matter.

The Sheriff: Mr. Hill will tell you at once. Was there a qualified chemist, Mr. Hill, in the shop?

Mr. Hill: Not to my knowledge. There was an old broken-down man in the shop washing bottles. I know the name of Robert Twaddle is on the Register.

The Sheriff: Can you satisfy Mr. Hill as to whether or not Mr. Twaddle was in the shop? Where is the shop?

The Respondent: In Castle Street.

Mr. Salvesen: I believe that it is the fact there was an old man, who was a broken-down chemist, and who was used as a cover by the respondent here.

The Sheriff: Let us consider that. You should plead "Not guilty."

Mr. Rennie: I asked Mr. Hill about that.

The Sheriff: Then you admit, Mr. Salvesen, that there was a qualified chemist in that shop?

Mr. Salvesen: I do not think it matters much.

The Sheriff: But, as a matter of fact, can you admit it?

Mr. Salvesen: I can only say that I consider it probable that the statement is correct.

The Sheriff: Shall I take it as admitted? This case is coming very much to be a case of "Not guilty" altogether or a case of no penalty.

Mr. Salvesen: My case is that this sale was not made under his personal superintendence, but was made by Stevenson himself who dispensed the article in question. It has been interpreted by two decisions, one of them 24 Queen's Bench Division and a subsequent decision by Sheriff Balfour here following upon the decision in the Queen's Bench Division. I think that Sheriff Balfour's statement of the law as reported is quite accurate. He says, "The next objection taken is that Shields was not registered, but that Faulds was duly qualified to sell poisons and that the poisons were actually sold under his superintendence. The authority of Mr. Justice Hawkins is referred to. He gave the dictum in the case of Wheeldon, which Mr. Deas read, and the gist of it consists of this, that an unqualified person can sell poisons if he acts under the personal superintendence of a qualified employer, or a qualified assistant of such employer. By such personal superintendence, Mr. Justice Hawkins means not mere presence in the room or shop where the sale takes place, but actual personal supervision, so that every individual sale shall be so guarded round by these precautions prescribed by the Act, that the safety of every member of the public may be provided for, as far as the law can accomplish that object. That opens up a question of fact in this case, and the question of fact is whether these sales of poison, under the circumstances described in the evidence, can be said to have been made under the personal superintendence of Dr. Faulds." Now, my friend has pleaded "guilty," and the meaning of the plea is that while he tells your lordship that there was a qualified chemist in the shop, he does not mean to contend that the poison was sold under the personal superintendence of that qualified chemist.

The Respondent: I withdraw my plea of "guilty," and now plead not guilty with your permission.

The Sheriff: The plea is not signed, and you may withdraw it.

Mr. Salvesen: I am quite willing that the plea should be withdrawn.

Mr. Rennie: My client is under a misapprehension in this case. He has made up his mind to plead guilty, and I may explain to your lordship our difficulty in this case here. Robert Twaddle has since died, and I am required to prove that the poisons were sold under his personal supervision, not only that he was on the premises, but that he was taking the superintendence of what was being done. Now, as a matter of fact, that was so; but, unfortunately, he is dead and I am left entirely in the hands of the prosecution. I am not prepared to risk that, as I had a conversation with Mr. Hill, and I find that a lien with the prosecution will not work here. My position is that I am compelled to plead guilty, but really it is a case where there should be no penalty imposed. There are other strong points.

The Sheriff: Let me point this out to you. You are pleading guilty, and the only meaning of that is that if the respondent did keep this man at all and kept him as a blind, it would be probably a pretty smart penalty.

Mr. Rennie: It is admitted that he was present.

The Sheriff: He was called a broken-down old gentleman.

Mr. Rennie: But, seeing that he was a qualified chemist, we are entitled to assume that he was as good as any other.

The Sheriff: Supposing he had been 90, or had had bad eyesight, what would you say to that?

Mr. Rennie: I do not think we would be entitled to take such considerations into account. All we have to do is to see whether he was qualified. I show you a letter written by James Robertson, secretary of the Royal College of Surgeons, who says that my client has passed the examinations in medicine which a medical man passes in connection with these subjects, and that establishes the fact that this was not the case of an absolutely incompetent man selling poisons to the danger of the public, and that there was no danger resulting to the lieges. I wish to point out that my client is not the proprietor of these premises, but that he is a mere assistant. These are the circumstances which I state as differing from the cases already decided, and I may add that the mere fact of him pleading guilty, and not troubling the court with a long defence must be regarded as a favourable circumstance.

The Sheriff: That this gentleman can dispense poisons, to judge from appearances, I have very little doubt, but why will he not place himself in a proper position? It is no reason to take into account that he was qualified. I have in a previous case judicially

been well aware that a gentleman was thoroughly well qualified, but he was not qualified under the Act. With regard to the second point, I cannot admit that this poor gentleman's death has anything to do with it. The case could have been proved without him, and I must look upon it that the old gentleman was kept there simply as a blind, and I must impose the same penalty as in the other cases, £5 for the offence, and £3 for expenses. Do you wish any time to pay it?

The Respondent: No, I will pay it now.

The next case called was against Jane M'Ewan, or Stevenson, who was charged with an infringement under sections 1 and 15, in that she sold red precipitate to Thomas Allan, at 49, Alexandra Parade, Glasgow, on January 29, 1892, she not being a duly registered pharmaceutical chemist and druggist within the meaning of the Pharmacy Act.

The Sheriff: I do not suppose you insist upon a conviction in this case?

Mr. Salvesen: It is in a different shop. I am afraid I must press for a conviction.

Mr. Rennie: The lady pleads guilty, and I have arranged with my friends that they should only take expenses.

The Sheriff: I must give a penalty; 1s. of penalty and £3 of expenses.

The next complaint was against David Lees, Licentiate of the Royal College of Physicians and Surgeons, Edinburgh, residing at Lansdowne Cottage, Shaw Street, Govan, for an infringement of the 17th Section of the Pharmacy Act, 1868, in that he on or about January 9, 1892, at or near the shop, No. 100, Elder Street, Govan, and by the hands of David Shankland, then an apprentice or servant to him, unlawfully sold to Thomas Allan a quantity of opium which formed part of the ingredients of pills compounded or dispensed by the said David Shankland, who was not then a person registered under the said Act, and without having the box in which the said poison was contained distinctly labelled with the name of the article, and with the word "Poison" and with the name and address of the seller of the poison.

Mr. S. M. Carrick, writer, appeared for the respondent.

Mr. Salvesen: Before your lordship asks the respondent to plead, I should say that we have withdrawn charges 1 and 2, and in consequence of that it becomes necessary for me to ask your lordship to amend the complaint by striking out the first two complaints and to amend the third by taking out "said offence is the second or a subsequent offence" and substituting "And said offence is the first offence whereby the said David Lees has become liable in a penalty not exceeding £5 instead of £10." It is quite competent for me to do that, because it is restricting the prayer of the libel.

The respondent pleaded "Not guilty."

John Rutherford Hill, sworn, and examined by Mr. Salvesen, deponed as follows:—On January 9, 1892, I accompanied Thomas Allan to a shop at No. 100, Elder Street, Govan, at 3.28 p.m. I sent Allan into the shop with the prescription which I now produce. It was for pills with lead and opium —opium pills. I stayed at the shop door and saw Allan go in and give the prescription to David Shankland. He was the only person in the shop. Allan came out without having got what he wanted, and in consequence of what he said to me, we went away for a little, and returned at four o'clock. Allan entered, and after some minutes had elapsed he returned with a box, which I produce, containing opium pills. There was no label on the box, which is in the condition in which I received it. On the box was written, "One every four hours when required. No. 15,683." There was nothing to show the name of the seller or his address, or the fact that what was dispensed was a poison, nor the name of the article. I analysed the pills and found them to contain opium, a scheduled poison. Allan was present when I analysed the pills and he signed the label which I put on. Over the shop door, I saw printed "Dr. Lees, surgeon," in large letters. The same name appeared on one of the panels of the glass door leading into the shop from the street and also on the side of the wall on the left hand side of the door. At the right hand side were the words "Consulting Rooms." There was no other name on the shop. On the wall on the left hand side of the door were the words, "Dr. Lees, house—Lansdowne Cottage, Shaw Street." This was in large letters—prominent letters. I could read them across the street quite easily. There was also a ticket in the window with "Dr. Lees, Surgeon," and his consulting hours. I did not find the name of Shankland mentioned in connection with the shop anywhere. Shankland is not a qualified chemist and druggist under the Act.

Mr. Salvesen: Have you been several times in this shop, 100, Elder Street?

Mr. Carrick: I object to that question. There is only one occasion libelled.

The Sheriff: It will probably be in your favour.

Mr. Carrick: It may be so, but I am unwilling to run the risk.

The Sheriff: I have not the slightest doubt about the competency of the question. It is perfectly competent.

Examination continued: I have been several times in this shop, 100, Elder Street, and have made purchases there. Thomas Allan purchased a bottle on December 9, 1891, and Dr. Lees' name was on the label. I produce that bottle.

Mr. Carrick: I object to that entirely. There are charges made against me on December 9, and my friend has seen his way to withdraw these. I entirely object to what took place a month before the date of this specific charge, which is the only charge against me. The charge against me now is that upon the 9th day of January I did something, and only upon that date.

The Sheriff: I suppose it is not admitted that Dr. Lees is the proprietor of the shop?

Mr. Carrick: That is my case.

The Sheriff: And you object to this?

Mr. Carrick: Yes.

Mr. Salvesen: I am trying to prove that he has something to do with this shop.

The Sheriff: I repel the objection.

The Witness: I produce the bottle. The label is "West End Medical Hall, 100, Elder Street, Govan. Laudanum. Poison. Medium dose, 25 drops. Dr. Lees, Surgeon. Hours, 11, 3, and 7." On the wrapper there is, "Sold by Dr. Lees, Fairfield Dispensary, 901, Govan Road."

Mr. Carrick: That is not the place where the offence is said to have been committed.

The Sheriff: I will let it in for what it is worth.

Examination continued: I also produce a bill of Edwards' "Harlene" which was wrapped about a bottle of castor oil purchased by Thomas Allan in your presence. I also produce a bottle of castor oil which was purchased at the same time in the same shop, 100, Elder Street, on December 9, 1891.

Mr. Carrick: Would your lordship kindly continue my objection to all this?

Examination continued: Upon the castor oil bottle there are the words "Dr. Lees, Surgeon," and no other name of a chemist, and the wrapper contains, on both sides of it, the words, "Sold by Dr. Lees, Surgeon, 100, Elder Street, Govan," in prominent letters. I also produce a bill of Beecham's pills on which there is

printed, "Sold by Dr. Lees, Fairfield Dispensary, 901, Govan Road, and West End Medical Hall, 100, Elder Street; house, Lansdowne Cottage, Shaw Street, Govan." This is the wrapper of a bottle sold to Thomas Allan by Christina Shankland, at 901, Govan Road, on January 9, 1892. I also produce a package containing cream of tartar. There is on it, "West End Medical Hall, 100, Elder Street. Cream of tartar. Dr. Lees, surgeon. Hours, 11, 3, and 7." That was sold on December 7, 1891, to Thomas Allan, to my personal knowledge. I saw it sold. I also produce a package of seidlitz powder purchased at 100, Elder Street, on February 7, 1892. It bears the words, "The West End Medical Hall, 100, Elder Street, Govan. Seidlitz powder. Dr. Lees, Surgeon. Hours, 11, 3, and 7." I also produce a box of lard purchased at 901, Govan Road, on December 9, 1891, from David Shankland, by myself, and the wrapper bears the words, "Sold by Dr. Lees, Fairfield Dispensary, 901, Govan Road, and West End Medical Hall, 100, Elder Street; house, Lansdowne Cottage, Shaw Street, Govan."

The Sheriff: Do I understand, Mr. Salvesen, that your case is that Dr. Lees has two places, 901, Govan Road, and 100, Elder Street?

Mr. Salvesen: Yes, and he sometimes puts a wrapper of one on the package and sometimes the other.

Examination continued: I produce also a bottle of castor oil purchased at 100, Elder Street, on 4th January, 1892, and the wrapper bears the words, "Sold by Dr. Lees, Fairfield Dispensary, 901, Govan Road, Govan." That was purchased at 100, Elder Street, although it bears a wrapper applicable to 901, Govan Road. I produce also a packet of oxalic acid sold at 100, Elder Street, Govan, on December 7, 1891, to Thomas Allan in my presence. It is labelled "West End Medical Hall, 100, Elder Street, Oxalic Acid, Dr. Lees, Surgeon. Hours 11, 3, and 7." I have got another package, a bottle of laudanum purchased on January 4, 1892, by Thomas Allan, at 100, Elder Street, Govan, and it bears these words, "West End Medical Hall, 100, Elder Street, Govan. Laudanum. Poison. Medium dose 25 drops. Dr. Lees, Surgeon. Hours 11, 3, and 7." These labels were all applied at the time the purchases were made by the person who was serving in the shop. There is no other name than that of Dr. Lees on any of them. I was never a patient of Dr. Lees. Neither the pills I got nor any of the medicines that I got in the shop were for a patient of Dr. Lees.

Mr. Carrick: Perhaps this might be a convenient place to note the objection.

The Sheriff: I have noted, "Respondent objects to the line as above. Objection repelled."

By Mr. Carrick: Dr. Lees is designed in this complaint as a Licentiate of the Royal College of Physicans and Surgeons, Edinburgh; do you know that that is correct?—I believe that is correct.

Up till recently was he a member of the Pharmaceutical Society?—I have no personal knowledge of that.

Did you not admit to me this morning that he was?—No, I said he is not a member.

Did you not say to me that it was within your knowledge that he was a member up till recently?—No.

And never heard he was?—Yes.

Are you not aware that there was a considerable correspondence with him and the Pharmaceutical Society?—No.

Did you never read it?—No.

On the occasion of the visits to the shops which you have referred to, did you see Dr. Lees on any one of these occasions?—Not at any of the shops.

Did you make any other inquiry with the view of ascertaining whether he was the owner of this shop at 100, Elder Street, or not?—Yes, I inquired at the Assessor.

What information did you get?—He said that he could not tell. The name on the Valuation Roll was David Shankland, but he could not say whether David Shankland was the tenant or not.

Did you see the Valuation Roll?—No.

But you were told that it was David Shankland?—I was told that his name was on the roll.

What other steps did you take to ascertain whether Dr. Lees was the owner of the shop or not?—Inquiring among people in the neighbourhood, who all said the shops were Dr. Lees'.

Of whom did you inquire in the neighbourhood?—I cannot recollect, but among others I asked the bootmaker next door to the shop.

Have you cited any person of whom you made any inquiry to attend to-day?—No.

Your information derived from that source was not such as in your opinion warranted their attendance?—It is merely hearsay and not good evidence.

In relation to the shop where is the consulting-room?—I do not know.

Were you never in the shop, 100, Elder Street?—Only in the front shop.

Can you not say where the consulting-room is?—I do not know. I say that there was a back apartment, but whether it is a consulting-room or not I cannot say.

Did you see any other place where a consultation could take place?—No.

Do you not think it is likely that that was the consulting-room?—It might have been.

Is it not probable?—Quite.

Is it not a very common occurrence for doctors to have consulting-rooms in chemists' shops?—I believe it is a common practice in Glasgow.

And is this the first case in which action has been taken for recovery of penalties under similar circumstances?—This is the first case I have had to do with.

The Sheriff: You are not pleading this because Dr. Lees has a consulting-room, but because he is the seller of the goods?

Mr. Salvesen: Yes, he is the seller of the poisons, and so designates himself on all the productions.

By Mr. Carrick (to witness)—But Dr. Lees does not designate himself as the owner of the shop or the seller of the poison in the matter of the pills?—No.

Then the source from which you draw your inference that he is the owner of the shop is derived from supposed facts other than those connected with the sale of these particular pills?—Yes, and also from the name above the door. It is connected with the sale of the pills.

Apart from the position of the name on the door there is no other circumstance connected with the sale of the pills which warrants you in the assumption that he is the owner of the shop?—Not in connection with that sale by itself.

By Mr. Salvesen: With reference to this box of opium pills if Dr. Lees had been given as the seller, and if it had been labelled poison there would have been no charge under the Act?—No.

It is the want of those things that constitutes the offence under this heading?—Yes.

Thomas Allan, sworn, and examined by Mr. Morison, deponed as follows:—On January 9, 1892, I went with Mr. Hill to the shop 100, Elder Street, about 3.28 p.m. Mr. Hill gave me a prescription, and I went into the shop and handed it to Shankland. He said that he would like to make it fresh for me, and asked me if I could call back about four o'clock, and I did so. He told me that he had sent the boy along to the other shop for some pill boxes and he asked me to wait a minute or two, and I waited for a quarter of an hour. That is the box I got. There is on the box "One every four hours when required, No. 15,683." That is all that is on the box. (Shown a number of productions.)

I saw these purchases made. These are the articles and respective labels and wrappers that were round the bottles in question when I got them.

Cross-examined by Mr. Carrick: Did you ever see Dr. Lees at these shops?—No.

Was it Shankland who gave you these pills?—Yes.

Was it he and the girl Macfarlane who gave you the things?—Yes.

Dr. Lees gave you none of them?—No.

You were inside this shop at 100, Elder Street?—Yes.

Did you notice any consulting room?—There appeared to be a room at the back.

Did you understand that to be the consulting-room?—I understood it was.

Duncan McAra, sworn, and examined by Mr. Salvesen, deponed as follows:—I reside at 132, Govan Road, Govan. I am factor for the shop, 100, Elder Street, Govan. I remember when the lease under which the premises are now held was entered into. David Shankland came to me about taking the shop. I agreed to give Shankland the shop at that time if he could produce a cautioner for it. I saw Dr. Lees in connection with the matter. He agreed to become cautioner for the rent, and he signed the missive as cautioner. I thereupon accepted Shankland as tenant. I knew Shankland previously, but was not willing to take him as tenant without a cautioner.

Cross-examined by Mr. Carrick: Who is your tenant?—David Shankland.

Do you make a return to the Valuation Roll?—Yes.

Is that a correct return?—Yes, that is correct.

Valuation Roll now put in.

The Sheriff: It would be more satisfactory to have Dr. Lees in the witness box, and I think that as it is a civil case we should put him in, if the parties choose to take the risk.

John Barr, sworn, and examined by Mr. Salvesen, deponed as follows:—

I represent Mrs. Cossar and I reside at 2, Lilybank Place, Hillhead. I produce the Govan directory; which is that published by the firm to whom I belong. It is the only directory applicable to Govan itself. There is an entry in that directory with reference to Dr. Lees. I find the entry "Dr. D. Lees, 901, Govan Road, and 100, Elder Street," under the heading "Chemists and Druggists—consulting rooms."

Cross-examined by Mr. Carrick: From whom did you receive your instructions to make that entry in the directory?—We did it ourselves. We took the Parlimentary Roll and made up the directory as far as we could, and then we got a staff of men and went round where there was likely to be a removal or anything that caused us to make inquiry. We found that a number of people were so reticent in the way of thinking that there was to be an additional tax put upon them that they would hardly give us the information. If we saw a sign up, we put down the name.

I take it that you got no instructions from Dr. Lees about this?—No; we issued no slip.

Dr. David Lees, respondent, sworn, and examined by Mr. Carrick, deponed as follows:—Are you the tenant of the shops either at 100, Elder Street, or 901, Govan Road?—Certainly not.

Have you ever represented to anybody that you were the tenant of either of these shops?—Never.

Do you obtain any portion of the proceeds of the sale of goods in either of these shops?—Not a penny.

Have you any interest in the sale of these goods in any way whatever?—Not the slightest.

Do you use both of these premises as consulting rooms in the exercise of your profession?—I do.

They are convenient centres in the burgh of Govan wherein your practice lies?—Yes.

Have you ever on any occasion dispensed medicine in these shops?—I have made up some for myself, but certainly not for any of the outside public.

Whereabouts is your consulting room in relation to the shops?—At the back.

With regard to the papers which have been wrapped round the several productions made, did you purchase these?—No, certainly not.

Did you give any authority for the use of your name?—Not the slightest. I gave the use of my name to put down for the consulting rooms—not for these bills, but for the labels if he would put in my consulting hours.

By the Sheriff: Your name is simply put down there to show your consulting hours, but you have no interest in the shops?—Not in the slightest.

And you did not sell these pills?—No.

And you did not intend the bills to hold out that you got any benefit from this shop?—No.

By Mr. Carrick: Your name on the labels is simply there for the purpose of informing the public as to your consulting hours?—Yes.

And there your interest in the matter begins and ends?—Yes.

You were a member of the Pharmaceutical Society?—Yes, until the last year I have been a member for a number of years.

You would be surprised to hear that Mr. Hill does not know that?—I am extremely surprised.

Cross-examined by Mr. Salvesen: Why does your name appear above 100, Elder Street?—I was asked, and I did so in the interest of myself; the more prominent I keep my name before the public the better for my professional practice.

There is no other name except yours?—That is the business of those who own the shop. I was asked if I would allow my name.

And you do not consider that that indicates to the public that it is your shop?—It may in other places than Glasgow, but not in Glasgow; it is a usual practice.

Is it a usual place to put the name of the person who carries on the business?—In many cases there is no name.

But if you saw the name "David Lees," would you assume that was the name of the person who carried on the business?—Not necessarily. If it indicates the consulting hours, it simply means that a doctor is visiting. It keeps my name prominently before the public, which is of importance.

You have it on a good many places?—I have it on the doors, and it is marked "Consulting Room."

Is your private address there as well?—Yes.

Have you seen those bills that are issued in these shops?—I may have seen them, but my attention was never drawn to any printed matter on them.

With regard to the labels, did you know about them?—I knew about the labels. They were done with my authority.

I suppose that you are aware that under the provisions of the Act the name of a seller of poisons ought to appear on the packets containing poisons?—I understand not. If it is a name like "Apothecaries' Hall" there is no name necessary.

But with regard to the box of opium pills to which the charge is now restricted, you are aware that there is no name on that?—I understand that there is no name.

I suppose you are quite familiar with the terms of section 17?—Yes.

Can you explain the words "Sold by Dr. David Lees?"—It is done without my knowledge and authority by David Shankland.

Did you authorise your name to be put on poisons that were sold?—I authorised it to be put on the labels giving the hours at which I came.

With the view of complying with the provisions of

section 17 of the Act?—I maintain that although it is taken off there, that label is perfectly complete. Its description is "West End Medical Hall." It is there to indicate that I am the consulting doctor, and as an advertisement.

In the same way "Sold by" would be an advertisement?—I did not allow it. I would not have allowed it if my attention had been drawn to it.

How long has this been carried on?—It is only within a year that this place was started.

And 901, Govan Road?—It has been carried on for many years.

Have bills of this sort been circulated for many years?—I have no knowledge. I only call there during consulting hours and treat my patients, get paid for them, and nothing else.

You were aware that Shankland was not a qualified man?—I was aware after I discovered it, but not when I went there at first.

And that he could not sell poisons without putting the name of somebody who was authorised to sell?—He could sell poisons under the name "West End Medical Hall," the same as "Apothecaries' Hall." There is no personal name required.

Although there was no qualified person connected with the name that was on the bill?—It is necessary that there should be a qualification.

The Sheriff: Supposing it was "Apothecaries' Hall," would that be sufficient?

Mr. Salvesen: It would not comply with the Act; it would not comply unless there was some authorised person.

The Sheriff: What is the practice with those Apothecaries' Halls? Is there a name?

Mr. Carrick: In the Glasgow Apothecaries' Hall, I get a label headed "Apothecaries' Hall."

The Sheriff: Do you buy poison, Mr. Carrick?

Mr. Carrick: Not as a rule, but if I did I would get exactly the same.

The Sheriff: What is the practice, Mr. Hill?

Mr. Hill: I believe it is not an uncommon practice in Glasgow to label them improperly without the name of the person, but we do not regard that as complying with the Act.

The Sheriff: Never mind that. You mean that it is quite common in practice to label them "Apothecaries' Hall." I only want to get at the practice.

Mr. Hill: Yes, my lord.

Mr. Salvesen (to witness): Did you become cautioner for Shankland?—Yes.

Why did you do that?—Because he came along with the factor and asked if I would do so.

Was this a mere friendly act on your part?—Yes.

For which you received no consideration?—Not the slightest.

Who is the tenant of 901, Govan Road?—David Shankland also.

By the Sheriff: Was there any arrangement between you and Mr. Shankland that you should allow him to use your name on one condition, that you should get the benefit of the place?—The arrangement was that I should get the benefit of the consulting rooms, and that he would personally get all the prescriptions which I prescribed for patients, and he would derive his benefit from that.

But was there not this additional arrangement made that he should get the benefit of your name—you were qualified, and he was not?—He asked me if I would allow my name to be above the door.

The Sheriff: I shall take it this way. Interrogated: Was there an arrangement for the consulting room that Mr. Shankland should be allowed to use your name, depones: I allowed my name to be used in the interests of my professional work.

David Shankland (22), sworn, examined by Mr. Carrick, deponed as follows:—

How long have you been in these shops?—About seven years in the Govan Road shop.

Were you fifteen when you went to the Govan Road shop?—Yes.

How long in the other one?—It is a year last May since I took the other one.

You have known Dr. Lees for three years?—Yes.

You carried on business before that?—Yes.

You were about 19 when Dr. Lees commenced with you?—Yes.

Are you studying for a doctor?—I got through the Preliminary for the Pharmaceutical Society, and I was reading up for the Minor, but unfortunately I took ill, and the doctor said that the studying would affect me too much.

Before Dr. Lees became connected with you, you carried on the Govan Road shop under Dr. Smith and Dr. Mackenzie?—Yes.

You always had a doctor on the premises?—Yes.

And that is a very common practice in Glasgow?—Yes.

Is there any arrangement between Dr. Lees and yourself whereby Dr. Lees derives any benefit from the shop in any shape or form?

The Sheriff: I take Dr. Lees' word on that point.

By Mr. Carrick: A number of printed wrappers have been produced in which you wrap up goods. Did Dr. Lees ever authorise you to put "Sold by Dr. Lees" on these wrappers?—Not that I can recollect, but there is a common practice, in order to advertise the doctor, that the doctor's name is put at the bottom.

Even to say that they are sold by him?—I never knew that "Sold by" was on the bills. I merely got my attention drawn to it yesterday.

By the Sheriff: There is a bill with reference to Beecham's pills, and it has no reference to your shop, but it has "Sold by Dr. Lees" on it. You got the labels from Beecham?—Yes.

Do you mean to say that they put on the words "Sold by Dr. Lees" without any communication to you?—The way it was done was this. In sending to Mr. Beecham and asking him to send us some wrappers and bills I wrote it on an account of Dr. Lees.

What was this professional account that you sent up to Beecham's people?—The ordinary account form of the doctor. I merely wrote on it "Please send some bills."

You used a sheet of the doctor's paper?—Yes, that was a common thing.

Do I take it that the only labels that Dr. Lees consented to were these two?—Dr. Lees, as far as I know, consented to his name being on all the labels

But never to be "Sold by"?—No.

Who is the tenant of 100, Elder Street, Govan?

Mr. Mackenzie: At this stage might I not be allowed to intervene? My client is to be brought up afterwards, and if he answers this question it may incriminate him.

The Sheriff: It does not incriminate him. The essence of the charge against him is that he is the tenant. Question allowed.

Myself.

You pay the rent?—I do.

Who pays for the drugs?—I do.

Have you a batch of accounts here?—Yes.

And they are all in your name?—Yes.

You are willing to produce these if asked?—Yes.

Cross-examined by Mr. Salvesen: You have told us that "Sold by Dr. Lees" orginated through a mistake of Beecham's people?—Yes.

And you have your account paper with Dr. Lees' name on the top of it?—Yes.

Did you invariably use his paper when you wrote orders of that kind?—No.

I find here Edward's Harlene; how do you account for the words "Sold by Dr. Lees" being on the bill?—I suppose I must say the same thing. If I was writing an ordinary letter to Beecham they might put it in my own name.

By the Sheriff: Would you allow me to suggest another way? Dr. Lees' name is above this door, is above the glass door, and a variety of other places; does that place go by the name of Dr. Lees' place, or can you say anything to explain that?—As far as I know in Govan every shop goes by the name of the doctor.

By Mr. Salvesen: You are not registered, and you did not want your name to appear?—I wanted to advertise Dr. Lees.

By the Sheriff: And not to advertise yourself? Now, Mr. Salvesen, what is the meaning of the word "sell?" You have to put the name of the parties selling, and on the facts, I think, as far as I see just now, subject to correction, that Dr. Lees is not the owner of that shop and does not get the profit of that shop, but I think that Dr. Lees had made some arrangement by which he was to get consulting rooms and he was to allow his name to be used. Is that the meaning of the 17th section?

Mr. Salvesen: I think your lordship has really explained the 17th section. The reason why you want the name and the address is so as to have someone against whom you may proceed. If a fictitious name and address are put upon labels of poisons, surely the mere fact that the person is not deriving the actual profits of the sale will not deprive him of the character of seller within the meaning of that Act. He is not the seller. He holds himself out to be the seller, and I submit that that is enough. He becomes the seller within the meaning of the Act.

The Sheriff: Let us go back for a moment. What is the meaning of the seller? He is the party bound by the sale. Is he not the party bound to deliver the sales? You do not make your contract with him; you make your contract with another.

Mr. Salvesen: But the 17th section is rather different from the 15th section, because the 15th section makes the offence of selling the poison one with which the party who actually carries on the sale may be charged, and the 17th section goes further. About the middle of the section are these words: "And for the purpose of this section the person on whose behalf any sale is made by an apprentice or servant shall be deemed to be the seller." The parties are in this dilemma, that if Dr. Lees did not commit this offence then Mr. Shankland did so.

The Sheriff: Then you can fine the seller. The question is whether you can fine Dr. Lees?

Mr. Salvesen: The difficulty with the public prosecution was to find the seller, and the only way was by taking the evidence which he obtained from the premises themselves and from the labels which were issued from the premises.

The Sheriff: Rest assured that there will be no expenses against you.

Mr. Salvesen: Then I confess that I feel the difficulty that your lordship has indicated, because Dr. Lees' evidence is not contradicted in any way, and one must take it as proving the fact that he has no connection with this business, but he has chosen to put himself forward in such a way as would suggest to any person that he was really proprietor of the shop.

The Sheriff: You cannot go the length of asking for expenses.

Mr. Salvesen: No, I do not; but I certainly put forward these facts as showing that the complainer has not acted unreasonably in bringing the complaint against Dr. Lees.

Mr. Carrick: With regard to the question as to who is the seller, I think the case of the Pharmaceutical Society *v.* Wheeldon proves conclusively that the seller is the person who actually hands over the goods sold. In that case it was held——

The Sheriff: I am quite with you there. Are you asking for expenses?

Mr. Carrick: Yes, certainly. I am brought into Court with three charges, and yesterday afternoon we received information that two of them would not be proceeded with. I consider that in spite of all this it is a very unwarrantable act of the Pharmaceutical Society. As Dr. Lees told your Lordship, he was up till eighteen months a member of that Society. He is also a gentleman who possesses all the qualifications necessary for the practice of medicine in this city. He is not to be lightly brought into Court and his name to be brought before the public in connection with this matter unless there is serious ground for a charge of the kind, and what I submit to your lordship is this, that with a little inquiry on the part of Mr. Hill and his associates they would have at once seen that there was no ground for the complaint. They precognosced Mr. M'Ara, who is their witness. They proceed to the Land Valuation Office, and they find on a perusal, or are told by the assessor there, that Mr. Shankland's name was on the Valuation Roll and Dr. Lees' was not, and they thereupon proceed to Mr. M'Ara, and they ascertain by the production of the agreement which he has with him, that Dr. Lees is neither more nor less than a cautioner for the rent, which only amounts to £13 per annum, and I submit that having brought this respondent into Court upon three charges, two of which they have seen fit at the last moment to drop, your lordship must deal with this question of expenses upon this principle, that "what is sauce for the goose, is sauce for the gander," and give me the £3 which you have allowed in the other cases.

The Sheriff: That there were three charges, two of them withdrawn, does not seem to me to meet the question. There has been the same expense with this as with all the rest. I do not think I can convict Dr. Lees, but on the question of expenses, had I the power to do it, I would give them against him, because, as I read the evidence, I think that this is a very bad case. I think it is a case of a doctor taking advantage of his medical profession to cover an uncertificated druggist. However, I have no power to give expenses to the prosecution.

The complaint against David Shankland bore that he was guilty of four charges under sections 1 and 15 in (1) that he sold oxalic acid to Thomas Allan on December 7, 1891, at 100, Elder Street, Govan; (2) that he sold red precipitate to J. Rutherford Hill on December 9, 1891, at 901, Govan Road; (3) that he sold laudanum to Thomas Allan on January 4, 1892, at 100, Elder Street; (4) that on January 9, 1892, at 100, Elder Street, he sold to Thomas Allan a quantity of opium as an ingredient in pills, he not being a duly registered pharmaceutical chemist, or chemist and druggist, within the meaning of the Pharmacy Act.

Mr. Daniel Mackenzie appeared for the respondent, who pleaded guilty.

Mr. Salvesen: I ask for a similar penalty as your lordship imposed in the case of John Neill. This case is no better.

The Sheriff: This gentleman has two shops. Supposing I impose that penalty in regard to one shop, how would you act in regard to the other?

Mr. Salvesen: I do not propose to ask more than expenses. In the previous case the penalty was not so severe.

The Sheriff: This penalty comes to £15 10s.

Mr. Salvesen: Yes, the same as in the case of John Neill. Unfortunately, this is the worst case because Christina Shankland sold poison in one of the shops on three different occasions, and then another girl, Agnes Macfarlane, sold on the fourth occasion. Altogether there are eight charges against David Shankland, and I submit to your lordship that he gets off very well if only a penalty is imposed against four.

The Sheriff: He has got two shops; what is the size of them?

Mr. Salvesen: I think they are doing a fair business. He seems to have been in business for a long time and to find it profitable.

Mr. Mackenzie: Your lordship has had the whole of the facts connected with this case in the one which has been concluded. There are, no doubt, two shops. One is rented at £13 and the other at £30; he is very anxious to get rid of the latter.

The Sheriff: It is quite evident that Shankland should pay the penalty and not the poor girl, and supposing I make a small penalty here, and find her liable, does Shankland pay?

Mr. Mackenzie: I do not know that I can ask your lordship to make it less than in the first case, but I think it is sufficient.

The Sheriff: And the result will be that the girl will not be made to pay?

Mr. Mackenzie: Yes.

The Sheriff: Then, I make this the same as the first, £5 for the first offence and £2 10*s*. for the second, third and fourth, and £3 of expenses, with two months to pay.

The complaint against Agnes Macfarlane, 100, Elder Street, Govan, bore that she had been guilty of an offence within the meaning of the 1st and 15th sections of the Pharmacy Act, 1868, in that she unlawfully sold to Thomas Allan a quantity of laudanum, being a preparation of opium, she not being a duly registered pharmaceutical chemist, or a chemist and druggist within the meaning of the Act. The Respondent pleaded guilty.

Mr. Morison: There is only one charge, and we shall be quite content with £3 of costs and 1s. of a penalty, in order to get a conviction.

The Sheriff: Does Mr. Shankland pay your expenses?

The Respondent: I do not know.

The Sheriff: I think that £15 10s. is a very large penalty for Mr. Shankland, and I think, in this case, I will impose a nominal penalty of 1*s*. without costs. You must take care what you are doing, and not bring yourself into trouble. I am surprised that there are so many cases of uncertified people selling poison. I am sure people might certify themselves and be at liberty to sell.

The complaint against Christina Shankland, 901, Govan Road, Govan, bore that she had been guilty of an offence within the meaning of the 1st and 15th sections of the Pharmacy Act, 1868, in (1) that she sold to Thomas Allan a quantity of laudanum on December 7, 1891; (2) that she sold to Thomas Allan a quantity of liniment of opium and chloroform, as ingredients in a mixture, on January 9, 1892; and (3) that she sold oxalic acid to Thomas Allan on January 29, 1892.

Mr. Salvesen: It has been intimated that the respondent has been taken suddenly ill, and under these circumstances I am instructed for the complainer to say that he does not propose to go further in this case, and the complaint will therefore be dropped.

The Court then rose.

Provincial Transactions.

BRIGHTON JUNIOR ASSOCIATION OF PHARMACY.

The annual meeting was held on Wednesday evening, March 30.

The Honorary Secretary's report and Treasurer's balance sheet were presented and passed, both being very satisfactory. Although there was a slight falling off in members, there was a good increase in honorary members, which more than made up for loss of fees from members. The dinner held during the autumn session was a great success, as was also the ball held during the winter session; it being the largest gathering of young pharmacists and their friends ever held in Brighton. There had been two prizes offered by the senior Association, to be competed for by the unqualified members; but as so few competed, only one was awarded—that to Mr. T. Rose.

The following officers were elected for the session 1892-93:—President, A. E. Colman; Vice-President, C. G. Yates; ex-President, W. H. Kilby Pears; Treasurer, Stanley Smith; Honorary Secretary, A. P. Nosworthy. Council:—J. Bennett, C. A. Blamey, S. Emms, H. Rigden, Stanley J. Smith, A. Wheeler.

LIVERPOOL CHEMISTS' ASSOCIATION.

The members of the Liverpool Chemists' Association and their friends, according to annual custom, dined together last week to the number of close upon a hundred. As a new departure the event took place in the Adelphi Hotel, where a generous repast was provided under the care of Mr. Mercanton, the manager of the hotel.

Mr. J. S. Ward, President of the Association, took the chair, and among other gentlemen present were Messrs. J. Bain and J. Hocken, Vice-Presidents; Richard Parkinson, Hon. Treasurer; A. S. Buck and J. Smith, Hon. Secretaries; M. Conroy, E. Davies, F.I.C., J. Overton, J. J. Smith, C. Symes, Ph.D., and W. Wellings, members of the Council of the Association. Among the guests were Drs. Nevins, Carter, W. G. Moore, O'Flaherty, and James.

The toast of the evening, the Liverpool Chemists' Association, was proposed by the Chairman, who spoke of the long and brilliant career of the Society, which was now at the end of its forty-third season. The Association, he said, had done good and useful work to pharmacy and pharmacists, not only in the district but throughout the country, and he impressed upon all the members the desirability of promoting the interests of the Association.

A number of other toasts followed, inclusive of "The Pharmaceutical Society of Great Britain," "The Medical Profession," "The Wholesale Drug Trade," etc.

The proceedings included an extensive and enjoyable musical programme, the entertainers in this department including Messrs. W. H. Atkinson, J. Jenkinson, J. Bain, W. Max Schroeder, and Leslie Harris, the last-named officiating as accompanist, in addition to contributing some enjoyable comic songs.

LIVERPOOL PHARMACEUTICAL STUDENTS' SOCIETY.

The twelfth and last meeting of the present session was held on Thursday, the 7th inst., Mr. H. Wyatt, jun., President, in the chair.

Mr. T. S. Tabor read a paper on "Photography," in which he advocated the pursuit of the art by chemists, as only by this means could the retailing of photographic materials be made a profitable adjunct to the business of a pharmacist. After briefly recounting

the history of the art Mr. Tabor described the camera and its various parts, and recounted the various steps required in taking a picture, laying stress on methodical habits to ensure successful work. Mr. Tabor exhibited a camera made by himself, also some beautiful work of his own, including a photograph of the "ghost" of a prominent member of the Society, taken by the Ilford iso-chromatic plate.

A vote of thanks, proposed by Mr. T. S. Wokes and seconded by Mr. R. H. Mitchell, was accorded to the lecturer, after which an excellent flash light photograph of the audience was taken and developed.

It is proposed to hold a social reunion about the end of the month, due notice of which will be given.

Proceedings of Societies in London.

SOCIETY OF CHEMICAL INDUSTRY.

London Section.

A meeting of the Section was held on Monday, April 4, Mr. T. Tyrer occupying the chair. After the transaction of some formal business concerning the election of the Sectional Committee for the ensuing session, and the announcement that the annual general meeting of the Society had been definitely fixed to take place in London on July 20, 21, and 22, Dr. Alder Wright read his paper on "Specific Gravity Determination for Practical Purposes." He reviewed, in the first place, the causes of confusion that frequently arise from the failure to distinguish clearly between "density," "relative density," and "specific gravity," pointing out that by the first named is meant the mass of a unit volume, a quantity perfectly distinct from the weight of a unit volume. Neglect to convey a clear idea of the conditions under which a given specific gravity is taken, and the precise standard of comparison, often leads to apparent discrepancies where the actual determinations are accurate. Taking in order the methods in common use, the author discussed the corrections necessary for the specific gravity bottle or pyknometer when complete exactitude was sought, and stated that its chief disadvantage was the impossibility of preventing the liquid expanding and flowing out of the perforated stopper when the determination was performed at a lower temperature than that of the balance case in which the weighing was performed—a state of things which was sometimes inevitable. A better form of apparatus was that provided with a long, narrow neck, graduated with a millimeter scale, the value of the readings of which was determined once for all. This allowed of expansion without overflow. A pyknometer of this description, fitted with a thermometer blown in one piece with the stopper of the side tubulus instead of being merely ground in, as is often the case, was exhibited. A further advantage of an apparatus with a graduated stem was that by taking readings at different temperatures and allowing for the expansion of the glass, the co-efficient of expansion of the liquid could be deduced with one filling of the instrument. Passing to the method of immersion in its most popular form, the author criticised the Westphal balance as ordinarily made and used. Of those sources of error which were characteristic of the instrument, the probability of inaccurate graduation of the beam and of error in placing the rider weights at their allotted divisions were the most important, while when used for hot liquids the expansion of the longer side of the beam could not be ignored. With regard to the determination of specific gravity by means of the hydrometer, the instruments commonly sold always needed checking before being taken into use, and even then the degree of accuracy obtainable by their means was by no means great. Dr. Wright described a form of hydrometer in which readings were taken before and after the addition of a standard weight, the alteration in the length of the stem immersed being read on a millimeter scale either engraved on the stem, or on the immersion jar, in which latter case a fiducial mark on the instrument itself was necessary. The paper was illustrated by specimens of the various instruments mentioned. At its close another form of instrument for taking specific gravities of solid bodies with rough accuracy was exhibited.

Reviews and Notices of Books.

Burdett's Hospital Annual and Year-Book of Philanthropy, 1891-1892.*

This book contains a wonderful amount of most useful information relating to everything connected with hospital administration. It also contains some valuable special chapters, relating to such things as nurses, hospital book-keeping and dispensing, with some interesting facts concerning lady dispensers and reference to the institutions where such are employed. It also contains instructions for those ladies who may seek to become dispensers. Indeed, the book teems with information not only relating to British hospitals, but Colonial institutions as well.

Saint Bartholomew's Hospital Reports. Vol. xxvii. 1891. Edited by Dr. W. S. Church and W. J. Walsham.†

This volume of reports contains some valuable papers. Among the more interesting may be mentioned "A Case of Malignant Endocarditis, with Cerebral Embolism and Subclavian Aneurysm," reported by Dr. Ormerod; "A Research on Diabetes; with a Note on the Pathology of the Pancreas," by Dr. Tylden; "The Treatment of Hæmoptysis," by Dr. Vincent Harris; and "The Prognosis of Gastric Ulcer," by Dr. Habershon.

There are also some papers of surgical interest by other members of the St. Bartholomew's staff.

Recent Materia Medica. By T. Harwood Lescher. Fourth Edition.‡

The fact that four editions of 'Recent Materia Medica' have been issued in eight years is in itself an indication of the estimation in which this little work is held. Owing to the rapid increase in the number of chemical and botanical remedies brought into notice every year, the number of pages has increased from 92 in the third edition to 115 in the present one. Including the additions to the British Pharmacopœia in 1891, altogether about one hundred remedies are now added. A table of synonyms of American and other herbs, with the names and doses of the resinoids derived from them, is also a new feature. The value of the book for students and others would probably be increased by careful revision in a future edition, and if the natural orders were brought into conformity with Bentham's 'Genera Plantarum,' which certainly must remain for many years to come the standard work on systematic botany. In such a book chemical formulæ are probably not of much use, but if they are inserted they should be correct, and in several instances that is not the case. The other errors that have come under observation have relation to the names of substances used as adulterations and substitutions. These do not

* London: "The Hospital" (Limited), 140, Strand, W.C. Crown 8vo. Pp. i. to clxxxviii. and 400. 3*s.* 6*d.*

† London: Smith, Elder and Co. Demy 8vo. Pp. i.-xxxvii. and 342.

‡ London: J. and A. Churchill, 1891.

affect the value of the work for ready reference as to uses and doses of new remedies. For that purpose it will be exceedingly convenient, and from its concise statement and convenient form it will effect a great saving of time to those who use it.

BOOKS RECEIVED.

REPORT OF THE PHARMACY BOARD OF VICTORIA. 1891. Melbourne: A. H. Massina and Co.

EXPERIMENTAL CHEMISTRY. By JOHN CASTELL-EVANS, F.I.C. London: Thos. Murby. From the Publisher.

TABLE FOR THE DETECTION OF POSITIVE RADICALS. By JOHN CASTELL-EVANS, F.I.C. London: Thos. Murby. From the Publisher.

DESCRIPTIVE LIST OF STANDARDS OF WEIGHTS AND MEASURES. From the Board of Trade.

HANDWÖRTERBUCH DER PHARMACIE. Part II. Edited by A. Brestowski. Vienna and Leipsic: Wilhelm Braumüller.

THE FUTURE WATER SUPPLY OF BIRMINGHAM. By THOMAS BARCLAY. Second Edition. Birmingham: Cornish Brothers, 37, New Street.

THE MEDICAL REGISTER FOR 1892. London: Spottiswoode and Co. From the Medical Council.

THE DENTISTS' REGISTER FOR 1892. London: Spottiswoode and Co. From the Medical Council.

FORMULAIRE DES MÉDICAMENTES NOUVEAUX ET DES MÉDICATIONS NOUVELLES. Par H. BOCQUILLON-LIMOUSIN. Third Edition. Paris: J. B. Baillière et Fils. 3 fr. From the Publishers.

ELEMENTS OF MATERIA MEDICA AND THERAPEUTICS. By C. E. ARMAND SEMPLE, B.A., M.B., M.R.C.P. London: Longmans, Green and Co. From the Publishers.

THE NURSING DIRECTORY for 1892. London: The Record Press, Limited, 376, Strand, W.C. From the Publishers.

Obituary.

Notice has been received of the death of the following:—

On the 28th of March, Walter Edward Haden, Pharceutical Chemist, London. Aged 33 years.

On the 30th of March, Samuel Gilbert, Chemist and Druggist, Sandbach. Aged 73 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith. Matter intended for publication should be written on one side of the paper only.*

PHARMACEUTICAL SOCIETY v. DR. LEES.

Sir,—I have every respect for the legal knowledge and decisions of Sheriff Birnie, but on a question of medical or pharmaceutical ethics he can scarcely be regarded as a better authority than the majority of the educated public. Even admitting, however, the truth of his opinion that I had, intentionally or otherwise, been covering an unregistered druggist, and shielding him from the consequences of his illegal acts, I have at least the consolation of knowing that I am even less blamable than the great majority of chemists throughout the country (probably including members of the Pharmaceutical Council) who, in employing unregistered assistants for the selling and dispensing of scheduled poisons, are not only aiding and abetting infringements of the Pharmacy Act, but are receiving pecuniary profit from these transactions.

Probably if Sheriff Birnie had but known these facts he would have treated more leniently those eight or nine scapegoats (not forgetting myself) who had been selected for punishment by the Pharmaceutical Society.

At all events, I think there is little wonder that many like myself have ceased to value an Act which, in most cases at least, is only set in motion to satisfy the jealousy or spite of neighbouring informers, and leaves exempt those in high places who are the greatest transgressors.

When the Pharmaceutical Council has shown a real determination to carry out the provisions of the Act honestly, fearlessly, and impartially, then, but not till then, will medical men and others recognize the equity of the law and the claims of those who administer it.

Govan. DAVID LEES.

THE OPIUM OF INDIA.

Sir,—In reference to Dr. C. J. H. Warden's reply to my remarks concerning opium on p. 688, will you permit me to point out that he has raised an entirely different question? My question was why should not India produce an opium that resembles Turkey opium in appearance and in percentage of morphia closely enough to compete with, and supersede Turkey opium in the markets of the world?

Dr. Warden replies to my query by raising quite a different question, viz., Is Indian opium inferior to Turkey opium in medicinal activity? I have not, as Dr. Warden suggests, "confused the two economic uses to which opium may be put—as a drug as a whole—and for the preparation of alkaloids." I have not, that I am aware, even mentioned its use as a source of morphia. I presume that the cheapest opium, from any country whatever, containing the largest relative proportion of morphia would best serve the purpose of the morphia manufacturer, and that Indian opium would answer as well as any other, if as cheap in proportion. I used the term "medicinal" opium in contradistinction to "smoking" opium, in which the flavour is of the greatest importance (*Chem. News*, vol. 65, p. 134). That Indian opium *could* be prepared so as to resemble Turkey opium in appearance and character, I gather from a remark in 'Pharmacographia Indica,' p. 106, where it is stated "a light-coloured, chestnut or reddish-brown variety of the drug, which is free from *pasewha* will as a rule be found to be distinctly granular." This light-brown colour and granular appearance are exactly the features which Turkey opium presents. With respect to Dr. Warden's statement that "Indian, though containing less morphia than Turkey opium, is yet administered in the same doses as the Turkey drug," I can only remark that according to 'Pharmacographia Indica,' p. 91, anhydrous Indian opium contains 3·86 to 4·92 per cent. of morphia, and that the Turkey opium used in this country in medicine averages as imported about 12 per cent. of morphia. If this difference in alkaloidal contents is of no consequence in India, it certainly is not so in this country, for I have only to-day heard of a case in which a dose of Dover's powder prepared with the reduced dried opium of P.B. strength (10 per cent. morphia) failed to produce the effect that it invariably produced when the powder was prepared with the powdered opium of commercial strength (12–15 per cent.). This, however, is apart from the question I raised. Dr. Warden admits that there is a prejudice against Indian opium which prevents its replacing Turkey opium for medicinal purposes in the markets of the world. My question once more reiterated is: Why does not India meet the prejudice and prepare an opium resembling that of Turkey in all respects, and thus establish a legitimate industry less objectionable than that of opium for "smoking" purposes?

E. M. HOLMES.

SYR. FERRI. QUININÆ ET STRYCH. PHOS.

Sir,—The liq. ferri phos. referred to is prepared by direct action of phosphoric acid upon iron wire. It is filled into 2 ounce bottles, each wrapped in coarse paper, and kept in a dark cupboard until required.

H. BARTON.

Erratum.—Page 831, column 1, line 21 from bottom, for *dilute* read *absolute*.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Batchelor, Maben, Mason, Hill, Stead, Ball, Alcock, Butler and Tanner.

NOTES ON PHARMACEUTICAL MICROSCOPY.

Anatomical Characters of the Genus Clusia. G. M. J. Vesque finds that the leaves of plants in the genus Clusia never have stomata on the upper surface, and that hairs are never present on them. The stomata on the lower surface have two lateral accessory cells parallel to the ostiole, and although these are sometimes hidden under the stoma they are always present. The epidermis is composed of flat cells with rectilinear, never with undulated, walls. Raphides when present are always in the form of sphæraphides. The hypodermis consists of rows of cells, rarely reduced to one or none, towards the apex of the leaf. Resiniferous canals in the parenchyma of the petiole and the midrib pass singly into the mesophyll, which they run through at two different levels. They are in oblique lines which cross the secondary nerves, often at an acute angle. The bundles of the secondary nerves are surrounded with a fibrous sheath, which is continuous or nearly so. The cells of the lower part of the mesophyll often possess thick walls and probably constitute an aquiferous tissue. The bundles of the midrib are rarely continuous, dividing into a lower grooved and an upper flat ribbon. The latter is inverted, *i.e.*, the liber above frequently separates into a large number of bundles, forming a flattened ring above and occasionally surrounding some included bundles. It is always sustained behind, at least, by masses of fibre. The bundle of the petiole is continuous, grooved, involute, or annular at the margin, and rarely accompanied by free marginal solitary or twin fascicles (*Journ. de Botanique*, vi., p. 81).

Adulteration of Lycopodium. Dr. Whelpley says that lycopodium is best examined with a power of about one hundred diameters. Specimens show better when examined by reflected light than when mounted in fluid and transmitted light passed through. Both methods should be adopted, however, for comparison. Macerate in glycerine for some weeks and mount in glycero-gum (*ante*, p. 327) for the latter. Talc, gypsum, resin, dextrin, starch, sulphur, pine-pollen, sand, turmeric, and various sporules have been found as impurities (*Amer. Monthly Micros. Journal*, March, 1892).

Dehydrating and Hardening Tissues. The *Journal of the Postal Microscopical Society* describes a convenient form of Schultze's apparatus, recommended by M. B. Thomas for dehydrating and hardening plant tissues prior to embedding in collodion for section-cutting. A plaster of paris diaphragm perforated to allow glass tubes to pass through is fixed about the centre of a jar. The tubes are provided with chamois leather diaphragms, as well as rubber bands to permit of their being kept at any desired depth. The tissues being closely packed in the tubes are covered with 50 per cent. alcohol. The tubes are then placed in position in the jar, which contains 95 per cent. alcohol, so that the two liquids are level. The strength of the latter is kept up by occasionally adding some calcium chloride to absorb water. It is stated that the process may be completed in from twelve to twenty-four hours.

Bleaching Vegetable Sections. Cole's method of preparing sections for staining is to bleach by means of solution of chlorinated soda. The length of time will vary according to the condition and nature of the tissues. Wash several times in fresh water and finally with water containing 8 or 10 drops of nitric acid to each half-pint. Transfer sections to alcohol for an hour before staining (*Methods of Microscopical Research*, p. lx.).

Stains for Vegetable Tissues. Dr. E. Vinassa has investigated the value of aniline colours for staining vegetable tissues, and divides them into three groups; those that stain parenchyma only,—safranin, congo red, benzopurpurins, etc.; those affecting lignified tissues, collenchyma, vessels, and nuclear sheaths—vesuvin, victoria green, chrysoidin, violet, methyl green, fuchsin, etc.; and stains that merely differentiate, such as victoria blues B, RRRR and BB, which colour the thickened cells darker than the surrounding tissue, and thus render them more conspicuous. To ensure sections being well stained, all protoplasm, etc., must be got rid of. This is effected by boiling with soda lye, washing with much water (acidified with acetic acid if necessary), and then allowing to drain. Afterwards immerse in a ½ to 1 per cent. lukewarm stain solution for two or three minutes, and again wash until the water runs clear. For double staining first put sections in the stain affecting the lignified tissue, thickened cell-walls, etc., wash well and transfer to stain for parenchyma. This should be heated to 100° C. and rendered slightly alkaline. Colours which are fast on cotton were found to stain parenchyma, whilst those that dye wool or silk directly stain the thickened cell-walls, etc. Suitable mordants (tannin, acetate of lead, etc.) for fixing the colours must be found by experiment. (From abstract in *Microscopical Bulletin*, viii., 6, p. 41).

Staining Tubercle Bacilli. A modification of Fränkel's method consists in dissolving 1 part of fuchsin in 100 parts of a 5 per cent. solution of carbolic acid, adding 10 per cent. of absolute alcohol, and heating the fluid in a watch-glass to near the boiling point. Float the prepared cover glasses in the stain for two minutes, remove, and *immediately* immerse for one minute in a solution of 1 to 2 parts methylene blue in 100 parts of 25 per cent. sulphuric acid. Then flood with water, dry, and mount in balsam (*Merck's Bulletin*, vol. v., 3, p. 168).

Cements for Slides. The "Gram—Rützou" composition recommended by Poulsen (*Botanical Micro-Chemistry*) appears to grow in favour. It consists of canada balsam 50 gm., shellac 50 gm., absolute alcohol 50 gm., and ether 100 gm. When mixed, dissolved, and filtered, evaporate over a water-bath to the consistency of thick syrup. Dallinger, in his new book, makes the useful suggestion that cement rings should be so finished that, when the objects are examined by means of immersion objectives, the rings will be unaffected by the cedar oil used as immersion fluid. Hollis's liquid glue or a varnish made by dissolving shellac or good sealing-wax in strong alcohol will effect the desired purpose when thinly brushed over the edges of mounts, however closed and finished. The *Scientific American* gives a recipe for a transparent cement composed of dammar 5

drs., mastic 3 drs., hardened canada balsam 3 drs., chloroform and rectified turpentine each 1 fl. oz. Dissolve and filter.

Biological Water Analysis. An instructive note, by Geo. W. Rafter, deals with the microscopical as distinct from the bacterial analysis of water. The former deals with all forms of life that are *easily* studied in all their phases by use of the microscope, including algæ, larger fungi, sponges, infusoria, rotifers, etc. The various forms of apparatus used are figured and described, and the technique clearly explained. Special attention is devoted to refinements in enumeration and measurement, and the work is placed upon a thoroughly scientific basis (*Amer. Monthly Micro. Journal*, March, 1892).

Preparation of Nutritive Agar. In the cultivation of bacteria the preparation of the culture medium is a matter of some importance. Agar is found to possess exceptional advantages for this purpose in many cases, and its preparation and sterilization, together with the preparation of beef-infusion, peptone, etc., are described in a practical manner by V. A. Moore, of the U.S. Department of Agriculture (*Bacteriological World*, through *Int. Jour. Micros. and Nat. Science*, II., 13, p. 457).

SYMBIOSIS AND SYMBIOTIC FERMENTATIONS.*

BY PROFESSOR MARSHALL WARD, SC.D., F.R.S.

(*Continued from page* 797.)

Now I want to pass to one or two more instances of parasitism and symbiosis, and this time to examples of rather a different class—namely, fungi which are parasitic upon higher plants. For among these parasitic fungi there are some very remarkable kinds of symbiosis indeed. For a long time they were looked upon as cases of crude parasitism; in fact, until quite recently parasitism was necessarily associated with the idea of injury. There may be injury in the end, and so there often is here; but temporarily some of them show most extraordinary cases of symbiosis. There is one—an example of undoubted parasitism of a rust-fungus on a higher plant. It is a destructive parasite adapted to live in leaves, but even this takes six or eight weeks to destroy the leaf, and there is no getting over the fact that during part of the time the fungus is living in the leaf, individual cells of the latter are benefited so far as intense living can be regarded as a test; for they become of a brighter green, and look like richer tissues altogether. That, however, is very short lived, and the plant as a whole does not get the benefit of it; but it is a case of local symbiosis, and I must maintain that, up to a certain degree, this is a case in point. These rust fungi show much more pronounced instances of symbiosis even than this; although they nearly always will be found to be eventually, and of necessity, plant-killing parasites. Take the case of a very well known garden plant, the house-leek. Now this plant, when its leaves are attacked by a certain rust-fungus, presents a very different appearance to the normal; and cases have been known where a plant which is attacked by such a fungus has actually been distinguished as a new species. It was abnormal, because attacked by a fungus living in the cells of the leaves. There are cases far more peculiar, and yet the leaves are not killed, or at least not forthwith. There is unquestionable symbiosis for the time being. But here is a much more remarkable instance. Certain firs are frequently invaded by fungi, and when that is the case their branches take different contours, owing to changes in the buds that come out from the side. Instead of growing out horizontally, as the normal branches should do, the affected shoot grows erect and developes its leaves all round. Secondly, the leaves are different in shape, in size, in thickness, and the transverse section is different. Thirdly, whereas these leaves are normally persistent on the tree for a period of from two to three or many years, these affected leaves fall off annually, and yet the branches are not killed: until, eventually, you have branches which look like, and which have received for many years the name of, witches' brooms. These witches brooms are simply extraordinarily well-defined bunches of branches, the extra luxuriant branches being induced by the irritating action of this fungus. The fungus may go on living for years and years in that way; and although, in the end, if you have your silver fir trees caught by this fungus at all points, the whole system will suffer for many years, at any rate, the damage is practically nothing.

There is a most remarkable group of fungi, which we must admit in the end are among the most destructive parasites that we know. One species of this fungus grows in maize plants, and many of its relations attack our cereals, converting the tissues of the grain into black, powdery masses of spores. You know them better, no doubt, as the smuts of corn, etc., which are very common indeed all over the country. I want to emphasize this point; that during the whole period of the vegetative life of the infected corn, from the period when it germinates to the period when the flower begins to open, it has a parasitic fungus in its tissues, growing up with it all the time, and yet it is almost impossible to make out the whereabouts of the fungus, even with the most careful preparation. It does not in any visible way injure the plant; but as soon as the young seeds begin to swell, then the fungus takes a bitter revenge, as it were, on the host, which has kept it in due check for so many weeks. Nevertheless, for three or four months you cannot look upon it as anything but a symbiotic combination between the plant and the fungus. They must have so arranged matters between them that the balance is neither on one side nor the other; nay, in some cases I am not at all sure that, for a few weeks, the tissues of the plant do not actually benefit from the stimulating action of the parasite. That, of course, is mere hypothesis.

One more case and then I will leave this series. In certain plants of the bilberry kind, Woronin has lately discovered that a large proportion of the fruits become barren and turned into black, mummy-like masses; all these mummified fruits are filled with the mycelium of a fungus known as *Botrytis*, among other names. The point of interest to us is this. Regarding these fungi Woronin says that when he collects specimens of them and allows them to stand awhile, they emit a distinct smell of almonds. They are attractive to insects and insects carry them away. These insects do not seem to care any more about them; but they simply go rummaging about among flowers, as is the manner of their kind, and in the usual way carry pollen from one flower to another. They therefore carry both pollen and Botrytis-spores to the stigmas of the bilberry flowers, and these germinate there. When the pollen tubes and Botrytis-hyphæ get there, they race one another down the tissues of the style, the juices of which serve them for nourishment, and finally the fungus wins, enters the growing ovules and feeds upon the endosperm. Having strengthened itself in that way, the mycelium now extends through the tissues of the ovary. It carries, in fact, everything before it. I think that you will agree that this is again a very remarkable case of temporary symbiosis.

Very many trees are found to have on their roots swellings of peculiar kinds. The roots of these trees

* From the 'Transactions of the Institute of Brewing.'

are so covered with these fungus-hyphæ, that it is quite impossible for the root-hairs to develop beneath the cover of fungus mycelium and to act as normal root-hairs—the thing is inconceivable. In very many cases these fungus-covered roots are found to be attached to organic substances in the soil, by means of the hyphæ; and on general grounds it seems difficult not to accept the view that they break up these organic substances in the soil. If this is so, we have organic materials of various kinds set free for the roots. The difficulty which comes in, and which is not entirely solved, is this. Frank says they break up these materials into various soluble ingredients, and then the fungus takes up the solution and hands it on to the tree. Frank wants us to believe that in the case of ordinary forest trees these fungus roots are essential, because the fungus alone can hand on to the tree certain materials which would not have got there by themselves. The other side of the question is, that the root allows the fungus to penetrate a certain distance into its tissues. This much is certain, that this mycorhiza is a very much commoner phenomenon that one would have believed five or six years ago. We find them through whole natural orders; they are very common on oaks, beeches, and many of our forest trees; they are found on pines; and it is a curious fact—I do not know whether it will bear so much stress being laid upon it as some have supposed—that many plants which have the mycorhiza grow in poor or sandy, or moor soil. For instance, the Vacciniums, the Pyrolas, the Ericas, etc., etc. At the same time, it has often struck me that there is some suspicion of contradiction in the two facts, that on the one hand the mycorhiza is of use to break up different organic materials in the soil, and on the other, that they are found on such poor, sandy soils. Nevertheless, there are ways out of that difficulty.

Not to be confounded with these mycorhizæ are certain tubercules or nodules found on the roots of other plants. It is not an uncommon thing to find structures such as a grape-like mass of swollen rootlets. If you cut into these rootlets you find a curious and very advanced fungus, which has been named *Schinzia*. There is no question as to the relation between the fungus and the root here. Originally, the fungus enters the young root-tissue in a state of growth at a time when it would have needed nutritive materials, and would then cease growing; the fungus, however, stimulates the cells to more continuous activity; they grow larger and divide oftener, and so the swelling results.

Much the most important of all these cases is that of the nodules on the roots of our peas, beans, vetches, clover, etc. These leguminous plants have such nodules on their roots, as a normal condition of events. The interior of the nodule shows the presence of slightly modified root-tissue, with a quantity of fungus-like hyphæ traversing it. These swollen cells are full of minute bodies, which are so like bacteria that they have received the name of bacteroids—that is, bacterium-like bodies. Now these bacteroids are really formed by these fungi-hyphæ, which enter into the tubercle. At certain periods the hyphal filaments are found passing down the root-hairs into the tissues. The only point I want to insist upon is this: those tubercles on the roots of the Leguminosæ are caused by the presence of these fungus-hyphæ. There is also not the least doubt about it that these bacteroids are distributed in the soil around when the tubercle is destroyed. My point is established by showing you that the tubercles themselves are due to the interactions between the fungus and the root: that is to say, the fungus is living symbiotically at the expense of the contents of the cells of the roots of the leguminous plant. Another point is the recent connection of these facts with another class of facts—namely, the increase of nitrogenous materials in the Leguminosæ themselves. All I want to do, however, is to give you illustrations of symbiosis; and this is unquestionably an excellent case. Whether the two sides of the ledger are balanced exactly is another matter, as also is the manner in which the balance is struck; but there can be no question about it, that the tubercles are not only not detrimental to the Leguminosæ, but they are of benefit to them. This being the case, the fungus must be regarded as of use to the host-plant, and as doing something for the latter in return for the advantages it receives from the cells. The other point hardly needs establishing. Here, then, is a very nice case again of symbiosis.

(*To be continued.*)

CIRCULAR LETTER FROM THE AMERICAN PHARMACEUTICAL ASSOCIATION.

To the Pharmaceutical Societies and the Pharmacists of all Countries, Greeting:

The American Pharmaceutical Association had extended an invitation to the Third International Pharmaceutical Congress, held at St. Petersburg, in 1874, to call the Fourth Congress in Philadelphia in 1876, during the Centennial International Exposition; but the selection of a city in the United States was deemed unadvisable at that time.

After it had been decided that the World's Columbian Exposition should be held in the City of Chicago in 1893, the American Pharmaceutical Association again invited the International Pharmaceutical Congress to meet in this country. The Italian Committee on Organization having, by circular of May 15, 1891, and for reasons stated therein, renounced the convocation of the Seventh International Pharmaceutical Congress at Milan; the Executive Committee of the Sixth Congress, at Brussels, by letter of November 26, 1891, confirmed the invitation of the American Pharmaceutical Association; and in a communication of February 16, 1892, the former Committee on Organization at Milan, expressed the view that there was nothing, under the circumstances stated, to prevent the organization of the Seventh International Pharmaceutical Congress in 1893, in Chicago.

Now, in view of the above facts, the undersigned officers of the American Pharmaceutical Association take pleasure in extending a hearty invitation to the Pharmaceutical Societies of all countries to appoint delegates to the International Pharmaceutical Congress, which is to assemble in the City of Chicago during the year 1893, and in which teachers to Pharmaceutical Institutions and pharmacists in general are likewise cordially invited to participate.

It is especially desired, that the contents of this circular letter be brought to the notice of kindred societies, and that information be given to the undersigned secretary, relating to suggestions of subjects of general importance, suitable for discussion and action by the Congress, as well as to the intention of Pharmaceutical Societies of Pharmacists and of Teachers of Pharmacy in other countries, of being present or represented at the Congress of 1893.

Further steps for promoting the objects and deciding upon the date of the Congress will be taken at the meeting of the American Pharmaceutical Association in July of the present year. Meanwhile the undersigned desire to assure all, who may come as delegates, as members or as visitors, to the International Pharmaceutical Congress, at Chicago, in 1893, of the very cordial reception on behalf of the pharmacists of the United States of America.

ALEX. K. FINLAY, *Pharmacist in New Orleans; President of the American Pharmaceutical Association.*

JOHN M. MAISCH, *Professor of Materia Medica and Botany; Permanent Secretary of the American Pharm. Association.*

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, APRIL 23, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE RETAIL PRICES OF DRUGS.

THE question of the prices of drugs as retailed or dispensed by skilled pharmacists is one upon which the public generally requires education, and this education must be in great measure imparted by pharmacists themselves. It is only by slow degrees that confidence is inspired in the superior qualifications of a class that is but gradually emerging from a more or less empirical stage of practice into a condition of scientific professionalism. Yet the slow pace will prove no drawback, if the progress of the members of that class keeps pace with or outstrips the growing confidence. In pharmacy this progress depends, of course, upon education; using the term not in the sense of a brief curriculum, but as embracing the whole period during which a conscientious pharmacist strives to keep himself abreast of the times in matters pertaining to his own particular province.

Certain it is that the public will eventually thoroughly realize the advantages accruing to it in being served by a body of trained men, able to deal rationally with drugs, and willing to devote themselves to the sometimes tedious and laborious work involved in their preparation and distribution. It may be taken for granted also that a somewhat tardy realization will be followed by generous recognition. An interesting sign of the times is a passage in a recent production by an author who is usually credited with revolutionary and destructive opinions. Mr. HENRY GEORGE, of "Progress and Poverty" fame, in his new work on "Protection and Free Trade," bases some of his arguments on druggists' profits. He points out that though, when buying small quantities of medicine or chemicals, he pays many times the original cost of the articles, what he thus pays must be regarded as being in a great degree wages rather than profit. Not only the original cost, but incidental business expenses and payment for services are of necessity included in the retail price. "These services consist not only in the actual exertion of giving me "what I want, but in waiting there in readiness to 'serve me when I choose to come. In the price "of what he sells me he makes a charge of what "printers call waiting time. And he must manifestly not merely charge waiting time for himself, but also for the stock of many different "things only occasionally called for, which he must "keep on hand." It is pointed out that the druggist has been waiting with his stock in anticipation of a sudden demand arising for small quantities of drugs or chemicals, and that the person needing them may find it cheaper to pay many times their wholesale cost rather than travel farther and buy larger quantities. So that even when the payment is not for skilled labour, it may be considered as being largely a payment of the same nature as would have to be made to a messenger were the druggist not there. If it were practicable in all cases to go to the producer he would be obliged to charge a higher price on account of the greater labour and expense involved in attention to small orders, whilst additional expense and trouble would be incurred by the consumer in communicating with the producer. The great use of middlemen in business is to save both parties this trouble and expense, and the profits competition allows them to make are infinitesimal as compared with the enormous savings effected. Further economy is effected by the middlemen being better able to guage the amount of stock necessary to provide for a given consumption, and thus greatly lessening the loss from deterioration and decay.

This exposition of the claims of retail dealers from a purely commercial aspect is a valuable one, and the views expressed should not be lost sight of when occasion offers to advance them. But whilst these views apply equally and fairly to all dealers in commercial products, we hold that pharmacists are in many instances entitled to claim also for special professional services. To this end, however, it is essential that individual pharmacists should do their utmost to educate first themselves, second, the other members of their class, and, lastly, the general public. If the more effectual administration of the Pharmacy Acts is ever to be made a source of advantage to registered chemists and druggists, as it should be, scrupulous observance of the provisions of the Act is the only basis upon which advance in that direction is to be achieved with certainty. To secure the stoppage of practices that are objectionable in the interest of the public, and at the same time detrimental to chemists and druggists, the latter must be absolutely free from any just liability to the reproach that they carry on the same objectionable practices in disregard of the Pharmacy Act. Only last week there was an illustration of the necessity for such careful compliance with the provisions of the Pharmacy Act in the statement made by Dr. LEES in regard to the employment of unqualified assistants

by chemists. But we believe that statement suggests more than can be established as a fact. Mr. Justice HAWKINS has well pointed out that there is no illegality in the employment of unqualified assistants. The only point to be observed is that such assistants shall not be entrusted with the performance of duties which are by the Pharmacy Act specifically restricted to duly registered persons. In that respect it may be hoped chemists will have perceived that they may derive material benefit from the effect of the judgment in the WHEELDON case, and that it is to their interest to support the maintenance of that construction of the Act.

INTERNATIONAL CONGRESS AT CHICAGO.

THE circular letter from the PRESIDENT and SECRETARY of the American Pharmaceutical Association, to which reference was made last week, will be found at page 871. Since then a communication has been received from M. VAN DE VYVERE, of Brussels, who was the General Secretary of the Sixth International Congress, in which he expresses the hope that by means of the arrangements now being made for the Congress at Chicago next year, the series of international gatherings of pharmacists may be continued, and serve to extend the fraternal relations already established by these periodical meetings on previous occasions. All difficulties appear now to have been removed, and it may therefore be inferred that the members of the Executive of the Sixth International Congress approve of the project to hold the seventh Congress at Chicago. M. VAN DE VYVERE mentions that he has received from the Chicago College of Pharmacy a letter, stating that it was resolved at the annual meeting last month to co-operate with the American Pharmaceutical Association in inviting pharmacists to meet in Chicago during the World's Fair.

REVISED MEDICAL SCALES.

THE chief alterations in the instructions recently issued by the Board of Trade occur in those relating to merchant ships (*Circular No.* 696). The quantity of carbolic acid ordered to be carried is doubled and, instead of specifying the various substitutes for this liquid, the instructions simply state "or other disinfectant of approved quality." Chloride of zinc (Burnett's) and Red Cross Antiseptic Fluid are now omitted from the list, as is also the No. 8 Gum Elastic Catheter. Carbolic acid powder, where it occurs, is inserted in the circulars under the same condition as the liquid carbolic acid.

PHARMACY BALL.

THE Pharmacy Ball last Wednesday evening was in every respect a complete success, notwithstanding the alteration of the time at which it took place. About 250 were present, and the music was, as usual, provided by Mr. DAN GODFREY'S band. At the supper the chair was taken by Mr. CARTEIGHE, who, in proposing the customary toast, complimented Mr. MASON upon the ability with which he had overcome the difficulties attendant upon the postponement of the Ball.

FLÜCKIGER TESTIMONIAL.

WE are requested to state that several further contributions to the FLUCKIGER Testimonial have been received, in addition to those already notified in the Journal at page 775. The PRESIDENT wishes it to be understood that his subscription list will close on the 30th inst., and a complete list of the subscribers will then be published.

We are indebted to Mr. Clarke, the Society's local secretary at Lowestoft, for bringing to our notice the remarks made by a local medical practioner at a coroner's inquest, in regard to the indiscriminate sale of secret remedies containing poison, under the designation of patent medicines. Dr. Roberts protested against the sale of these articles by grocers and others who have no knowledge of their contents, and are unable to exercise the care necessary in supplying them. The Coroner concurred in that view of the matter, and at his suggestion the jury, agreeing with him, added a rider to their verdict to that effect.

* * *

In connection with the alleged case of lead poisoning mentioned at page 666 inquiries made by the Crown authorities have failed to furnish ground for criminal proceedings; but by order of the Crown Counsel the contaminated sugar has been destroyed by the Leith police and the casks in which it was packed have been burnt.

* * *

We understand that the Catalogue of the Hanbury Herbarium compiled by Mr. Holmes, the Curator of the Society's Museum, is now completed and will shortly be ready for delivery to members and associates who may desire to possess copies of it. In some instances explanatory matter has been added. This is distinguished by being enclosed between brackets, so that, exclusive of these portions, the catalogue represents the Herbarium as left by Daniel Hanbury.

* * *

An international congress is to be held at Genoa from the 4th to the 11th of September next, in honour of Columbus, and for the inauguration of the new Botanical Institute which has been presented to the University of that town by Mr. Thomas Hanbury. At the same time there will be an exhibition of horticulture, and botanists of all nations are invited to assist at these celebrations.

* * *

It is announced that a conference of members of the Institute of Chemistry will be held on Monday, May 16, in the rooms of the Chemical Society, Burlington House. The Conference will take place at 3 o'clock in the afternoon, and the subject for discussion will be "The Present Regulations with respect to the Admission of Fellows and Associates to the Institute." Papers dealing with that subject are invited, and it is stated that an official report of the proceedings by an authorized reporter will be published.

* * *

The Eye in Health and Disease will be the subject of the Gresham Lectures, to be delivered at the Gresham College, Basinghall Street, on the 26th, 27th, 28th and 29th of this month, by Dr. E. Symes Thompson, F.R.C.P., the Gresham Professor of Medicine.

Transactions of the Pharmaceutical Society.

EVENING MEETING IN LONDON.

Wednesday, April 13.

MR. MICHAEL CARTEIGHE, PRESIDENT, IN THE CHAIR.

The last general meeting of the session took place on Wednesday, the 13th inst., when the chair was taken by Michael Carteighe, Esq., President, at 8.30 p.m. He first called upon Mr. Holmes, the Curator, to give a description of the recent donations to the Museum, which he said were so numerous that it would be impossible to deal with them all, but Mr. Holmes had classified them and would deal especially with those in which investigations had been made into the histology of the drug.

RECENT DONATIONS TO THE MUSEUM.

BY E. M. HOLMES, F.L.S.

Aden Senna.

A small variety of senna, with hairy leaves, was recently offered at the London drug sales, and a specimen has been presented to the Museum by Mr. J. Moss. The leaflets have occasionally appeared in European commerce, and were detected by Batka in Mecca and in Alexandrian senna. I am informed by Messrs. Hale and Son that one bale of this hairy senna, imported from Aden, was offered in public sale on March 3 last together with some Mecca senna and, although marked "without reserve," no bid was obtained for it. It was subsequently sold at a merely nominal price. Mr. Moss informs me that an infusion of the leaves produced a full effect upon a strong man and caused no griping. It would, therefore, appear to deserve further investigation. The leaflets correspond exactly in size, shape, and pubescence with those of *Cassia holosericea*, Fresenius. An excellent illustration and description of the plant is given by Wenzel Batka in his 'Monographie der Cassien Gruppe,' t. 4, pp. 35–50. The plant belongs to the same section (*Brachycarpeæ*, Bentham) of the large genus Cassia as the official senna. For all practical purposes this variety of senna may be easily recognised by the leaves being smaller and more obtuse than Alexandrian senna, and by the remarkable hairiness of the leaves.

Cassia holosericea is a native of Abyssinia and Nubia, extending to Arabia and eastward as far as Scinde. It is a small shrubby plant about 1½ feet high, with imparinnate leaves bearing 6–9 pairs of oval oblong leaflets, which are shorter and more obtuse than those of *C. acutifolia* and smaller than those of *C. obovata*, differing from both in their oblong outline and in being densely covered with very short hairs. The inflorescence is an axillary raceme. The pods have not the interrupted ridge which characterizes the fruit of *Cassia obovata*, but are smooth like those of *C. acutifolia*. They are, however, smaller than the latter and hairy. The plant has borne no less than nine names, all, except the name given by Fresenius, being open to objection on account of having been previously used by other botanists or for other reasons. Consequently, *Cassia holosericea*, Fresenius, is the name adopted by Bentham in his 'Revision of the Genus Cassia.'

The Commercial Varieties of Coca Leaves.

Coca leaves, as met with in English commerce at the present time, consist principally of two varieties known respectively as Peruvian or Truxillo, and Bolivian or Huanuco leaves. A third variety has occasionally been offered at London drug sales, but cannot, I believe, be said to have entered retail commerce. This third variety, obtained from a plant cultivated in Java, is imported in a carefully dried condition.

Nearly four years ago, Mr. D. Morris, the Assistant Director of Kew Gardens, pointed out in a paper read before the Linnean Society of London (*Journ. Linn. Soc.*, vol. xxv., pp. 381–384, Dec., 1888) that there was more than one variety of coca in cultivation, and he described, under the name of *Erythroxylon Coca*, var. *Novo-Granatense*, the plant we now recognize as Peruvian coca. Two years later, Dr. W. Burck, the Assistant Director of the Botanical Gardens in Java, adopted Mr. Morris's variety, and described in addition two other forms of the coca plant, one of which he retained as a variety under the name of *Erythroxylon Coca*, var. *Spruceanum*, and the other he raised to the rank of a distinct species, which he named *Erythroxylon Bolivianum*. In his paper on these plants (which was first published in "Teysmannia") he gives the credit of the work really done by Mr. Morris to Dr. W. T. Thiselton Dyer, having evidently been misled by the fact that the substance of Mr. Morris's paper appeared anonymously in the Kew *Bulletin* some months before the paper was published in the Journal of the Linnean Society. An abstract of Dr. Burck's paper has already appeared in the *Pharm. Journ.*, for April 2, p. 817. From these two papers by Mr. Morris and Dr. Burck it would appear that the Peruvian or Truxillo coca is the produce of the variety *Novo-Granatense*, Morris, and that the Bolivian or Huanuco variety is yielded by *E. Bolivianum*, Burck, whilst the Java coca and some of that cultivated in Ceylon and India is obtained from *Erythroxylon Coca*, var. *Spruceanum*, Burck.

It has been pointed out in a footnote to the same abstract that these plants differ somewhat in the alkaloids they contain. The Peruvian or Truxillo coca has yielded to Hesse alkaloids consisting, in nearly equal proportions, of cocaine and cinnamyl-cocaine, with apparently some isatropyl-cocaine (or truxilline, as it was first called). The Bolivian variety was found by this chemist to yield alkaloids of which the greater part consisted of cocaine with some cocaidine, and rarely some cinnamyl-cocaine. The Java leaves, according to the same authority, contain a considerable amount of isatropyl-cocaine, but less cocaine than the other varieties. This difference in alkaloidal constituents may prove to be of some importance, since Liebreich has stated that isatropyl-cocaine is a poisonous base, probably giving rise to the poisonous symptoms repeatedly observed when cocaine that is not perfectly pure is used.

The Java coca is not, I believe, used in this country for the preparation of cocaine, though I am informed that a good deal of it is sold in Germany for that purpose. In this country cocaine is, I believe, generally prepared by purifying the crude cocaine imported from Lima. The leaves are also imported, but are chiefly used for pharmaceutical and dietetic preparations. For such purposes it may be desirable to select the coca leaves that are believed to contain little or no isatropyl-cocaine, viz., those of *E. Bolivianum*. Bolivian coca is, however, as a rule, not so carefully dried as the Peruvian coca; young leaves of a pale brownish-green tint and of good odour should therefore be selected. It has been shown by Dr. Greshoff that leaves kept in a moist atmosphere, or exposed for any length of time, readily lose a portion of their alkaloid. His experiments also show that young leaves contain more than double the quantity of alkaloid that is found in older leaves collected at the same time. The illustration given by Dr. Burck of the different varieties of coca have been photographed, so that I am now able to show them on the screen. These photographs and the

live specimens of the plants kindly lent for the occasion by Mr. T. Christy, together with the dried specimens on the table from the Society's Herbarium, will serve to illustrate the characters that distinguish the varieties of the coca leaves of commerce. Full details of these characters are given in the abstract already published in the Journal. The coca plants lent by Mr. T. Christy are extremely interesting. From the illustration given by Dr. Greshoff it seemed to me probable that the coca plant must be dimorphic, since the styles are represented of different lengths. Mr. Christy's specimens show that not only is this the case, but that the plant is probably trimorphic. In the specimen with lanceolate leaves, which appears to correspond with the variety *Spruceanum* of Dr. Burck, the styles are much larger than any of the stamens, which are arranged in two series, one row being slightly taller than the other and arriving first at maturity. In the specimen with oblanceolate leaves, agreeing with the variety *Novo-Granatense* of Mr. Morris, the styles are much shorter than any of the stamens, which are also arranged in two series. It appears probable, therefore, that a third form of the plant may occur in which the styles would be of medium length and the stamens longer. The coca plant frequently produces fruits even in this country, so that there probably exists a contrivance for self-fertilization. So far as I can judge from the small specimens I have examined, this is effected in the case of the long styled form by the curling outwards and backwards of the styles at the time that the second row of stamens matures, and in the short styled plant by the stamen curling downwards towards the stigmas, which at this period are protruded outside the filaments. If this explanation be the correct one it is also of interest to note the chemical differences that occur in the active principles in different forms of the same species.

Pernambuco Jaborandi.

About seventeen years ago I ventured the opinion that Pernambuco jaborandi was probably derived from an undescribed species of *Pilocarpus*, more nearly allied to *P. Selloanus* than to any other known species. Ever since that date I have endeavoured, whenever an opportunity offered, to obtain flowers of the plant, but, until this year, without success. About two years ago I saw in the Botanic Garden, at Cambridge, a specimen of the Pernambuco plant. Last year Mr. Lynch, the Curator of the Garden, was kind enough to forward me a few blossoms for examination, but this year he has been able to send a flowering branch, from the examination of which I am able to determine that the plant is an undescribed species, for which I propose the name *Pilocarpus Jaborandi*. The plant differs from *P. Selloanus*, to which it is most nearly allied, in having four pairs of leaflets, in the elliptic-oblong shape of the leaflets and their more fleshy consistence, in the veinlets being more prominent on the upper surface, in the slender glabrous pedicels, only three times longer than the leaf buds, in the minute bracts being situated near the apex of the pedicel, in the rose colour of the ovate petals, pedicels, and upper part of rachis, and in the rugose crenate disc. The calyx is pentagonal, not lobed. I purpose giving a fuller description of the plant on a future occasion. An analysis of the known pinnate-leaved Brazilian species of *Pilocarpus* will be found in *Pharm. Journ.*, [3], v., p. 641, and a figure of the fruit of the plant on p. 582.

Valuable Cinchona Barks from New Granada.

Mr. R. Thomson, of Bogota, who is engaged in cinchona cultivation in the neighbourhood of that city, recently presented to the Society's Museum specimens of some rich barks from trees that he has at present under cultivation, together with herbarium specimens of three of them. Of the nine specimens of barks received, four were obtained from plants found wild in New Granada, and considered by collectors to be valuable trees. These are named respectively Thomsoniana, Negra, Tuna, and Pombiana. Mr. Thomson could not identify them with any known species or variety of cinchona and brought them to the Museum for comparison and identification. Mr. David Howard has analysed samples of the nine barks and has kindly furnished me with a table of the analyses. From this table it will be seen that the barks obtained from cultivated plants grown from purchased seed are fairly rich in alkaloids. These do not require further notice. The four others are, however, interesting from several points of view. Before attempting to describe these specimens it may be well to direct attention to the fact that the cinchonas form a very intricate genus, one series running into another through a series of intermediate forms. The forms in their native country are, however, limited to a certain extent by the fact that certain species are practically confined to certain districts and to particular elevations. Thus, in New Granada, or the United States of Colombia, as it is now called, the quinine bearing trees may practically be limited to four groups:—

1. Soft Columbian barks, of which *C. lancifolia* may be taken as the type.
2. Hard Carthagena barks, represented by *C. cordifolia*.
3. Pitayo barks by *C. Pitayensis*.
4. Cuprea bark by *Remijia pedunculata*.

Except the last the barks of all these are distinctly fibrous and are furnished with a whitish spongy coat. In structure, as seen under the microscope, the first is easily distinguished (from *Calisaya* and *Officinalis* barks) by the presence of numerous thickened cells in the middle cortical layer. The second has also similar cells, fewer in number, but is further distinguished by the woody fibres being arranged in very irregular rows. The third, like *Calisaya* and *Officinalis* barks, is free from thickened cells in the middle bark, and the fourth is easily distinguished from all known cinchonas by the thickened cells of the cork and by the short bast fibres being obtuse, not tapering at the ends (see Flückiger, 'Cinchona Barks,' tab. viii.).

The leaves of both *C. lancifolia* and *C. Pitayensis* are glabrous, lanceolate and leathery in texture, but the flowers of the latter have the inner surface of the corolla covered with hairs. In *C. cordifolia* the leaves are much larger, ovate and cordate, or slightly decurrent at the base. In *Remijia* the inflorescence is axillary, and the flowers much smaller than in the true cinchonas. On comparing the barks and herbarium specimens received from Mr. Thomson with these species, the following features were observed.

1. *Thomsoniana.*—Mr. Thomson's remarks concerning this species are as follows:—"Discovered in 1883 in the central Cordillera of the Colombian Andes, at about eight thousand feet; very rare. A very distinct species; it grows with great rapidity, in this respect rivalling *C. succirubra*; the foliage and capsules are large, like those of the latter. A few thousands of this plant were propagated from cuttings, from which it grows with marked facility, and these have attained large dimensions notwithstanding the unsatisfactory state of cultivation to which they have been subjected in recent years." The bark has the hard outer surface and coarse fibrous fracture on the inner surface characteristic of *C. cordifolia*. The leaves of the herbarium specimen are large, oval, tapering below into the short petiole, hairy on the under surface and slightly so on the upper, not furnished with scrobicules. The microscopical structure indicates a relationship to *C. cordifolia* in the scattered stone cells of the middle bark,

and the irregularity of the rows of more or less isolated bast fibres. The plant approaches *C. Tucujensis* in the shape of the leaves. The analysis, however, shows a much larger percentage of quinine than might be expected from either *C. cordifolia* or *C. Tucujensis*, but not more, perhaps, than might be obtained under cultivation. The plant evidently belongs to the section of hard Carthagena barks, and may appropriately retain its present name as a form of the group to which *C. cordifolia* belongs.

2. *Negra.*—Concerning this bark Mr. Thomson says: "The cinchona marked 'negra' was detected by me on the Central Cordillera of the Colombian Andes at about 8,000 feet. Very few plants were discovered when, about seven years ago, I had it propagated to the extent of a few hundred plants. It grows very slowly. At the plantations in Colombia I named it 'negra' (it is unknown elsewhere) to enable the Peons to distinguish it, for in every stage of its growth it presents a peculiarly dark aspect; its fresh bark, the pith of the young wood, its foliage, the petioles and venation having a beautiful claret colour." The bark at first sight bears a considerable resemblance to specimens of *C. Ledgeriana*, but is not so thick in proportion and does not show the tendency present in that bark to exfoliate the outer layer. The inner surface shows the tendency to split which is characteristic of *C. micrantha* bark. The Herbarium specimen shows, however, that the leaves and flowers resemble those of *C. lancifolia*, but the leaves have no evident scrobicules. The microscopical structure of the bark also indicates that it belong to the *C. lancifolia* group by the numerous stone cells in the middle bark and the absence of laticiferous vessels. The bark, however, is much harder than soft Columbian bark and the plant must therefore be considered as a distinct form belonging to the *C. lancifolia* group.

3. *Tuna.*—This bark still more strongly resembles Ledgeriana bark than the last in being of remarkable thickness. The plant I have not seen. The microscopical section of the bark shows that it evidently belongs to the *C. lancifolia* group, having numerous stone cells in the middle bark. Like the Negra bark, however, it is much harder than the bark of typical *C. lancifolia*, and must also be considered as a distinct and very rich variety of that species, being probably the richest known in percentage of quinine.

4. *Pombiana.*—The following information concerning this plant is given by Mr. Thomson:—"Pombo species. Discovered in Ecuador (1880-1881) by Senor Enrique Pombo of Bogota. After its discovery it was exported to a considerable extent. In 1883 I received seeds from Ecuador, from which and from cuttings I raised and planted out several thousand plants. This is probably the only plantation of this species known. During the first years it proved a very slow grower, but latterly it has assumed quite a luxuriant growth, though the cultivation has, practically speaking, ceased. The plant in its general aspect has no resemblance whatever to any other cinchona with which I am acquainted. It closely resembles a myrtaceous tree (*Jambosa vulgaris*). The tree is remarkable for its dense mass of dark glossy foliage, and is, perhaps, the most beautiful of all cinchonas. Both capsules and seed are very small."

The bark is extremely fibrous, easily splitting in a longitudinal direction, and internally is of an orange-brown tint. The microscopic structure is very distinct from any species of cinchona that I have seen. The wood fibres are arranged in distinct oblong groups, the nearest approach to which occurs in the bark of *C. macrocalyx* (a species that has not, so far as I am aware, been found north of Ecuador). The middle bark resembles that of *C. lancifolia* in containing numerous stone cells. The leaves belong to the *C. lancifolia* type, but are small, remarkably leathery, polished on the upper surface, resembling those of *C. Pitayensis*, but rather narrower. Indeed, on examining the plant, I thought at first that it must be a variety of that species, more particularly since the flowers are hairy on the inner surface of the corolla. It thus presents in the bark the characters of *C. lancifolia*, and in the plant those of *C. Pitayensis*, and should be regarded as a variety of *C. lancifolia*, forming a connecting link with that and *C. Pitayensis*.

These barks have a special interest as showing that when cultivated in their own country and under suitable conditions, an increase in the amount of alkaloid may be expected. It may be hoped that Mr. Thomson will succeed in cultivating the remarkably rich varieties Negra and Tuna. In conclusion I wish to express my thanks to Mr. James Hart, of Manchester, for having at a very short notice prepared the excellent micro-slides and lantern slides of these cinchona barks, without which it would have been impossible to arrive at their real relationship, or to exhibit their structure this evening.

A New Form of Essence of Lemon.

For some time past "terpene free" essential oils have been offered in commerce, but the mode of preparing some of them so as not to injure the odour or flavour has been kept as secret as possible. This is especially the case with the essence of lemon, which has hitherto been chiefly prepared abroad, a particular brand made in the Isle of Elba being considered the best. Recently a small specimen of this so-called "terpene free" essence of lemon prepared in this country was presented by Mr. A. A. Barrett. As it was stated to be sold at £10 per lb., or nearly twenty times the price of ordinary essence of lemon, it occurred to me that it might be worth while to compare it as regards odour and flavour with ordinary essence of lemon of reputed purity, and that the discovery of any ready means of distinguishing between the two essences might be of some importance.

This comparison has been made so far as the limited quantity of material at my disposal would allow by Mr. Jowett, one of the Bell scholars of the present year. The experiments made by him show that this new essence more readily becomes altered in flavour by keeping and exposure than when mixed in its natural state with its own terpene. Its solubility in rectified spirit is much greater, one volume being soluble in 5·3 volumes of the spirit, as against 18 volumes required for the natural ecuelled essence. The boiling point is higher, being about 179° C., and the specific rotatory power is greater, being +65° as against +47°·2 for the ecuelled oil. The data given in 'Pharmacographia' offer too wide a margin for comparison and seem to have been intended to include both ecuelled and distilled oil. Mr. Jowett summarises the results of his experiments as follows:—

	So-called "terpene-free" oil.	Oil from Trinidad.
Relative density (15° C.) . . .	·851	·876
Solubility in spirit	1 in 5	1 in 18 (approx.)
Specific rotatory power . . .	+65°·8	+47°·2
Boiling point. .	About 179°	From 172°–176°

"The chief differences noticed between the sample of oil supposed to be terpene free and that of the ordinary oil of lemon are in their solubility, specific rotatory power, and boiling point. The relative densities of the oils also differ, but only in a slight degree."

The chief use of the new essence appears to be in making a soluble essence of lemon for aerated waters, in which, probably by reason of the non-exposure to the air the flavour does not seem to become readily altered. The colourless terpene obtained in

the process still retains some odour of lemon. This liquid, I am told, can be obtained at the low price of about 2*s.* per pound, and is said to be used for mixing with more powerful oils in making perfumes for soaps.

It should be mentioned that the essence of lemon used by Mr. Jowett for comparison was ecuelled oil prepared in the Island of Trinidad. It formed one of the exhibits from that island in the Colonial and Indian Exhibition in London a few years ago.

The Eucalyptus Oils of Commerce.

The object of the present note is to direct attention to the somewhat unsatisfactory state of our knowledge of the eucalyptus oils of commerce. As long ago as 1885, when the oil of eucalyptus was first made official in the British Pharmacopœia, Mr. C. B. Allen pointed out in the pages of the *Pharmaceutical Journal*, vol. xvi., p. 537, the difficulties that arise when the oil of one species of eucalyptus is dispensed at one house of business and that of a different kind at another. The fact that the Pharmacopœia allows the use of the oil of *E. globulus*, *E. amygdalina*, and other species (which may have different odours) places the pharmacist in a very awkward position whenever a new oil of eucalyptus appears in commerce. During the last two years a new variety of eucalyptus oil has been introduced into this country under the name of oil of *E. oleosa*. This oil has a decided odour of cummin, and in that respect is quite different from an oil which formerly bore the name of "oleosa." The oil with the cummin odour is obtained from *Eucalyptus cneorifolia*, which was formerly considered by Sir F. von Müller to be a variety of *E. oleosa*.*

Light may perhaps be thrown upon some of the difficulties that attend the dispensing of eucalyptus oil, according to the British Pharmacopœia standard, if we take a brief glance at the history of its introduction into use in this country. When *Eucalyptus globulus* was first brought into notice as an anti-malarial agent, its properties were considered to be due in large measure to the volatile oil of the leaves. Eucalyptus oil, therefore, soon came into use in medicine; but the oil which entered commerce in this country in quantity was not that of *E. globulus*, but of *E. amygdalina*, an oil which had for some time previously been in use in Australia. The reason for this is obvious, when it is understood that *E. amygdalina* yields nearly four times as much oil as *E. globulus*, and that the oil also possesses a much more agreeable odour. After a few years the *E. amygdalina* tree appears to have become scarce in the neighbourhood of the distilleries, and recourse was had to the "mallee scrub," a copse-like growth of small trees about 25 feet in height and extending over large districts. The eucalypts of which it is composed are chiefly of four species, viz., *E. oleosa*, *E. dumosa*, *E. gracilis* and *E. uncinata*. The oil thus obtained entered commerce under the names of oil of *E. oleosa* and of *E. dumosa*. At the time (1885) that the Pharmacopœia authorized the use of the oil of *E. globulus*, the cultivation of this species had spread to a large extent in Algeria, Spain and the South of France. Oil of *Eucalyptus globulus* therefore soon appeared in commerce from these sources, as well as from Tasmania, and also from California, where it is a by-product in the preparation of a preventive of boiler incrustation. The oil of *E. globulus* from all these sources is by no means uniform in character. Some samples that I have seen have a rank odour like that of the leaves, others have a camphoraceous but not unpleasant odour, as if they had been rectified by redistillation. In some samples from the south of France I have detected the odour of turpentine; in those of Algeria and Malaga there is often a savine-like odour due, perhaps, to a still having been used for eucalyptus after the distillation of savine. It may here be remarked that the crude oil and the dark brown treacly residues after rectification of the oil, find a ready market for perfuming soaps.

Several eucalyptus oils possess an ingredient, especially when recently distilled, which causes a sense of irritation in the throat when the oil is inhaled. This ingredient is supposed to be of the nature of an aldehyde, but I have seen nothing definite in print upon this point. The presence of this body is, however, probably of considerable importance from a therapeutical point of view, since eucalyptus oil is largely used as an inhalation in diseases of the lungs. For this purpose I am given to understand that the oils of *E. amygdalina* and *E. dumosa* are preferred in Edinburgh and elsewhere. This preference seems remarkable, in connection with the statement that has been frequently made, viz., that eucalyptus oil owes its medicinal value to the presence of eucalyptol; for only Wallach and Gildmeister appear to have found any eucalyptol in this oil, and even then its presence was accounted for by others, on the supposition that the leaves of *E. globulus* were probably mixed in the stills with those of *E. amygdalina*. But the oil of the latter plant has been shown, without contradiction, to contain a quantity of phellandrene. It is also a remarkable fact that much of the eucalyptol that was first used in medicine consisted of the first portion passing over in the distillation of the oil and contained a quantity of phellandrene. The evidence therefore seems to point to the fact that oils containing phellandrene are preferred for the treatment of lung diseases. It seems desirable, therefore, that experiments should be made with this body by physiologists in order to determine whether the properties of eucalyptus oils are due to eucalyptol, phellandrene, or some other ingredient of the oil. For the sake of uniformity in dispensing it may be hoped that in the next Pharmacopœia a product of definite composition extracted from eucalyptus oil may take the place of an oil of unknown and indefinite composition.

In connection with the oil of *E. cneorifolia*, recently introduced, it may be interesting to point out that although it has a strong odour of cummin, cuminol has not been obtained from it. The body to which oil of cummin owes its odour does not appear to be known, since it is stated in 'Pharmacographia' [2nd ed.], p. 333, that neither of the two ingredients, cymene and cuminol, have the same odour and taste as the crude oil.

Spurious White Hellebore Root.

About three months since a powder, with some of the root from which it was obtained, was brought to me with the inquiry whether it was genuine white hellebore, as some doubt on this point had been expressed by the person to whom the drug was offered. A large quantity of the root (I believe two tons) had been offered, and the powder is apparently used on a large scale in agriculture for killing insects.

The root had the conical shape of *Veratrum album*, and like it was evidently of monocotyledonous structure. But it was only half the size of the root of *Veratrum album*, and the scaly remains of the leaf-bases that form a characteristic feature in the root of that plant were not present. The taste was slightly aromatic, and an examination of a section of the root revealed the fact that the starch presented the obovate shape and flattened character of the starches of the Scitamineæ. An inquiry as to its geographical source resulted in the information that it came from Africa, probably from the West Coast. The plants of that continent are so little known beyond the coast line and the banks of the large rivers, that it was considered unprofitable to pursue the inquiry further.

* 'Eucalyptographia,' sub. *E. oleosa*.

The history of this drug, however, serves to show the practical importance of a knowledge of the microscopic features of the official and officinal drugs. For the specimen on the table I am indebted to the kindness of Mr. Christopher Langridge, of Manchester.

Kath or Pale Cutch.

A specimen of pale catechu prepared in the north-west provinces of India, and a second specimen of black catechu were presented some months ago to the Society's Museum by the Director of Kew Gardens. The pale catechu consisted of flattened cakes that had evidently been submitted to pressure in a filter press, and the black catechu was apparently the expressed fluid from these cakes dried in the form of an extract. An account of these products was given in the Kew *Bulletin* for February, 1891, from which it appears that two kinds of trees are recognized by the natives, one containing white spots in the heart wood and the other free from them. For the manufacture of Kath the wood containing white spots, which are presumed to consist of catechin, are preferred.

Catechin, being sparingly soluble in water, it occurred to me that the catechin-free black catechu might form a stronger, or, at all events, a more elegant tincture than that made from a catechu containing catechin. I therefore asked Mr. C. Morrow to make a few experiments in this direction. He found that a tincture of catechin or of catechu containing catechin invariably deposited the catechin when diluted with water. He found also that proof spirit or spirit of 40 per cent. dissolved only two-thirds of the black catechu, but that a solution of it could be made of a strength of 54½ grains to 1 fluid ounce in the form of a syrup, which mixed perfectly with water, and retained its astringent taste. I venture to suggest this form of preparation as more palatable than the tincture and better adapted for administering the drug to children.

The pale catechu or catechin is stated in 'Pharmacographia' to be converted into catechu-tannic acid by heating. Catechin does not precipitate gelatine and is, therefore, to a large extent, a waste product in tanneries, and it occurred to me it might be possible to obtain, by heating it, a material of a pale colour which would be very valuable for tanning purposes. I therefore asked Dr. Passmore to make a few experiments upon this substance. He found that although catechin could be changed to catechu-tannic acid by heat, it acquired during the process a darker colour. He also found that when kept in solution, catechin changes slowly into catechu-tannic acid of a dark colour.

Tari Pods.

Samples of a large number of Indian drugs have recently been forwarded to London with the view of ascertaining if a demand would arise for them when better known in this country. One of these, sent under the name of Tari pods, is derived from *Acacia digyna*. Messrs. Gonne, Croft and Co. have kindly furnished me with an analysis of these pods, from which it appears that they contain 33¼ per cent. of tannin available for tanning purposes, and suitable for making a leather of a light colour. The tannin gives a blue-black colour with ferric salts, so that the pods would probably serve also for the manufacture of ink.

New Granada India Rubber.

With the specimens of cinchona plants Mr. Thomson brought two specimens of leaves of the plant yielding the "virgen" rubber of Columbia. He states that he does not think it is identical with the *Sapium biglandulosum*, Müll., Arg., with which it has been identified at Kew,* that the specimens brought to me represent the average size of the leaves, and that whereas the Demerara plant bearing the same name at Kew yields a worthless rubber, the Columbian plant yields one of the best kinds of rubber; and that when it was largely exported some years ago it realized prices closely approximating to the Para rubber. With the "virgen" rubber leaves Mr. Thomson also brought two other leaves of a plant which grows in company with it, but it does not give rubber, though it produces abundance of a milky secretion. The "virgen" rubber was, he states, only discovered ten years ago and he does not think the plant is known to Europeans.

I have been permitted to look through the specimens of the natural order, *Euphorbiaceæ*, in the collection of the late Mr. Triana at the British Museum, but have failed to find any leaf of a *Sapium* at all approaching the "virgen" leaf. It would, therefore, appear to have been unknown to that botanist, who was probably quite up to date as regards the botany of New Granada. Both the plants grow, according to Mr. Thomson, about 7000 feet above the level of the sea, which may account for it having remained unnoticed. I have also examined the large and valuable series of specimens of the genus *Sapium* in the Kew Herbarium, and have failed to find any leaves exactly resembling those brought by Mr. Thomson in size, venation, and consistence. In shape his plants approach nearly to some forms included under *S. biglandulosum* in the Kew Herbarium, but the angle of the veins and the mode of their branching are different. There is no doubt that the leaves belong to this genus, and that the species of the genus are extremely variable, yet, as often happens in such cases, certain forms of the same species may produce very different chemical substances. I have placed upon the table an ordinary specimen of *Sapium biglandulosum*, beside the "virgen" rubber plant leaves, and although the dissimilarity is very great, I should hesitate in the absence of more complete material to assert positively that they belong to a distinct species. An account of the "virgen" rubber is given in the Kew *Bulletin* for February, 1891, p. 31, where the following statement occurs:—"This widely-spread and extremely variable species extends from Mexico and Panama to Colombia, Venezuela, Guiana and Brazil. The variations which it presents in habit are probably as extreme as are to be met with in the vegetable kingdom."

Muna Muna.

Under this name a plant was presented to the Museum by Messrs. G. N. Souratty and Co. It has a high reputation in Ecuador as an emmenagogue and uterine stimulant, and is said to be invariably used, in the form of tea, for mountain sickness. Its greatest reputation, however, is as a cure for sterility. The plant is stated to grow in rocky places on the mountains where the ledges are nearly bare of soil. On examination the plant proves to be *Micromeria*. It belongs to the natural order *Labiatæ*, and has a flavour resembling that of pennyroyal.

Chilian Remedies.

Some specimens of native remedies in common use in Chili, brought by a resident in that country to England, have been recently presented to the Museum of the Society by Mr. A. C. Abraham. Three of these are already well known in this country, as well as on the Continent and in the United States. These are Boldo, Cheken and Pichi. The others have not yet been introduced into European medicine, but one of them, Paico (*Chenopodium ambrosioides*), is used as a vermifuge in the United States. As they are extensively used in Chili, and may at any time appear in the London drug market, it may be useful to record,

* Kew *Bulletin*, 1890, p. 149.

for purposes of reference, a brief account of their properties and uses, and the characters by which they may be recognized.

BAILAHUEN.—*Haplopappus Baylahuen*, Remy (*Compositæ*). The specimens received consist of a woody stem with somewhat crowded coriaceous leaves less than one inch long and oblanceolate in outline, the widest portion of the leaf being less than half an inch across. In the broadest part, which is above the middle, the leaf has two or three short triangular teeth, and it tapers below into a slightly amplexicaul base. Both the stem and leaves present a varnished appearance, due to exuded resin. The taste is faintly aromatic, resembling slightly that of patchouli, but without bitterness. The plant is a native of the high Cordilleras of the province of Coquimbo. Its medicinal properties appear to be due to the presence of the resin. Internally it is employed in the form of an infusion as a stimulant in weak digestion. It is also reputed to possess emmenagogue properties. Externally it is applied for healing the wounds of animals. The plant is described in Gay's 'Flora of Chili,' vol. iv., p. 42. According to Baillé it has been found useful in diarrhœa and acute and chronic dysentery (see *Pharm. Journ.*, [3], vol. xix., p. 685, under *Hysteronica Baylahuen*).

CEPACABALLO.—*Acæna splendens*, Hook. et Arn. (Rosaceæ).—The drug consists of dark brown woody stems, forked at intervals of several inches, and densely covered with the somewhat rigid bases of the crowded leaves. The leaves are imparipinnate with entire, linear, lanceolate silvery leaflets, which bear some resemblance to those of *Alchemilla alpina*. The leaves, however, owing to the slender petiole, are mostly broken off. The leaf bases are erect and imbricate, or recurved at the apex, and although covered with silky hairs have not, owing to their browner colour, the same silvery appearance as the leaves. The taste is astringent and slightly bitter. The plant has no perceptible odour. It is described in Gay's 'Flora of Chili,' p. 291, and in the *Botanical Miscellany*, p. 306. It is found in the Cordilleras of Santiago, San Fernando, etc., ascending to a height of 5–600 feet. The whole of the plant is used in medicine in the form of infusion, and is given in the liver complaints common in the northern and central parts of Chili. It acts also as a slight diuretic and is employed as an emmenagogue. Another species known as Pimpinela (*Acæna pinnatifida*, R.P.), is also employed as an emmenagogue. In this species the leaves are glabrous.

NATRI.—Three species of Solanum appear to be used under this name in Chili, viz., *Solanum crispum*, R. et P., *Solanum Gayanum*, Remy., *Solanum Tomatillo*, Remy. The drug received appears to belong to the last-named species. The stems are cylindrical and longitudinally wrinkled, more or less forked, with erect branches, the leaves alternate, linear lanceolate, $1\frac{1}{2}$ to 2 inches long, and $\frac{1}{3}$ to $\frac{2}{3}$ of an inch in diameter, coriaceous, brittle, and minutely wrinkled. The taste is persistently bitter.

The plant has an excellent reputation. No one in Chili, says Dr. Murillo, is ignorant of its beneficial effects. It is chiefly used as a febrifuge and tonic in the bilious fever of a typhoid character common in the country, especially amongst those exposed for a length of time to solar heat. This fever is known as "Chavalongo." In all fevers of a typhoid character it is given with good results in the form of a decoction or infusion in small and repeated doses. The plant has naturally attracted the attention of scientific men in Chili. Chemical investigation of the plant has been made independently by Drs. Miranda and Larenas. They found an alkaloid to which Dr. Miranda gave the name of natrina and Dr. Larenas the name of witheringina. Both agree that it possesses the following properties:—

It forms crystalline salts with the mineral acids, gives an orange-red precipitate with the reagents of Mayer, Bouchardat and Dragendorff. The last-named reagent gives a precipitate in a solution containing $\frac{1}{30000}$ part of natrina. The alkaloid is soluble in alcohol and in boiling water, but insoluble in ether and chloroform. When heated it melts and then chars, giving off an odour like burnt horn. Concentrated acids give to it a red colour. The sulphate, according to Dr. Larenas, crystallizes like sulphate of quinine. Natri is stated by Messrs. Miranda and Larenas to afford 1·9 p.c. of the alkaloid from the stem and 2 per cent. from the leaves. The process adopted by Dr. Larenas for the extraction of the alkaloid consists in exhausting the leaves by water acidulated with sulphuric acid, concentrating the liquid by evaporation, and precipitating resinous and colouring matter by subacetate of lead, freeing the solution of acetate of natrine from lead by hydrogen sulphide, and precipitating with sodium carbonate.

According to Dr. Navarette, the infusion of natri lowers the temperature and slows the pulse, whilst it produces a stimulant action upon the stomach and, after it has been taken a few days, exerts a slight aperient action. Natrine, according to Dr. Miranda, produces nausea, vomiting and purging, and acts as an irritant, whether employed in the form of enema or hypodermically injected. Dr. Murillo remarks that although natrine is a less powerful antipyretic than quinine, it is a simple and innocent remedy which is certainly effectual in fevers of a typhoid type. It would seem, therefore, that the drug might be worthy of trial in cases in which quinine is not well borne. A further investigation of its alkaloid might also prove of interest from a chemical point of view.

PAICO.—*Chenopodium ambrosioides*, L. (Chenopodiaceæ). The use of this plant as a vermifuge, for which purpose it is given in the United States, appears to be unknown in Chili, where it is employed as a stimulant to digestion, and as an emmenagogue. In cholera epidemics it is also extensively used instead of mint. Dr. Murillo remarks that he knows of no better carminative remedy in the treatment of the diseases of infancy.

PANUL.—*Ligusticum Panul*, Bert. (Umbelliferæ). The drug consists of the fruiting tops, only fragments of leaves being present. The umbels are compound, the partial umbels consisting of few flowers. The fruit is small, and in shape and appearance bears some resemblance to conium, but has two broad vittæ on the commissural surface, and there is neither general nor partial involucre. The umbels also are generally arrayed in threes. The leaves under a good lens are seen to be covered, especially on the margins, with minute rough points. In shape the leaf segments resemble those of conium. The stem is hollow and strongly furrowed, and about two lines in diameter, the peduncle of the umbels being only about $\frac{1}{3}$–$\frac{1}{2}$ line in diameter. The odour of the herb faintly resembles that of fœnugreek or of lovage, and the taste is slightly aromatic, leaving after a time a sensation of warmth in the mouth. The Chilians employ the plant in skin diseases and to arrest or reduce perspiration in phthisical patients; for the latter purpose it is given in decoction. A tincture mixed with water and drawn up through the nostrils is used to relieve headache. The plant is described in Gay's 'Flora of Chili,' vol. iii., p. 131.

SABINELLA.—*Margyricarpus setosus*, R. et. P. (Rosaceæ). The drug consists of woody densely branched slender stems having a more or less scaly appearance, due to the sheathing bases of the petioles, which are only their own length apart, and thus give a flexuose appearance to the stem. The leaves are imparipinnate, and the leaflets, which are mostly broken off, are small and linear-subulate. It has very little taste and no

odour, and is only faintly astringent. According to Dr. Murillo, it has proved useful in the treatment of mucous discharges.

Te de Burro.—*Eritrichium gnaphalioides*, D. C. (Boraginaceæ). This consists of the woody stems, which are from one to two lines in diameter, with erecto-patent branches at intervals of about ½ inch on the main stem. The thin, dull, chalky white bark readily serves as a distinctive feature. The leaves when present are linear, sessile and entire. The plant bears the name of tea of the Cordilleras and is very commonly used in the province of Atacama, where there is said to be hardly a house which does not keep some branches of the plant ready for use. It is employed in the form of tea for indigestion and diarrhœa. The taste is pleasant but slightly acrid, and the drug produces for a time a sialogogue effect followed by astringency.

The subject-matter of Mr. Holmes' communications was further explained by a number of illustrations thrown on the screen by the optical lantern.

In conclusion the Curator directed the attention of the meeting to the donations exhibited in the Materia Medica Museum, consisting of the rarer specimens of the British and medicinal plants that had been presented to the Society during the past year. There were also slides of the false Pareira brava prepared by Mr. W. M. Holmes, and of the new cinchona barks and Aden senna prepared by Mr. J. Hart, of Manchester. These would be found ready for inspection under the microscopes belonging to the Society. A model of the Van Heurck micro-photographic camera, recently described in the pages of the Journal, and kindly lent by Messrs. Watson and Sons, was also exhibited.

False Pareira Brava.

Mr. Murton Holmes explained, by the aid of microscopic sections thrown on the screen, the most important differences between genuine pareira brava and a spurious article sometimes met with in commerce.

Dr. B. H. Paul then read the following note on—

Liquor Strych. Hydrochlor.

The object of this note is to illustrate the cause to which the deposit frequently met with in this preparation is due. The subject has been worked out by Mr. Duncan, of Edinburgh, and the result described in a paper which appeared in the Journal of April 9. When the liquor is made strictly in accordance with the Pharmacopœia no deposit is formed by cooling to near the freezing point, but when an excess of acid is added the deposit of crystals is considerable. It appears that time is to a considerable extent an element in the formation of this deposit, which is no doubt an acid hydrochlorate of strychnine. The deposit often comes out in a bunch of very palpable crystals; whereas those formed by rapid cooling are very finely divided, small and needle-shaped. A solution made with such proportions as to be exactly neutral, and without the spirit, remains unaltered when kept in a cool chamber. The curious thing about it is that when exposed to a low temperature, but not low enough to freeze the water, it goes absolutely solid, forming a mass of silky crystals. A solution made with double the quantity of hydrochloric acid requisite for neutralizing the strychnine deposits crystals on very slight cooling. As Mr. Duncan has pointed out, there can be no doubt that this deposit of crystals in the solution of strychnine is entirely due to an excess of acid. The Pharmacopœia formula orders a quantity of acid which is slightly in excess for the 9 grains of strychnine, and possibly it would be advisable to reduce the proportion from 14 minims for 9 grains to something less than 10 minims. There would then be no risk of deposit at any ordinary temperature. A specimen made three weeks ago has remained perfectly clear, and even when put into a freezing mixture it gives very little deposit.

Discussion.

Mr. Martindale said he had been exceedingly interested in the specimens of jaborandi, and was glad Mr. Holmes had been able so far to identify the species which yielded this peculiar drug. It had occurred to him that *Pilocarpus pennatifolius* was not identical with that which was considered most active in commerce. When the drug first attracted attention the specimens which were most active had a roughish surface, something like the one now shown, and on comparison with the specimens cultivated at Kew it was evident that there was a great distinction between them. Experiments were tried to discover their physiological action, and *P. pennatifolius* leaves grown at Kew, even in larger doses than were usual with the true jaborandi, failed to produce anything like the action of the Pernambuco jaborandi. Even with children frequent doses of the powdered Kew leaves failed to produce a perceptible diaphoretic action. At that time, evidently, the true botanical source of the drug was not ascertained, but it was then thought possible that the character of the plant might have been changed by hothouse cultivation, and that, therefore, the elaboration of the active principle, the pilocarpine, had not taken place. Now that Mr. Holmes had a sufficient quantity of what he assumed to be the genuine source of the Pernambuco jaborandi he hoped experiments would be made as to its physiological action. With regard to *Erythroxylon Bolivianum*, although it seemed to produce very good and pure cocaine, it was not liked so well as some of the northern Peruvian cocas, such as the Truxillo, because the Bolivian variety contained such a quantity of wax, which was objectionable in making pharmaceutical preparations; this was shown by the dark green glossy surface of the leaves. It was quite true, as stated by Dr. Hesse, that it was one of the best sources of cocaine.

He had paid some attention to solutions of strychnine lately, and could not quite agree with the view expressed in Edinburgh as to the desirability of continuing to use the pure alkaloid rather than a salt in making these preparations. Some of the salts were so readily soluble, especially the one which he had recommended, the acid sulphate—although he found on repeating his experiments it was not quite so much so as he had originally stated—that he considered their use preferable. When the requisite proportion of the salt to form liquor strychninæ was put into water it dissolved immediately, which was a great advantage. You had a definite salt to work with, and there was no excess of acid likely to be present. The use of the pure alkaloid, as recommended in the Pharmacopœia, was exceptional in the case of strychnine, salts being directed in the case of both morphine and atropine. In the German Pharmacopœia the nitrate was mentioned, the alkaloid itself was not official. The same thing occurred with codeine, where in place of the alkaloid itself they had the phosphate, which was readily soluble. The reduction in strength by making a solution of the salt rather than the alkaloid by adding an acid to it, would tend to make a more permanent solution of this powerful drug, which would be far more convenient for prescribers and dispensers. His assistant, Mr. Lee, who had conducted some experiments on the same lines as Dr. Paul, had come to the same conclusions as one of the gentlemen who spoke at Edinburgh. He (Mr. Martindale) had stated elsewhere that the strength of the solution of acid sulphate was 1 in 36, but he found it was more nearly 1 in 40·5. The nitrate was a very convenient salt for use, but not so admissible as the acid sulphate.

Mr. Moss said he could add nothing to the information Mr. Holmes had given with regard to the origin of the Aden senna he had exhibited, but since communicating with him he had had further experience as to its therapeutic value. A preparation of it had been made and used to some extent by his workpeople, who all reported favourably upon it. The first man he asked, who was a big strapping fellow, had taken a fluid drachm of the liquid extract, and he said it was all right; that it was rather nice, and had a sweet taste. Not being quite satisfied he spoke to another man, and he volunteered the information that it was rather sweet. He himself then made a comparison of three liquid extracts made from this Aden senna, and two other varieties. He found the distinction was really most marked. The Aden senna was sweet and pleasant, and had no acrid taste of any kind whatever. When he saw it lying on the showboard of Messrs. Hale and Son he wondered what a parcel of *Cassia obovata*, which he took it to be, was doing in London. He thought he would send a sample to Mr. Holmes, and from this had resulted the interesting remarks he had given them. With regard to the pareira brava, it had been stated several times that it came into commerce as a mixture of root and stem, both of which he had examined; that which had been put on the table as Bahia pareira brava could never be mistaken for it. The two plants were totally distinct, independent of the microscopic characters which Mr. Murton Holmes had so clearly pointed out. For one thing it was very much lighter. The general structure, also, was very different; it was much more uniform and even; there was more of a pattern in it, so that one could not easily confuse one with the other.

Mr. Thos. Christy said there were only a few specimens in commerce of the many varieties of coca. He had brought specimens of three of his plants, which differed very much in appearance, especially when you saw them growing, and they were now 3 to 4 feet high. There were several other varieties, which they were now trying to get, through Mr. Thompson. The question of the quality of coca leaves was very much misunderstood in England; in Germany they had discovered a method of getting very much more of the crystallized material out of the leaf, and consequently nearly all the leaves were now sent to Germany; the Java leaves did not come here at all, but went straight to Holland, and from thence to Germany. He had also brought a few growing plants, one being the *Anemone Pulsatilla nigricans*, which was grown largely in Germany, because it could be transported easily in the fresh state in spirit; here, of course, the high price of spirit rendered that impossible. Another specimen was the *Fabiana imbricata*, which showed that as good a plant could be grown in Europe as in South America.

Mr. R. A. Davies said they were all much indebted to Mr. Holmes, and he was very glad that he had brought forward the subject of eucalyptus oils, upon which he had very little to add. Mr. Holmes had furnished him with a sample of the cneorifolia oil that he might compare it with other oils which had been examined, and he found it identical with the oil he had previously described as the product of the *E. oleosa*. This completely confirmed what Mr. Holmes had said, the sp. gr. was ·921, which was exactly the mean of two samples of oleosa, the rotation was in the same direction, but very small, only 5° in 100 mm., and it contained no phellandrene but a considerable quantity of eucalyptol. When he read a paper on this subject at the Conference last year he had not succeeded in confirming a statement he had seen attributed to Messrs. Schimmel that some varieties of eucalyptus oil, particularly the *E. oleosa*, would yield eucalyptol in a crystalline form by merely cooling the oil, without any previous fractionation, but he had now reason to believe that his failure to obtain crystals arose from not having the ice, which he used to produce a freezing mixture with salt, in a sufficiently divided state to produce the lowest possible temperature. During the winter he had had the opportunity of using snow, and he had obtained eucalyptol in crystals without any fractionation from four varieties, viz., *E. oleosa*, *E. cneorifolia*, *E. dumosa*, and one specimen which he believed to have come from *E. globulus*. About twenty or thirty specimens were tried in all. Three out of the four became quite solid, like so much oil of anise, when cooled in a mixture of salt and snow. With regard to the medicinal value of the various constituents of eucalyptus oil, he thought the time had come when some investigations should be made in that direction. It was clearly a matter for medical men to take in hand. There was no difficulty in procuring phellandrene of a fair degree of purity from *E. amygdalina*, and the oil was still sufficiently plentiful. In the same way eucalyptol could easily be prepared in considerable quantity from *E. cneorifolia*, and therefore medical men might fairly be asked to take up this investigation.

Mr. Drysdale said it appeared that both Mr. Holmes and Mr. Davies referred to the oils of *E. cneorifolia* and *E. oleosa* as if they were separate and distinct, but he stated they were one and the same product. Some years ago when this oil was first made, the distillers had recourse to the 'Eucalyptographia' of Baron von Müller, in which the species *cneorifolia* was given as a sub-variety of *oleosa*, but he believed it had been discovered since that the *E. cneorifolia* was a distinct variety. The distillers had given the name *oleosa* to their oil on that authority and partly on account of its being more euphonious. He might add that this species was not propagated to any extent in Australia; it was found almost exclusively on Kangaroo Island along the banks of the Cygnet river. It was a small scrub, locally known by the name of "narrowleaf" eucalyptus.

Dr. Passmore said he had recently analysed several samples of cneorifolia oil, and in one case it contained nearly 50 per cent. of eucalyptol, another specimen also contained a large quantity; in the higher boiling point fraction, viz., from about 200° to 220°, there was apparently an aldehyde which had an odour like lemons, and he thought probably it might be citral.

Professor Attfield, referring to the solution of strychnine question, said some recognition was due to a gentleman whose name had not been mentioned, Mr. McPherson, who two years ago undertook the examination of these liquors, and read a paper upon them at the Conference, in which he drew attention to the varying amounts of acid chloride which would be present, according as one used actual weights, or parts by weight; and this would account for some pharmacists producing a preparation more acid than others. There was not time to go into the question of the various strengths of all these formulæ, but on reference to the paper it would be seen that he gave improved formulæ, such as would probably be introduced into the Pharmacopœia at some future time. It was satisfactory to find that if these instructions were carried out there was no important difference; but it would seem desirable to use a solution not perhaps quite neutral, but containing very little excess of acid, and not expose it to too low a temperature, as was first recommended by Mr. Umney. He could not attempt to touch on any other subjects which had been brought forward; but he highly appreciated Mr. Holmes's efforts, and looked forward to a continuance of such researches as likely to furnish him with material for future reports on the Pharmacopœia. It was through such researches, brought forward in such an admirably concentrated way, that they might hope in future to

get a British Pharmacopœia which would be superior to any other Pharmacopœia in the world.

Mr. DYMOND said he had had an opportunity of seeing the work done on the oil of lemons, and might add a word or two on that subject. He thought it was hardly correct to speak of it as oil of lemons from which the terpene had been removed, because, as appeared from the figures, a good deal of the terpene was still left. The boiling point of this distilled essence of lemon was practically the same as that of the other from which the terpene had not been removed. The terpenes in essence of lemon were chiefly limonene, and, to some extent, pinene. They both boiled at a temperature of about 170°, so that probably a large amount of the limonene was still present. The question was—What was the object of removing the limonene? It was merely a diluent, which possibly was rather an advantage than otherwise. What they really wanted to know was whether this distilled essence could be obtained without deterioration of the essential ingredient, and it was not yet thoroughly understood what that essential ingredient was. It might be the ketone-like body citral, which occurred in certain specimens of eucalyptus oil, but it was not yet certain. They wanted to know whether an oil of lemon could be prepared containing the essential ingredient in a fair state of purity. The difficulty was this—in all essence of lemon, after standing, a large amount of white deposit occurred, and it was not yet ascertained that the same thing would not occur with this distilled oil; if it did not, it would be a distinct gain; but he feared the probability was that a deposit would take place in time. This white deposit was no doubt something closely allied to limettin, which Professor Tilden had obtained from oil of limes, though not identical with it; and it was a question whether that limettin or the body allied to it was formed from substances which still remained in the essence, or from the limonene which was removed. It was not likely to come from the limonene, which was a fairly stable body. A great deal of work, therefore, yet remained to be done, and with regard to the figures given he might say they were not of very much value until they knew exactly the source of the oil and how it was prepared. In such a complex mixture as oil of lemon, slight variations in the conditions under which its preparation was conducted might make considerable differences in the rotatory power, boiling point, and specific gravity.

The PRESIDENT then proposed a hearty vote of thanks to Mr. Holmes, also to Mr. Murton Holmes and Dr. Paul, and to Mr. Hart, who had assisted in preparing the sections and slides.

The vote of thanks was carried unanimously.

MEETING OF THE EXECUTIVE OF THE NORTH BRITISH BRANCH.

A meeting of the Executive of the North British Branch was held in the Society's House, 36, York Place, Edinburgh, on Wednesday, April 13, at 1 p.m., Mr. J. Laidlaw Ewing in the chair.

Present: Messrs. Boa, Ewing, Gibson, and Stephenson, Edinburgh; Fisher, Dunfermline; Hardie and Kerr, Dundee; Jack, Arbroath; Kermath, St. Andrews; Kinninmont and McAdam, Glasgow; Maben, Hawick; Nesbit, Portobello; Storrar, Kirkcaldy; and Strachan, Aberdeen.

Apologies for absence were received from Messrs. Frazer, Glasgow; and Paterson, Aberdeen.

The minutes of last meeting were read and approved.

The report of the General Purposes Committee, which included an expenditure of about £33 for new fittings, specimens and apparatus required by the Board of Examiners in connection with the new style of examinations, and an expenditure of about £20 for alterations and repairs on chimneys and fire-places in the Society's House, and repairs on stable in Duke Street Lane, was read and adopted.

The Executive went into committee to consider the annual report to the Council, and on resuming, it was moved by the Chairman, seconded by Mr. Gibson, and agreed, that the report be adopted and forwarded to the Council.

The following resolution was unanimously agreed to:

> "That the next election of Executive take place on Wednesday, June 15, and that the Chairman and Vice-Chairman be appointed scrutineers of the voting papers, with power to add to their number."

The Chairman read a letter from Mr. William Gilmour, Edinburgh, stating that he had met with two difficulties in connection with the new regulations as to the sale of methylated spirit: 1. It was occasionally required in an emergency on Sundays and it was a hardship not to be able to supply it. 2. Medical men and scientists complained that the new methylated spirit containing mineral naphtha could not be used for microscopic purposes or the preservation of pathological preparations, on account of its becoming opaque on addition of water. He had been in communication with the Somerset House authorities, but had got no satisfaction, and suggested that the Executive should take up the question and see if any concessions could be got to meet these difficulties.

Mr. Nesbit said he had found great inconvenience occasionally from the prohibition to sell on Sundays. In one instance of a woman who was seriously ill he had had to give her some of the spirit as a present rather than turn the messenger away. This woman died, and it would have been a serious reflection on the law had such a result followed a refusal on his part to supply the spirit when required by the medical attendant.

Mr. Kinninmont said he had applied to the Inland Revenue authorities for permission to use the unmineralized methylated spirit in making a disinfectant solution largely used on board ships. He stated that he used about 40 gallons a year, but his application was refused. He could not understand this, as an identical preparation was made by the Glasgow Apothecaries Company, and they had no difficulty in getting the permission refused to him.

Mr. McAdam said that was quite true.

The Chairman said his firm had frequently been put at a serious disadvantage from having to refuse to supply methylated spirit on Sunday in emergencies when it was required for cases of serious illness. They had applied to the Inland Revenue authorities, but without avail, and they were told that they could not be allowed even to give it away, as had been done by Mr. Nesbit.

Mr. Nesbit said the spirit he gave away was from his private house.

Mr. Gibson said he had heard that this new mineralized methylated spirit had given rise to such difficulties that there was a probability the Inland Revenue authorities would revert to the old form.

It was moved by Mr. Kermath, and seconded by Mr. Fisher:—

> "That the Executive bring under the notice of the Council the restrictions on the sale of methylated spirit, with a view to securing from the Inland Revenue permission to supply methylated spirit on Sundays, on the prescription of a medical practitioner, and also that permission be got to sell small quantities of the methylated spirit without mineral naphtha for scientific purposes, as is at present done in the case of rectified spirit."

Mr. McAdam moved as an amendment, seconded by Mr. Hardie—

"That all reference to the sale of methylated spirit on Sundays be deleted from the motion."

On a division, 7 voted for the amendment and 8 for the motion, which was therefore declared carried.

Mr. Kermath asked what had been done about dividing the country into areas, and appointing Local Secretaries for these areas.

The Chairman stated that the matter had been remitted to a Committee by the Council, and was at present under consideration. The meeting then closed.

MAJOR EXAMINATION IN LONDON.

April 19, 1892.

The following are the questions that were set for this examination:—

Physics.

1. State the law governing the diffusion of gases, and describe an experiment in illustration of it.
2. Define specific and atomic heat, and give a process by which the specific heat of a solid may be determined.
3. Describe the construction and principle of a bichromate battery cell, and represent the reactions which take place in it by equations.
4. Define the terms "electrode," "electrolyte," "ion," and mention any technical applications of electrolysis with which you are acquainted.
5. Show what occurs when a ray of light falls at an angle upon a plate of glass with plane parallel sides.
6. Distinguish between radiant heat and light, and give some method by which they may be separated.
7. What is meant by the "plane of polarization?" How is it affected by a solution of glucose?

Chemistry.

1. Define isomerism and point out its various forms, giving examples.
2. How is calcium hypophosphite prepared? Give the equation. Why is the gaseous product of the reaction spontaneously inflammable? Account for the basicity of phosphorous and hypophosphorous acids respectively by a reference to their constitutional formulæ.
3. Give a process for the preparation of ethyl iodide, and describe the properties of the compound. What is its reaction with metallic zinc?
4. What is ethylene, and to what class of bodies does it belong? Name its principal derivatives, and show how they may be prepared from it.
5. Describe the sources, character, and chemical constitution of succinic acid, and indicate its relation to tartaric acid.
6. What is the constitution of glycerin, and how has it been determined?
7. Give a general account of the carbohydrates, showing the principle upon which they are classified.
8. Give the chemistry of naphthalene. What are its uses in the arts?

April 20.

Botany and Materia Medica.

(*Morning.*)

1. Refer to their respective natural orders the botanical specimens submitted to you, and name the genus of any that you may know. Write a full description of that marked A.
2. What are the characteristics of the N.O. *Gentianaceæ*? Name any indigenous genera of this order.
3. Distinguish between epiphytes, parasites, and saprophytes, and give examples of each.
4. Describe the chief varieties of anthocarpous fruits, and give an example of each
5. Describe the structure and development of the pollen grains of the *Gymnospermia*.
6. What are *paraphyses*? In what natural orders are they found?
7. Define *arillus*, *arillode*, *elater*, *hyphæ*, and *callus*.
8. Describe the origin and growth, and the chemical nature and reactions of the cell-wall.

(*Afternoon.*)

1. Describe the microscopic structure of the seed of *Ricinus communis*.
2. Examine microscopically the three samples of Lupulin (A, B, and C), and report upon the quality of each.
3. What is *Copaiba*? Describe its principal constituents, and give tests for its purity.
4. What are the chief constituents of *Kino*? What decomposition products are formed (1) by dry distillation, (2) by melting with caustic potash?
5. State what you know respecting the constituents of *Veratrum viride* and *Veratrum album*.
6. Explain fully the production and constitution of essential oil of almonds, and give tests for its purity.
7. How would you separate quinine from a mixture of the Cinchona alkaloids?
8. Explain fully the official process for the preparation of strychnine.

MAJOR EXAMINATION IN EDINBURGH.

April 14, 1892.

The following are the questions that were set for this examination:—

Chemistry and Physics.

Physics.

Time: 10 *a.m. to* 1 *p.m.*

1. Define the term "Velocity." What is usually adopted as the "Unit of Velocity?"
2. By whom was the doctrine of "Latent Heat" first taught. How may the latent heat of a body be determined?
3. Describe how you would determine the melting and boiling points of a substance. Do both of these points vary for the same substance; and, if so, under what conditions?
4. What is the principle and manner of working of a freezing machine in which air is the fluid employed?
5. How does the motion of a luminous body affect the wave-length of its light?
6. Explain fully what is meant by "Electrical Induction."

Chemistry.

Time: 2 *to* 5 *p.m.*

1. Give a process by which cyanate of potassium may be practically prepared. What relation does cyanate of ammonium bear to urea?
2. How is tetra-ethyl-ammonium iodide prepared, and what are its properties?
3. What is the general effect of nascent hydrogen upon nitro-derivatives?
4. What reaction takes place in the preparation of iodide of ethyl when phosphorus is used in the process?
5. Give the structural formulæ of normal propyl alcohol, and iso-propyl alcohol. State how these compounds are obtained, and mention the products of their oxidation.
6. What is the nature of allyl alcohol, and how may it be prepared? What is its relation to propyl alcohol?
7. Discuss the chemistry of mustard.
8. How does soap vary as regards its composition? What effect has this variation in pharmacy? Give the chemical explanation of the fact that a tablet of soap may lather freely when first used, and only with difficulty after it has been used for some time.

April 15.

BOTANY AND MATERIA MEDICA.

BOTANY.

Time: 10 *a.m. to* 1 *p.m.*

1. Describe protoplasm and the part it plays in the economy of plant life.

2. Compare the apex of the stem and the apex of the root in a phanerogamous plant, illustrating by diagrams; point out the reasons for any differences between them.

3. By what characters are the Musci to be distinguished among Cryptogams?

4. Give the class and order in the Linnæan and De Candolle systems of the flowers submitted to you, and give your reasons for so classifying them in each case.

5. Explain fully what is meant by sexual and asexual reproduction; give an example of each; and define the terms antherozoid, oosphere, oospore, sporophore and oophore.

6. Name the tissues in the plant section shown to you, and give an account of their functions.

MATERIA MEDICA.

Time: 2 *to* 5 *p.m.*

1. Name the constituents of *Cinchona succirubra*. Is quinine found in all the varieties of Cinchona? What is meant by amorphous alkaloids? Give a theory as to their formation.

2. What are the physical and chemical characteristics of Pelletierine? From what is it obtained? Describe a process for its elimination.

3. Explain minutely the changes which take place on bruising cherry laurel leaves in presence of water, and state in what other products an analogous result occurs.

4. What are the sources of the aloes of commerce? In what proportion is aloin found in them. Do the aloins differ in composition; if so, in what respect?

5. Describe as far as you can the sections of Digitalis leaf, Pareira root, and Podophyllum rhizome submitted to you.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At the meeting of this Association, held at 103, Great Russell Street, on the 24th ult., Mr. W. Lloyd Williams, A.I.C., President, in the chair. The following paper was read on—

THE CHEMISTRY OF THE LIVER.

BY A. P. LUFF, M.D., B.SC., M.R.C.P.

Although I shall trouble you with as few anatomical and physiological details as possible, yet it is necessary for the comprehension of the subject that I should give you some idea as to the relationship of the liver to the alimentary canal and to the circulation in general. The liver is a large gland connected by means of the bile duct with the upper part of the intestinal tract; it is composed of a number of small lobules, each of which may be regarded as a miniature liver, since the chemical changes occurring in the liver are the sum of the chemical changes occurring in the individual lobules. The liver is a very vascular organ, and is supplied with blood from two different sources; from one source, by means of the hepatic artery, it receives blood from the systemic circulation, which blood is intended for the general nutrition of its substance, or, in other words, for the repair of the wear and tear of its tissues; from another source, by means of the portal vein, it receives blood from the digestive viscera, notably from the stomach and intestines, and in this portal blood are conveyed to the liver the dissolved products resulting from the action of the various digestive juices on the constituents of food during their passage through the alimentary canal; these soluble products which result from the processes of digestion are in the liver submitted to important chemical changes, and these changes I propose to consider to-night. To recapitulate, the hepatic artery merely conveys arterial blood for the nutrition of the liver substance, whereas the portal vein, by means of its tributaries from the digestive viscera, conveys in its blood material upon which the liver exercises its elaborative action.

The substances elaborated within the liver can leave that organ by two channels, either being discharged by means of the bile-duct into the upper part of the intestines, or passing by means of the hepatic vein into the general circulation. The liver is therefore placed in the road by which portal blood conveying material from the digestive tract must pass before it can gain access to the general circulation, and it is a gland provided with remarkable chemical powers, by means of which it can transform substances that would in themselves be harmful to the organism into useful or harmless products. We have now to consider what these chemical powers are, with which the liver is provided.

The chief chemical functions of the liver are, the secretion of bile, the formation of sugar, the formation of urea and other urinary substances. As regards the first mentioned function, viz., the secretion of bile, the liver performs the *rôle* of a secreting gland, the duct of which, viz., the bile-duct, opens into the upper part of the intestines. As regards the two other functions, viz., the formation of sugar, urea and other urinary substances, the liver is practically playing the part of a ductless gland, from which the elaborated products (sugar, urea, etc.), are carried off by the outgoing venous blood. Bile is a somewhat viscid fluid, dirty green or reddish-brown in colour, possessing a bitter taste, a slightly alkaline reaction, a sp. gr. of 1·020, and containing from 10 to 15 per cent. of solid matters. A considerable quantity of bile is being daily produced by the liver, about 50 fluid ounces being secreted in twenty-four hours by an adult man. The greater part of the specific biliary substances are manufactured by the liver, and are not simply removed in a ready made condition from the blood. The sodium salts of the bile acids form two soaps, viz., sodium glycocholate and sodium taurocholate.

Glycocholic Acid ($C_{26}H_{43}NO_6$) is a compound of glycocine and cholalic acid, the union of these two substances taking place in the liver cells.

$$\begin{cases} CH_2{\cdot}NH_2 \\ COHO \end{cases} + C_{24}H_{40}O_5 = C_{26}H_{43}NO_6 + H_2O$$

Glycocine. Cholalic acid. Glycocholic acid. Water.

Glycocine is formed in the intestines during the pancreatic digestion of proteids; but as to the production of cholalic acid nothing is known, except that it is probably produced within the liver cells.

Glycocholic acid is especially abundant in the bile of herbivora and of man; and the amount is increased in the bile of man by a vegetable diet. In the intestines the glycocholic acid of bile is decomposed, taking up water and splitting into glycoceine and cholalic acid.

$$C_{26}H_{43}NO_6 + H_2O = \begin{cases} CH_2{\cdot}NH_2 \\ COHO \end{cases} + C_{24}H_{40}O_5$$

Glycocholic acid. Water. Glycocine. Cholalic acid.

Taurocholic Acid ($C_{26}H_{45}NO_7S$) is a compound of taurine and cholalic acid, the union of these two substances also taking place in the liver cells.

$$C_2H_7NO_3S + C_{24}H_{40}O_5 = C_{26}H_{45}NO_7S + H_2O.$$

Taurine. Cholalic acid. Taurocholic acid. Water.

Taurine is formed in the intestines during the pancreatic digestion of proteids.

Taurocholic acid is especially abundant in the bile

of carnivora and is also present in the bile of man. In the intestines it takes up water and splits into taurine and cholalic acid.

$C_{26}H_{45}NO_7S + H_2O = C_2H_7NO_3S + C_{24}H_{40}O_5$.
Taurocholic acid. Water. Taurine. Cholalic acid.

To separate the bile salts, evaporate the bile to a quarter its bulk, make into a paste with animal charcoal, dry at 100° C. and extract with alcohol; from the alcoholic solution the bile salts may be precipitated by adding ether in excess. Pettenkofer's test for the bile acids consists in the development of a red colour on the addition of strong sulphuric acid and a concentrated solution of cane sugar. The two bile acids may be separated from each other by dissolving the sodium salts of the two bile acids in water, and adding neutral lead acetate, when the glycocholate of lead is precipitated. Filter, and add to the filtrate basic lead acetate and ammonia, when the taurocholate of lead is precipitated. From the lead salts the bile acids can be liberated by means of sulphuretted hydrogen. The glycocholate and taurocholate of sodium are found very sparingly in the fæces, and are only represented to a slight extent in the urine. It is calculated that about seven-eighths of these bile salts are re-absorbed from the intestines and returned to the liver, in the form of the simpler constituents, glycocine, taurine and cholalic acid, into which they have split up in the intestines, these bodies being again united within the liver to form the bile salts. If, therefore, the liver normally depends upon the recovery from the intestines of so large a proportion of its bile salts, is it to be wondered at that the liver becomes so quickly deranged, as it does, during an attack of profuse diarrhœa, when the bile salts which should be returned to the liver are swept away in the stools.

Cholesterin ($C_{26}H_{44}O$). The chief interest of this constituent of the bile lies in the fact that it forms the main constituent of the concretions known as gall stones. Very little is known as to its mode of formation; in a gall stone its presence can be detected by crushing the stone, dissolving out the cholesterin with chloroform, and adding strong sulphuric acid to the chloroform solution, when a red colour is produced.

The yellow colouring matter of the bile of man and of the carnivora is due to a pigment bilirubin $C_{32}H_{36}N_4O_6$; the green colouring matter of the bile of herbivora is due to a pigment biliverdin $C_{32}H_{36}N_4O_8$. These pigments are derived from blood-colouring matter, for bilirubin is indistinguishable from hæmatoidin, a pigment found in old blood deposits. Biliverdin is a more highly oxidized state of bilirubin; either of them if reduced with nascent hydrogen yields hydrobilirubin $C_{32}H_{36}N_4O_5$, which is identical with urobilin, the bile-pigment derivative in urine, and with stercobilin, the bile-pigment derivative in fæces. Bile pigment differs from blood pigment in that it contains no iron; consequently, iron salts are found deposited in liver tissue. Small quantities of phosphate of iron are present in bile, but not in bile pigment.

The work of the bile is to assist in the digestion of fat, which it does by acting both as an emulsifying and a saponifying agent; the emulsification of the fat is favourable to its digestion, and the saponification is favourable to its diffusion or osmosis. Bile prepares the contents of the stomach, as they are passed into the intestine, for the digestive action of pancreatic juice; this it does by neutralizing the hydrochloric acid of the gastric contents, and so putting an end to the action of pepsin. It also promotes the digestion of starch and stimulates the peristaltic movements of the intestines. Being a weak antiseptic bile retards the putrefaction of food in the intestines; hence in cases of obstructive jaundice, in which bile is absent from the intestines, the stools are more offensive than to smell.

The liver is a source whence sugar is discharged into the circulation, for the portal venous blood contains only 1 part of sugar per 1000, whereas the hepatic venous blood contains 2 parts of sugar per 1000, and considering the great quantity of blood passing through the liver this means that a large amount of sugar is being daily produced by the liver and discharged into the blood leaving that organ. From what is this sugar produced? It is produced from a substance named glycogen, which is manufactured by and stored up in the liver cells.

Glycogen ($C_6H_{10}O_5$) is a member of the carbohydrate group, and is an isomer of starch and dextrin. The production of sugar in the liver takes place in two stages; first, the formation of glycogen, and second, the conversion of glycogen into sugar. Glycogen is derived from food, and especially from carbohydrate foods. It is also derived from proteids, but not from fat, as the livers of animals fed exclusively on fat contain no glycogen. If minced up liver is boiled with water the glycogen is extracted, and can be precipitated by the addition of alcohol to the aqueous extract. It is a white powder soluble in water and yielding an opalescent solution. Iodine gives a mahogany brown colour with glycogen; by boiling with dilute sulphuric acid glycogen readily combines with water and yields glucose.

The amount of sugar in the venous blood of muscle is below that present in the arterial blood; sugar is therefore consumed by living muscle, to which it is a food and heat-producing substance. Glycogen must therefore be regarded as a temporary carbohydrate reserve, stored up for the time in the liver and capable of conversion into sugar, as demand for the latter arises within the system. On the one hand, it is formed by and deposited in the liver cells from materials brought to the liver in the portal blood; on the other hand, it is given out by the same cells in the form of sugar, as necessity arises. The glycogen of the liver is diminished by fasting, by fevers, and in cases of poisoning by arsenic and phosphorus, the diminution in the last three cases being due to derangement of function of the liver cells. The glycogenic function of the liver is intimately associated with the interesting disease known as diabetes. In this disease there is an excess of sugar in the blood, which excess is disposed of by the kidneys, and so appears in the urine. This excess of sugar in the blood may be attributed to abnormal action of the liver, *i.e.*, increased production of sugar, or to deficient consumption of sugar by the tissues. It is probable that both causes co-operate in the causation of diabetes, although the former is doubtless the more potent factor. Since the system can only dispose of a definite quantity of sugar in a certain time, if the blood contains more sugar than usual, the excess of sugar must of necessity make its appearance in the urine. It follows that it is essential in the treatment of diabetic patients to exclude from their diet all starchy and saccharine substances.

Nitrogen enters the organism in the different proteid articles of food; it leaves mainly as urea. The liver is the chief place where urea is formed, the kidneys acting as filters through which it passes in solution. As to the actual formation of urea and uric acid in the liver not much is known. We are acquainted with some intermediate substances between proteids and urea, bodies which are less complex than proteids, but which are more complex than urea; these substances are certainly derived from proteids, and are probably some of the antecedents of urea. They are, leucine and tyrosine in the intestines, glycocine in glycocholic acid and in the intestines, creatine and sarcosine in muscle, and uric and hippuric acids in urine.

It is known that the introduction of glycocine and

leucine into the bowel or into the circulation increases the amount of urea. As further evidence of the great importance of the liver as an excreting organ, I may mention that many poisons, especially metallic ones, and particularly antimony, arsenic, copper, lead and mercury are excreted by the liver.

The President (Mr. W. Lloyd Williams) asked was it likely that glycogen would ever be found useful as an aid in weakened and defective nutrition, in those cases where an easily assimilable carbohydrate was called for? They were all acquainted with the use to which pepsin had been put and to a certain extent with the mode of preparation. Glycogen doubtless presented difficulties, inasmuch as it would be necessary to dissect out the liver and plunge it into boiling water immediately after the death of the animal, in order to avert the very rapid transformation into sugar which occurred, but the difficulties need not of necessity prove insuperable, if this agent was likely to be of service. The question of the feeding of diabetic patients had recently been discussed; and he would ask Dr. Luff's view as to the desirability or otherwise of prohibiting the use of carbohydrate food material in cases where the disease was well pronounced. Another point that needed clearing up was that which related to the presence of traces of sugar in urine. Did healthy urine normally contain sugar or not? Some authorities said it did, others declared that the copper reducing agent present in urine, otherwise normal, was not sugar at all but creatinin.

Mr. E. J. Parry asked if there was any direct evidence that uric acid and tyrosine were antecedents of urea? For it seemed difficult for chemists to understand how—with the large quantity of urea excreted by man—such an insoluble substance as uric acid could be present in such quantity as could give rise to it. Did Dr. Luff mean that in the transference of fat a continual decomposition took place, of the fat into glycerine and a fatty acid and a recomposition in the next cell and so on; as Von Sachs assumed in the case of transference of fats in plant tissues? It was interesting to note that most of the bodies Dr. Luff had mentioned, taurin, creatine, cholin, etc., had been synthesized.

Mr. F. C. J. Bird asked if anything were known as to how the liver converts glycogen into sugar.

Mr. Seccombe said the ordinary test for glycogen—the addition of weak iodine solution which gave a brown coloration that disappeared on heating and returned on cooling—was not a very satisfactory one. Did Dr. Luff know of a characteristic test whereby glycogen could be readily distinguished from dextrin. He (the speaker) had not always been successful with Pettenkofer's test for bile salts; perhaps this was due to insufficient care in applying the test, as the sugar was very liable to become charred by the sulphuric acid; would not this be obviated by substituting furfurol for sugar. He did not regard the test as characteristic, for a similar reaction was obtained with albumen, cholesterin, and other substances.

Mr. Smith asked as to the effect of nervous irritation upon individuals of a diabetic tendency.

Mr. Frank A. Rogers asked if the administration of phosphorus aided or retarded the formation of glycogen.

Mr. Bainbridge said Dr. Luff had stated that arsenic and phosphorus retarded the formation of glycogen. He would ask how he reconciled that statement with the fact that horses dosed with arsenic improved in so marked a manner in condition, and also the healthy appearance of the arsenic eaters of the Tyrol.

Dr. Luff, in replying, said that he had no knowledge of the use of glycogen as a dietetic, nor had he ever heard its use suggested. He was afraid that it would be difficult to obtain a sufficient quantity of the substance, for as Mr. Williams had stated, unless the livers were dissected out and extracted immediately after death, the yield of glycogen would be very small or *nil*. It had no great advantages over dextrin, which was also soluble, unless it was that it is somewhat more easily converted into sugar. With reference to discontinuing carbohydrate diet after diabetes had passed a certain stage he did not follow a hard and fast rule. He would certainly say that where the case was past remedy give the patient all the comfort possible in life. In his opinion sugar was not a normal constituent in urine. Either creatinin, uric acid or some uric acid combination caused the reactions observed. Mr. Shillingfleet Johnson considered the reducing agent to be creatinin, for after extracting that body, on again testing, he failed to observe the reaction which he had obtained before the process. As to tyrosine and uric acid being the antecedents of urea he thought nothing could be urged to the contrary. It was true that uric acid was very insoluble, but it was possible that the soluble compound might be formed from the insoluble. With reference to the saponification of fat by bile, the idea mentioned by Mr. Parry of the splitting up and recomposition of the soap was what was generally accepted. Acetone is not found in diabetic urine. Aceto-acetic ether is formed which on distillation gives rise to the formation of acetone. The glycogen of the liver was, under the influence of an unorganized ferment, converted into sugar, the change occupying but a very short space of time. The iodine test for glycogen was unsatisfactory. In identifying glycogen, after proving its nature by boiling with dilute sulphuric acid and testing with Fehling, the appearance of its solution was most characteristic, it having an opalescent or milky appearance. The failure mentioned with Pettenkofer's test for bile salts was probably caused by the solution of sugar not having been cooled before adding the sulphuric acid. Dr. Dickinson's milk diet for diabetic patients had been given up, as it was found that they did not fare so well on the skimmed milk recommended. With reference to the influence of arsenic and phosphorus upon the formation of glycogen, his remarks referred to poisonous doses. With small doses of arsenic gradually increased, as in the instances mentioned, there was an improvement in the general nutrition.

At a meeting held on Thursday, March 31, Mr. W. Lloyd Williams, A.I.C., President, in the chair, a paper was read on "Osmosis and its Relation to Plant Life," by H. Garnett. This paper will be published in a future number of the Journal.

Provincial Transactions.

NEWCASTLE-ON-TYNE CHEMISTS' ASSISTANTS' AND APPRENTICES' ASSOCIATION.

The annual business meeting of the Association was held at Lockhart's Café, St. Nicholas Square, on Wednesday, the 13th inst., at 8.15 p.m. Mr. G. F. Merson, President, occupied the chair.

The minutes of the previous meeting having been read and confirmed, the Chairman called upon the Secretary to read the report of the Prize Committee in connection with the annual competition which was held recently. The report showed that eight apprentices presented themselves at the examination. The papers were carefully scrutinized and the results were found to be as follows:—1st prize (Bentham and Hooker's 'Flora,' and Ince's 'Latin Grammar,' presented by the Editor of the *British and Colonial Druggist*), John Henry Taylor, 68, Malvern Street, with 97·5 per cent. of marks; 2nd prize (Bentley's 'Botany' and

Bentley's 'Materia Medica,' presented as above), Edward Taylor Wilson, 135, Pilgrim Street.

Mr. B. S. Proctor, in presenting the prizes to the successful candidates, urged all the members of the Association to take advantage of the educational opportunities which the Association afforded. All the candidates could not gain prizes, but they could all gain knowledge and experience, which were sometimes better than a prize. Those who did not succeed in gaining a prize this year would, by steady reading and diligence, be certain to make a most creditable appearance next session. The treasurer's report showed that the Association had a balance of £2 15*s.* 10*d.*, whilst the Secretary's report showed that, though there was a slight increase in the number of members, there was a noticeable falling off in the attendance at the meetings. This was attributed to evening classes in chemistry, etc., being held at the science schools on the same night. The report also contained a recommendation to fix the dates of meeting for next session on such nights as would not interfere with the classes in any way.

The following office-bearers were then elected for next session:—President, Mr. G. F. Merson; Vice-President, Mr. Hedley Pattinson; Secretary, Mr. A. Russell Bennet, 20, W. Grainger Street; Assistant Secretary; Mr. Robert MacClumpha; Treasurer, Mr. F. R. Dudderidge. Members of Committee: Messrs. Geo. Cormack, J. Johnston, J. Mackenzie, B. T. Ord, F. Park and E. T. Wilson. Members of Prize Committee: the President, Secretary, and Mr. F. Park.

Arrangements for holding botanical excursions during the coming summer were referred to the Committee.

The usual vote of thanks having been awarded to the retiring office-bearers, the meeting then closed.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

A successful session was wound up on the 12th inst., when a smoking concert was held at the Albion Hotel. The committee were fortunate in securing the services of several well-known amateurs and professional gentlemen, and a most enjoyable evening was spent.

EDINBURGH CHEMISTS' ASSISTANTS' AND APPRENTICES' ASSOCIATION.

The annual business meeting was held in the Pharmaceutical Society's House, 36, York Place, on the evening of Wednesday, April 13, at 9.15. In the unavoidable absence of the President the chair was taken by Mr. Rutherford Hill, Ex-President.

The minutes of last meeting having been read and approved the Secretary read the report of the Prize Committee on the "Ainslie" Pharmacy Prize Competition, from which it appeared that the "Ainslie" Prize had been gained by Mr. Alexander Cruickshank, 56, Newington Road, with 95 per cent. of marks; and the second or "Aitken" Prize by David Harley, 67, High Street, Burntisland, with 63 per cent. of marks. The Committee were unable to award a prize for the third paper.

The Chairman then presented the first prizeman with Maisch's 'Organic Materia Medica,' Prantl and Vines' 'Botany,' and Richter's 'Inorganic Chemistry'; and the second prizeman with Balfour Stewarts' 'Physics,' Gerrard's 'Materia Medica,' and Macadam's 'Practical Chemistry.'

The Treasurer read the Financial Statement showing a balance of £2 4*s.*

The Secretary then read the annual report, which referred to the Session as having been a very successful one, and the membership showed an increase of ten as compared with last year. The Committee was specially indebted to Mr. J. Laidlaw Ewing, Chairman of the North British Branch Executive, for the exceedingly interesting address with lantern views which he gave at one of the meetings at considerable trouble and expense to himself. An unusually large number of very active members had left town during the year and a hope was expressed that others would come forward to fill their places.

On the motion of Mr. Simpson, seconded by Mr. Murray, the financial statement and report were unanimously adopted, and a vote of thanks was awarded to the retiring office-bearers.

It was remitted to the Committee to arrange a scheme of botanical excursions for the summer months.

The office-bearers for the ensuing session were then elected as follows:—President, John Lothian; Vice-President, William Beverley Cowie; Secretary, Alexander J. Dey, 21, Duke Street; Assistant Secretary, J. Simpson; Treasurer, J. F. Petrie; and as Members of Committee, Messrs. Cruickshank, Hendry, Kerr, McBain, Murray, Smith, Whyte, and Wood. Prize Committee, Messrs. Duncan, Henry, and McEwan.

The meeting then closed.

Parliamentary and Law Proceedings.

THE COUNCIL OF THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN *v.* KELLAND.

Before His Honour Judge Granger at the County Court of Cornwall, holden at Penzance, on the 12th instant, the Council of the Pharmaceutical Society of Great Britain sued R. Kelland, of 38, Market Place, Penzance, to recover £30, being the amount of four penalties of £5 each for selling poisons, to wit: nux vomica, arsenic, strychnine, and oxalic acid, and one penalty of same amount for keeping open shop for the sale of poisons, and one further penalty of same amount for taking, using, or exhibiting the title of chemist contrary to the provisions of the Pharmacy Act, 1868.

Mr. C. W. Langley Flux appeared for the Council.

Mr. W. Dale appeared for the defendant.

On the case being called, defendant's solicitor admitted that defendant had incurred the penalties, and consented to judgment being entered for the full amount claimed.

Mr. Flux applied for costs, and mentioned that proceedings had only a year previous been taken against defendant, who, nevertheless, had continued to offend against the provisions of the Act.

His Honour granted costs, and entered judgment for the full amount claimed and costs accordingly.

Obituary.

Notice has been received of the death of the following:—

On the 31st of March, William Farnworth, Pharmaceutical Chemist, Blackburn. Aged 72 years.

On the 31st of March, Thomas Teat, Chemist and Druggist, Waltham.

On the 31st of March, M. L. Denbigh, Chemist and Druggist, Birkdale.

On the 31st of March, Henry Nelson, Chemist and Druggist, York.

On the 1st of April, George Gilmour, Chemist and Druggist, Glasgow.

On the 2nd of April, Francis Jackson, Chemist and Druggist, Liverpool. Aged 74 years.

On the 2nd of April, J. W. S. Wilkinson, Chemist and Druggist, Seaham Harbour.

On the 3rd of April, Samuel Scott, Chemist and Druggist, Gainsborough. Aged 79 years.

On the 3rd of April, W. Cribb, Chemist and Druggist, Ramsgate.

On the 3rd of April, G. H. Parsons, Chemist and Druggist, London. Aged 52 years.

On the 3rd of April, William Tomlinson, Chemist and Druggist, Marple Bridge. Aged 57 years.

On the 4th of April, H. E. Attwood, Chemist and Druggist, London. Aged 40 years.

On the 7th of April, William Gross, Chemist and Druggist, Bury St. Edmunds. Aged 81 years.

On the 7th of April, Frederick Green, Chemist and Druggist, Talcolnestone. Aged 54 years.

On the 9th of April, Thomas Smyth, Chemist and Druggist, Narberth. Aged 59 years.

On the 10th of April, Brooksbank Armstrong, Chemist and Druggist, Fulham. Aged 68 years.

On the 15th of April, Richard Preston, Pharmaceutical Chemist, Fulham.

On the 15th of April, W. H. Miller, Chemist and Druggist, Salcombe.

On the 18th of April, James Jeffcoat, Chemist and Druggist, Kilburn.

BOOKS RECEIVED.

MATERIA MEDICA, PHARMACY, PHARMACOLOGY AND THERAPEUTICS. By W. HALE WHITE, M.D., F.R.C.P. London: J. and A. Churchill.

THE CALENDAR OF THE PHARMACEUTICAL SOCIETY OF IRELAND. 1892. Dublin: Chas. Chambers. 1*s*.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith. Matter intended for publication should be written on one side of the paper only.*

PHARMACEUTICAL MICROSCOPY.

Sir,—It has been a pleasure to me to read from time to time your notes on "Pharmaceutical Microscopy," and I sincerely hope the articles may receive the practical application which they merit. I, for one, shall hail the day when a microscope is considered to be an absolute necessity in every pharmacy, not religiously placed under a glass shade in a conspicuous position, there to remain with the seeming idea of producing a feeling of awe within the mind of the youngest apprentice, but for common and constant service. One can see no reason why every chemist should not be also an accustomed preparer of microscopic mounts, especially with regard to the roots, leaves, barks, etc., among which it is his lot to trade. Again, what is to hinder the chemist possessing such skill from exercising it in ways which, although they may not be at once remunerative, will eventually pay.

At the moment, one fact suggests itself to my mind, *i.e.*, the general opinion existing among physicians, as a whole, in reference to the general body of chemists and druggists cannot be looked upon as a high one. But assuming that the ordinary chemist and druggist was equally educated microscopically with his professional patron, the respect of the latter must necessarily be greatly deepened and the professional right of the pharmacist to exist be placed upon a surer foundation.

Turning again to the notes, may I offer a suggestion to the writer of them, viz., to be very sure that all formulæ and methods of preparation for staining, etc., work out well in practice. To the beginner this is a very important item. Likewise to be particular in noting that the reagents and staining materials, etc., are easily obtainable and up to date, *e.g.*, in the issue of March 12, *re* Cole's method of double staining, iodine green is given. Now iodine green is difficult to obtain of ood quality, if at all, for the simple reason that it has been displaced in the dyeing world by acid green. Again, in Gilburt's method of double staining the formula given is somewhat vague, no strength of alcohol as a solvent being given, and no guide as to the colour results of staining with the mixed fluids. Such details, microscopic as they may appear in themselves, are sometimes macroscopic in their results, and make all the difference between a complete success and a complete failure. In closing permit me to say that it would be a valuable addition to the pages of the Journal to place a "Notes and Queries" column in a fairly conspicuous position. In this questions might be asked, and failures, as well as successes in this and kindred subjects, be recorded.

Southport. HENRY BALL.

In reply to Mr. Ball's kindly criticism, it must be said that though in many instances the value of the information given can be personally vouched for, this would be quite impracticable in every case. The idea is that in giving brief abstracts and carefully intimating the sources of information, assistance will be afforded to those workers whose time or opportunities may be limited. The first of the formulæ named by Mr. Ball is a classic one by a leading authority on mounting, and was inserted more particularly for the benefit of beginners. Iodine green or any other staining material may be procured from Grübler, of Leipzig, or his agent Kanthack, New Oxford Street. By the term "alcohol" microscopists usually understand strong rectified spirit or methylated spirit of 61 o.p.—[ED. PH. J.]

SALE OF "PATENT MEDICINES" CONTAINING POISONS.

Sir,—I have pleasure in informing you of the commonsense remarks made by one of our local practitioners highly condemnatory of the practice of grocers and other unqualified people dabbling in the sale of the so-called "patent medicines," and I would like to add that if chemists were alive to the opportunities which arise from time to time of making the Pharmacy Act a real power for good we should have less cause for complaining of the burdens which we are called upon to bear.

GEORGE ERNEST CLARK,
Lowestoft. *Local Secretary.*

WHAT IS JALAPIN?

A recent examination of "jalapin" of trade (both of British and German manufacture) shows that a confusion exists in the application of the name "jalapin" to substances that are not identical.

British makers apparently do not recognize as "jalapin" the ether-soluble resin so named by Mayer, but apply the term to a product consisting almost entirely of the "convolvulin" of that chemist, viz., a resin insoluble in ether. German manufacturers, on the other hand, send to England as "jalapin" the resin so called by Mayer, and which is soluble in ether. The latter constitutes about 90 per cent. of the resin that exists in scammony root and in tampico jalap, and is therefore relatively of far less commercial value than the ether-insoluble resin, which can only be obtained in quantity from true jalap.

It appears desirable, therefore, that the confusion should be removed, either by commercial recognition of the chemical term "jalapin," or by an authoritative statement that when jalapin is ordered in British pharmacy the decolorized resin of jalap root only should be sold or dispensed, and not decolorized resin of scammony.

Southwark. JOHN C. UMNEY.

Geo. Hern; Kiloh and Co.—Your letters have been sent to the publishers, New Burlington Street, to whom they should have been addressed.

Clifford Price.—Your query should be submitted to the Registrar of the General Medical Council, 299, Oxford Street, W.

Erratum.—Mr. Dymond has pointed out that in the report of his lecture, printed on page 801, the word "*phosphorous,*" by a printer's error, has throughout been spelt "*phosphorus.*"

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Hill, Christy, Umney, Clarke, Thompson.

"THE MONTH."

Photographic Representation of the Movements of Plants.

MM. Dewèvre and Bordage describe an ingenious contrivance for photographing the movements of the growing parts of plants, and give the results of a series of observations on climbing plants (*Humulus Lupulus, Ipomœa purpurea, Convolvulus sepium*), which do not, in all respects, agree with those of Darwin. They state that the nutation of a young stem, whether climbing or not, consists of a succession of more or less irregular circular or elliptical curves, varying every moment, even in their direction, and caused by the unequal lengthening of the zone of growth of the stem. In the case of the *Ipomœa* they were able to determine a distinct heliotropism. They state that white light retards the growth, both of climbing stems and of those which do not climb, and that the violet and ultra-violet rays exercise a distinctly prejudicial influence on the growth of the stem. Similar observations on roots made to grow in water demonstrated the existence of a distinct movement of circumnutation, even more regular than that of the stem. A similar movement was observed in a number of aerial roots which are insensible to the effects of radiation, such as those of Orchideæ, Aroideæ, and Bignoniaceæ. By the same apparatus curves were also obtained of the sleep-movements of leaves, both of those in which the movements of the leaves are in an upward and of those in which they are in a downward direction. In both cases the movement is by no means an uninterrupted one, but consists of a number of alternate movements upwards and downwards at first considerable, afterwards much smaller; to the former of these the authors apply the expression movements of oscillation, to the latter movements of trembling (*Rev. Gén. de Botanique*, 1892, 65).

Substances which accompany Chlorophyll in the Leaves.

By heating the leaves of the vine with carbon bisulphide, A. Étard has succeeded in dissolving out a number of chemical substances of definite chemical composition, some of them new. A portion of the substances thus extracted is soluble in alcohol, a portion insoluble. The soluble portion yields a substance with the composition $C_{17}H_{34}O$, which he calls *vitol*, and a substance soluble in ether, a diatomic alcohol, to which he gives the name *vitoglycol*, with the empirical formula $C_{23}H_{44}O_2$, the true composition of which is probably $C_{23}H_{42}(OH)_2$. This is accompanied by a triatomic alcohol called *œnocarpol*. With similar treatment the leaves of the lucerne yielded a monatomic alcohol *medicagol*, with the formula $C_{20}H_{44}OH$. From *Bryonia dioica* a hydrocarbon $C_{20}H_{42}$ was obtained, which he calls *bryonane*. The substances to which the term "wax of leaves" has been applied are probably a mixture of these bodies with crystalline paraffines (*Comptes Rendus*, cxiv., 364).

Period of Formation of the Flower.

Several interesting observations on this subject have lately been recorded. W. Russell (*Rev. Gén. de Botanique*, 1892, p. 18) states that the male catkins of the walnut begin to be formed about the end of April, and are fairly developed by the July preceding their blossoming. The female flowers, on the other hand, make their appearance on twigs which are formed in the spring, and the whole of their development takes place in the same year. They are, therefore, fertilized by the pollen of male flowers formed at a very much earlier period. By July the catkin is about a centimetre in length, and the pollen-sacs are then already formed, although the pollen-grains are not fully differentiated until the moment of flowering. According to Sig. Martelli (*Bull. Soc. Bot. Ital.*, 1892, p. 52), there are two important periods in the development of the inflorescence of the vine, viz., the summer (about August) when the axial parts of the inflorescence are first formed, and the early spring (after February) when the differentiation is effected of the principal axis into secondary axes and flower-buds. Winter is a period of rest, when there is no apparent increase in the buds. An examination in the autumn of the degree of development of the third and fourth buds from the apex of the branch will indicate the prospects of a crop of grapes for the ensuing summer. The yellow rays of the solar spectrum are those which take the greatest share in the decomposition of carbon dioxide and the process of assimilation; the blue are those which chiefly affect the movements of stimulation and of irritation; while the ultra-violet are most efficacious in the production of the flowers and reproductive organs. For the vine salts of potash in the soil are of great importance. Professor Sachs's theory that the substances which go to the formation of the flower are already formed in the green leaves, receives support from a fresh series of experiments carried out by him in the case of the buds formed on the leaves of *Begonia* (*Flora*, 1892, p. 1). Leaves of a *Begonia* gathered at the end of May were propagated in the ordinary way on wet sand. Numerous buds were formed in the course of a few weeks; but it was only after they had grown to vigorous plants about the end of November that inflorescences were first produced in the axils of later leaves. Another series of leaves gathered from flowering plants at the end of July was propagated in the same way, and the buds formed on these already contained inflorescences in the axils of the first leaves, which blossomed in October, and which must have been present in a rudimentary condition in the very youngest condition of the bud. The conclusion drawn from these facts is that the substances which are used up in the formation of the flowers are present in the leaves in the summer, but not in the early spring.

Bacillus of Measles.

The *Berliner Klinische Wochenschrift* contains a paper by Drs. Canon and Pielicke, in which they give the results of their researches on the bacteriology of measles. The preparations were made in the same way as in Canon's researches on influenza (*ante*, p. 792), and stained with an eosin-methylene blue solution. They were placed for five to ten minutes in absolute alcohol and then for some hours in an incubator. The bacilli were stained blue, frequently much more deeply at the ends than in the middle. Sometimes they are as long as half the diameter of a red blood corpuscle, sometimes quite small and having the appearance of diplococci. The authors believe the bacillus, which was found in the living blood in fourteen cases of measles, to be of a specific kind and the true exciter of the disease. Bacilli similar in shape were seen in the expectoration and nasal mucus of patients suffering from measles. First cultures on bouillon were obtained,

but attempts at further cultivation failed, as did also experiments on other nutritive media (*British Medical Journal*, p. 868).

Saliva and Pathogenic Micro-organisms. Sanarelli has investigated the properties of the saliva in respect to the growth of the micro-organisms most often found in the mouth. He finds it possesses bacteria-killing properties, chiefly dependent upon the number of micro-organisms introduced into it. The *staphylococcus aureus*, *streptococcus pyogenes*, *micrococcus tetragenus*, and the typhoid and cholera bacilli perish if in small quantities. The diphtheria bacillus ceased to thrive and the pneumococcus lost its virulence (*Centralbl. f. Bakt. w. Paras.*, *B. M. J. Epitome*, p. 56).

Immunity against Pneumonia. Drs. G. and F. Klemperer (*Berliner Klin. Wochen.*) have found that any nutrient medium in which the pneumococcus has grown, even after removal of the coccus itself by filtration, confers immunity against the pneumococcus-septicæmia. They also found that exposure to a temperature of 60° to 65° C., for one or two hours, made the immunising solution more efficacious. The authors consider that the blood serum of protected animals renders harmless the poison (pneumotoxin) formed by pneumococci and so, if introduced into the circulation, cures pneumonia already in progress (*The Bacteriological World*, p. 160).

Protection against Bacillus Tuberculosis. The Paris correspondent of the *Lancet* writes to the effect that MM. Héricourt and Richet have been experimenting on dogs with a view to securing immunity against infection by the micro-organism of human-tuberculosis. The dog is almost refractory to bird-tuberculosis, but very susceptible to the human variety of the disease. Of four dogs inoculated with cultures of human tubercle, two that had previously received an intra-venous injection of bird-tubercle were yet alive and well 122 days after the experiment, whilst the others died in twenty-two days. It would thus appear that the presence of the avine variety of the bacillus is inimical to the growth and development of that affecting human-kind.

Fiji Ginger. The Kew *Bulletin* for April contains some interesting information regarding the new ginger recently described in our columns by Mr. Gane, whose results are there quoted. The specimen examined by Mr. Gane, it should be stated, was sent to the Society's Museum from Kew. It appears that the ginger plant is readily propagated and yields an abundant crop if the soil be good and not too dry. Practical difficulties in preparing the rhizomes for market have, however, interfered with its cultivation in many colonies. These difficulties having been experienced at Fiji, the aid of the Kew authorities was sought, and there now appears to be good reason for hoping that the Fiji ginger may become an article of local industry.

Curing of Ginger. Jamaica ginger may be cured to produce either "coated" or "uncoated ginger. The latter is that prepared for medicinal use. To prepare it the rhizome is simply scraped, washed, and well dried in the sun. It should then have a pale, buff hue, a striated and fibrous surface, should break easily, exhibiting *a short farinaceous* fracture with numerous bristle-like fibres. The bleaching by burning sulphur or chlorinated lime, and the covering with sulphate or carbonate of calcium, are processes usually performed on gingers after they reach the first market (Kew *Bulletin*, April).

Curious Plants. The Museum at the Royal Gardens, Kew, has lately been enriched by a second small collection of dried plants, sent from the Solomon Islands by the Rev. R. B. Comins. This includes flowering specimens of a tree belonging to the *Sapotaceæ* which bears seeds that are most singular in appearance. They are called "turtle-seeds" by the islanders, and the name is said to be quite appropriate. The *Bulletin* also contains a reference to the *Lasianthera papuana*, a plant whose fruit consists of one fertile cell and two others forming a fleshy body on one side of it. It is developed from a three-celled ovary.

Ginseng Plant at Kew. Efforts have been made at various times to establish the Corean Ginseng plant at Kew. The Coreans, fearing invasion of their practical monopoly in the root, have been loth to part with seeds. Mr. Walter C. Hillier, Consul-General in Corea, has now sent a small packet of seeds obtained from the Government Gardens at Songdo. He says they are sown in the spring in fine leaf mould, without manure. At the end of the first year the plants are set out, but it is five or six years before they reach maturity (Kew *Bulletin*, April).

Cultivation of Plants for Perfumes in he United A number of attempts have been made in Florida and California to introduce the cultivation of perfumed flowers and extraction of their essences, in imitation of the methods practised in France. The technical journals of the two states contain many details of the "enfleurage" system by means of which lard is converted into perfumed fats. These are sold in boxes containing 10 to 20 kilos. The results so far obtained are not altogether satisfactory, owing to the tendency to rancidity exhibited by the fat. One factory in Georgia producing the Gardenia pomade has been in operation since 1886 (*Revue des Sciences Naturelles*, April).

Evolution of Methods of Pollination. Miss Alice Carter shows that most monocotyledonous plants are either hydrophilous or anemophilous, and that the entomophilous method of pollination was undoubtedly evolved later in point of time. The *Cyperaceæ*, *Gramineæ*, *Urticaceæ*, and *Piperaceæ* are probably ancestral types, whilst the *Euphorbiaceæ* is a degenerate type. These are the only orders comprising more than one thousand species which are characterized by inconspicuous flowers (*Botanical Gazette*, March).

Occlusion of Hydrogen by Lead. The result of a series of experiments conducted by J. Shields is the relegation of lead to that group of metals which do not occlude hydrogen. A consequence of this is the rejection of the hypothesis that hydrogen, being occluded by lead, plays an important part in the chemistry of secondary batteries. In a postscript the author points out that almost all substances possess the property of condensing gases and vapours on their surface, and "that no attempt has been made to show that *absolutely no hydrogen* is absorbed by lead," but that it practically occludes no hydrogen (*Chemical News*, p. 196).

The Origin of Rye. It was stated by Ascherson, in the flora of Brandenburg, that the Scilian *Secale montanum* is the source of the rye actually cultivated, the *Secale cereale*. An important difference between the two plants, however, lay in the fact that whilst the former is perennial the *S. cereale* is an annual plant. This objection has now been removed by Professor Batalin, a Russian scientist, who has observed in the country of the Don Cossacks the rye-plant growing during several consecutive years without re-sowing, either natural or artificial (*Revue des Sciences Naturelles*, April).

Carbolate of Camphor. This preparation is made by adding 1 part, by weight, of carbolic acid to 3 parts of camphor, and straining through gauze after standing for twenty-four hours. A permanent liquid results, having a specific gravity of ·990. It is said to be thoroughly antiseptic and possessed of considerable germicidal powers. By mixing the liquid with oil its tendency to produce an eruption when kept in contact with the skin is prevented (*Therapeutic Gazette*).

Masrium, a New Element? A paper has been read before the Chemical Society by H. D. Richmond in which he states that he and Dr. Off, in the course of an examination of a mineral which is provisionally termed *Masrite*, discovered traces of a substance which differed in several important respects from any known metal, and was therefore recorded as a new one under the name *Masrium*. This word is derived from the ancient name for Egypt, the mineral in which the supposed new element is found being of Egyptian origin. A sample of masrite analysed by the authors contained 10·62 per cent. of alumina, 2·56 per cent. of manganous oxide, 4·23 per cent. of ferrous oxide, with small quantities of ferric and cobalt oxides, and 36·78 per cent. of sulphuric anhydride. The balance was made up of water of crystallization, the mineral being an impure manganese alum crystallizing with 22 molecules of water. The quantity of unknown oxide present was 0·2 per cent., and the total amount of mineral available being small, the examination of the properties of the element was less complete than is desirable. The properties as far as they have been determined are as follows :—The metal masrium (formula Ms) falls in the second series and twelfth group of the elements when arranged in their periodic order ; it has an atomic weight of about 228, and the formula for the oxide is MsO. It gives no precipitate with hydrochloric acid, nor with sulphuretted hydrogen in hydrochloric acid solution, but yields a white precipitate with sulphuretted hydrogen in the presence of acetic acid. It gives a white gelatinous precipitate with ammonia, insoluble in excess, and similar precipitates with ammonium sulphide and carbonate. With potassium ferrocyanide it gives a white precipitate insoluble in excess of the precipitant, but soluble in excess of masrium chloride. Potassium ferricyanide yields no precipitate. Oxalic acid gives a white precipitate soluble in acetic acid and in excess of the chloride of the metal. A basic salt is precipitated on boiling a neutral solution of the acetate, but re-dissolves on cooling. Neutral potassium tartrate gives a precipitate soluble in excess of the precipitant, and from this solution ammonia does not precipitate masrium hydrate. The caustic alkalis give white precipitates soluble in excess. The soluble salts are also white, and of those that have been examined the sulphate $MsSO_4 8H_2O$, crystallizes best, either from its aqueous solution or, preferably, from 50 per cent. alcohol. This appears to form an alum, in which it takes the place of the potassium sulphate in ordinary alum, and also gives a double salt with potassium sulphate. Efforts to prepare the metal itself have been at present unsuccessful, and further information, notably on its spectroscopic character, is necessary before it can be definitely admitted as a new element.

The Scientific Alliance. Six of the more important scientific societies of New York have decided to co-operate for the advancement of science and for mutual encouragement. At the same time the individuality of the respective societies is fully maintained, and all reserve the management of their own affairs. The *Chemical News* suggests that a similar organization might be useful in London, the combined influence being likely to act as a check to the hostile movements of the Government and so-called "advanced thinkers" who are ever on the watch to interfere with research.

Chemistry of Photography. Photographic methods have always been conducted in a more or less rule-of-thumb manner, and it is interesting to note that Professor Armstrong has been communicating to the *Journal of the Camera Club* what he terms "a very general confession of the faith that is beginning to arise within him, after much pondering over photographic literature, etc., etc." The first article, wherein the author brings the full weight of his extensive scientific knowledge to bear upon the subject, deals with "The Theory of Development in relation to the essentially Electrolytic Character of the Phenomena and the nature of the Photographic Image," and is reproduced in the *Chemical News* for April 14.

The Assay of Ipecacuanha. A correspondent of the *Pharmaceutical Review*, C. R. R. Beck, whilst criticising the results obtained by various investigators in dealing with ipecacuanha root, states that the menstruum he has found most effective for the extraction of emetine is composed of chloroform 3 volumes and alcohol 1 volume. Of this mixture he employs 40 c.c. for 5 grammes of the drug. The average results obtained in a series of experiments with different menstrua were as follows :—

Menstruum.	Average yield.
Ammoniated chloroform . .	2·85 per cent.
Chloroform (plain)	3·10 „ „
Chloroform, 3 vols. } Alcohol, 1 vol. }	3·20 „ „

British Poisonous Plants. In *Science Gossip* for April appears an article on indigenous plants with poisonous properties, in which the author deals in an instructive manner with many that are officinal. *Solanum dulcamara*, *Aconitum Napellus*, *Conium maculatum*, *Datura stramonium*, *Hyoscyamus niger*, *Atropa Belladonna*, *Digitalis purpurea*, *Lactuca virosa* and *Daphne mezereum*, together with many others, are all treated of in turn. The folk-lore is touched upon and many interesting facts detailed. The poisonous properties and their causes are discussed, and the author, noting that alkaloids are crystalline and

poisonous, ventures a suggestion that the raphides found in some plants of the lily tribe may also be poisonous.

Panax Gum. Mr. J. H. Maiden read a paper on *Panax* gum at a recent meeting of the Linnean Society of New South Wales. He described true gums from *Panax sambucifolius*, var. *angusta*, *P. Murrayi* and *P. elegans*. Slight odours of a peculiar character distinguish them from acacia gums, certain of which they closely resemble (*Nature*, p. 567).

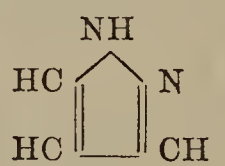
An Aid to Botanical Collectors. It has been the custom to examine all collections of plants presented to the Royal Gardens at Kew, to report upon them to the donors, and illustrate anything of sufficient interest in Hooker's 'Icones Plantarum.' Further encouragement is now to be given to collectors by the description for the information of botanists of all plants of which the novelty can be ascertained with some degree of certainty. They will also be distinguished by formal names. The Kew *Bulletin* will be the vehicle by which the information will be imparted from time to time, and the first instalment appears in the number for April. Among the new plants described is the Chinese drug "Ya-tsao," of which specimens of the pods occur in the Pharmaceutical Society's Chinese collection. Mr. Hemsley has named the plant *Gleditschia officinalis*. It is considered to be a very distinct species, having broad leaflets and a short narrow pod.

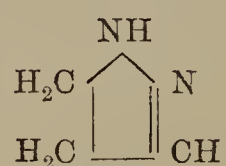
Natural History of Ireland. The first number of a new periodical, dealing chiefly with matters relating to Irish botany, zoology, and geology, has just been issued. The *Irish Naturalist* starts as the official organ of all the Irish Natural History Societies, and has promises of support from an extensive list of workers in science. A special feature will be the publication of local lists and monographs of various groups of Irish plants and animals.

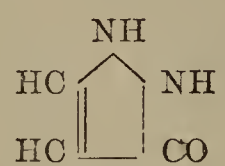
Peculiarities of the genus Casuarina. A note was recently published in "The Month," on page 689, dealing with the researches of Dr. M. Treub on the genus *Casuarina*. An article by A. B. Rendel treats of the subject at length, and is illustrated by comparative drawings. The conclusion arrived at is that though Dr. Treub has made out some points of the highest interest he has hardly adduced sufficient evidence to warrant the separation of the *Casuarinaceæ* as a distinct sub-division of flowering plants (*Natural Science*, April).

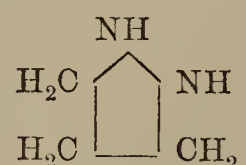
Cultivation of Gambir. Gambir is the second in importance of the products of the Malay Peninsula, and the current issue of the *Agricultural Bulletin* deals with this substance in an exhaustive manner. Virgin soil appears to be best for the cultivation and, where land has been under cultivation with other crops, it is advantageous to let it lie fallow and return to jungle for a time before replanting with gambir. The proper range of cultivation is from sea-level up to about four or five hundred feet altitude, above which the plant does not thrive. In the Peninsula and Rhio the plants are grown from seeds and never from cuttings, though propagated from the latter at Bangka. The seedlings are planted out when about nine months old and a foot tall. They thrive best in dry, sandy soil, with full exposure to the sun. Great care is taken to prevent water accumulating at the roots and, to this end, it is usual to select a hillside for the cultivation, so that the water may escape as quickly as possible after rain. Four kinds of gambir are made by the Malays. *Gambir bulat* (round gambir) is the most expensive of the chewing gambirs, and consists of thin circular biscuits about 1½ inch across and a line thick. The Siak gambir of this form often contains rice dust and cloves as impurities. *Gambir papan* (board gambir) is in thin squares about 1½ inch square and one line thick; this is light brown and crumbly in texture. *Gambir paku* (nail or finger gambir) is in sticks about three inches long and very dark in colour. *Gambir dudur* (dice or cube gambir) is made in small cubes an inch each way. Other forms are mentioned by various authors as being manufactured for special markets, but the fancy of the natives is stated to be for the forms here specified.

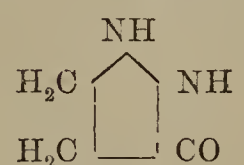
Nomenclature of Pyrazol Derivatives. In view of the increase of our knowledge of compounds of the class to which antipyrin belongs, which are represented by a ring-formula containing two atoms of nitrogen in the ring, it is advisable to adopt a uniform system of nomenclature for them. That put forward by Dr. Knorr, who is the author of much work on the subject of these compounds, offers the greatest simplicity. He regards all bodies of this class as derived from one of the following compounds by the substitution of hydrogen by radicals :—


Pyrazol.


Pyrazolin.

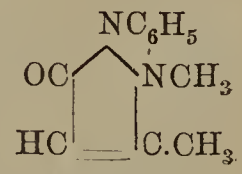

Pyrazolon.


Pyrazolidin.


Pyrazolidon.

In pyrazolon and pyrazolidon the oxygen may be attached to any one of the three carbon atoms, so that each of these bodies can exist in three forms. To distinguish between the isomeric substances of this kind, and to indicate conveniently to which of the carbon atoms any radical is attached in a given compound, the atoms in the ring are numbered thus—

The isomeric ketone-bodies are then distinguished by prefixing to the name the number of the carbon atom to which the oxygen is attached, and a similar plan is adopted to distinguish the position of substituting radicals. Thus, for example, antipyrin is the 1-phenyl-2-3-dimethyl-5-pyrazolon. The constitution of any compound of this class may be expressed by a similarly constructed name. Lederer, on the other hand, avoids the introduction of so many terminations, and calls the various compounds by names showing their relations to pyrazolon by means of prefixes. He gives, for instance, the names isopyrazolon and hydroisopyrazolon respectively to Knorr's 3-pyrazolon and 3-pyrazolidon, taking


Antipyrin.

Knorr's 5-pyrazolon as the normal compound; he does not offer any plan, however, for indicating the positions of substituent groups.

Titanium and its Compounds. An account of a comprehensive study of titanium and its compounds is given by M. L. Levy in the *Annales de Chim. et de Phys.* (6, xxv., 433). On account of the similarity of this element to silicon, M. Levy endeavoured to obtain it in crystalline form by methods similar to those that have been successful with the latter, and by the reaction of silicon and titanium chloride at a high temperature, he succeeded in obtaining crystals which he believes to be pure titanium, though those obtained in most experiments were contaminated with silicon. He also obtained similar crystals, but in less quantity, by using magnesium, aluminium, boron, tin, or copper in place of silicon. The crystals are very hard, steel-white, scarcely acted on at all by chlorine or hydrochloric acid containing oxygen, and only attacked by oxygen at a high temperature. By heating together titanium, aluminium, and chlorides of potassium and sodium, a crystalline alloy was obtained, having the formula $TiAl_4$; as prepared it was contaminated with a small quantity of silicon, probably from the porcelain vessel used, believed to exist as an isomorphous compound $SiAl_4$. The peroxide of titanium, for which various formulæ have previously been assigned, was prepared by the action of hydrogen peroxide on titanic anhydride, and shown to be represented by the formula TiO_3. Several titanates of zinc were obtained, some of which are crystalline, but others were only obtained in an amorphous form. Compounds of titanic acid with phenol, salicylic acid, naphthol, and other bodies of a phenolic character were prepared; most of these compounds are crystalline, and they are all readily saponified by water or alkali with formation of titanic acid and the corresponding phenol. The reactions of titanium which are of service analytically were also studied, and a number of tests are given by which it can be distinguished from niobium, tantalum, and tin, or detected in their presence. The titanium is converted into titanic acid by calcination, and the reagents employed are all organic substances, and, with the exception of brucine, all of phenolic constitution. Incidentally a number of new tests are mentioned, by which, using the oxides of the last-mentioned elements as reagents, many similar bodies can be readily distinguished, such as α- and β-naphthol and salicylic acid and its isomers. Levy has also experimented with various modifications of the usual method of estimating titanium, and finds that satisfactory quantitative determinations of this element may be made by fusing the substance under examination with potassium bisulphate, dissolving the mass in acidulated water, neutralizing with potash, and again acidifying with sulphuric acid, then boiling for six hours and collecting, calcining, and weighing the precipitated titanic acid.

"Antipyrin Alcohol." According to Knorr and Taufkirch the substance recently obtained by Brühl by the action of sodium and carbonic anhydride on antipyrin (*Pharm. Journ.*, [3], xxii., 812), and named by him antipyrin alcohol, is identical with the compound formed by mixing an alkaline solution of aceto-acetanilid with excess of methylamine; they also state that it has much feebler basic properties than would be expected in an antipyrin alcohol, and on heating with water or acid it breaks up into methylamine and aceto-acetanilid. The product formed by the addition of two atoms of hydrogen to the antipyrin molecule must be one of two possible compounds if the ring formation is retained. One of these, phenyl-dimethyl-pyrazolidon, has been prepared by Knorr and Duden and found to possess properties quite different from Brühl's "antipyrin alcohol." The other compound, phenyl-dimethyl-oxypyrazolin, has not been obtained, but an inspection of its structural formula shows that it would be extremely unlikely to yield the above-named products on hydrolysis, and it should possess the basic properties of antipyrin. Knorr and Taufkirch are therefore of opinion that the body obtained by Brühl is β-methylamido-croton-anilid:— $CH_3-C^{\swarrow NHCH_3}_{=CH-CO-NHC_6H_5}$, and that in the action of sodium and carbonic anhydride on antipyrin, separation occurs between the two nitrogen atoms (*Berichte*, xxv., 768).

New Isomers of Atropine and Homatropine. It has been shown by Ladenburg that hyoscine gives rise on hydrolysis to tropic acid and a base isomeric with tropine and distinguished as ψ-tropine, and from this he was led to infer that hyoscine is the tropyl derivative of this base. It is now proved by Liebermann and Limpach (*Berichte*, xxv., 927) that this is not the case. By heating together tropic acid and ψ-tropine they have obtained a compound having the formula $C_{17}H_{23}NO_3$, but not identical with hyoscine. On hydrolysis it again formed tropic acid and ψ-tropine, and is therefore tropyl-ψ-tropeine. It differs from hyoscine in the characters of its aurochloride and platinochloride and in its physiological action, and it forms a new member of the group of isomeric alkaloids of which atropine is the most important. It may be obtained in white crystals melting at 86° to 88° C., and it forms a crystalline hydrochloride. Dr. Liebreich, who has examined the physiological action of the hydrochloride, states that it produces no dilatation of the pupil, but is irritating to the mucous membrane of the eye. Like atropine, it belongs to the class of heart-poisons, but is only about half as powerful as the latter. A similar compound of ψ-tropine with mandelic acid has also been formed; it has the formula $C_{16}H_{21}NO_3$, and is named ψ-homatropine. It is a thick, oily liquid, which has not yet been crystallized, and it is found by Dr. Liebreich to be devoid of mydriatic action.

Tropid. In the synthesis of tropyl-ψ-tropeine from tropic acid and ψ-tropine, about 50 per cent. of the tropic acid taken was changed into the anhydride tropid; this was also obtained by Ladenburg in the similarly conducted synthesis of atropine. Liebermann and Limpach have examined this body and find that although it is formed by loss of water from tropic acid in molecular proportion, two molecules of the latter combine in its formation, the alcoholic and carboxylic groups respectively uniting with each other with elimination of water, and its formula accordingly is $C_{18}H_{16}O_4$. By the action of acids on the salt formed by the union of tropid with an alkali, the tropid is regenerated in an unaltered state and tropic acid is not formed, as the alkali metal only enters into

combination with the carboxylic group of the tropid, and the connection between the residues of the alcoholic groups is not broken.

Alkaloids of Lupinus albus. The alkaloid lupanine, originally obtained by Hagen from *Lupinus angustifolius*, and which has recently been further described by Siebert (*Pharm. Journ.* [3], xxii., 609), has also been obtained by A. Soldaini from *L. albus*. It is an oily liquid having the formula $C_{15}H_{24}N_2O$, and forming crystalline salts. In addition to lupanine Soldaini has obtained from *L. albus* an alkaloid also having the formula $C_{15}H_{24}N_2O$, and forming crystalline salts, but itself crystallizing in prisms melting at 99° C. Its relation to lupanine has not yet been ascertained, and will be the subject of a later communication (*Archiv der Pharm.*, 230, I., 61).

Percentage of Ash in Kamala. The percentage of ash which should be yielded by pure Kamala has at times been the subject of much discussion. The British Pharmacopœia permits a maximum of 10 per cent., but commercial samples usually contain from 20 to 50 per cent. or even more, and it is very difficult to obtain a specimen which will fall within the limits of the official test. Professor Flückiger has now published the results of some experiments made with an authentic specimen of the drug (*Archiv der Pharm.*, 230, I., 2). He procured ripe fruits of *Mallotus philippinensis*, from which he obtained 10·79 per cent. of kamala; and the latter, air-dry, gave from 1·36 to 1·56 per cent. of ash when ignited in the usual way. It is a matter of some difficulty to ensure complete combustion of the carbon, and Professor Flückiger recommends that ammonia and alcohol should be first added to the kamala, and the whole evaporated to dryness and ignited in an open dish. By this treatment the contents of the glands are extracted and completely burnt without difficulty; a sample so treated yielded only 1·28 per cent. of ash.

Essence of Lemon. Some interesting information is furnished concerning essence of lemon in Messrs. Schimmel's April Report on Essential oils (p. 28). They state that only a small part of the article coming into commerce can be termed pure. From some experiments made on expressed and on distilled essence of lemon prepared by themselves from fresh 1891 fruit, they find that the pure expressed oil has a specific gravity of 0·858 and an optical rotation of +61°0′, and the distilled oil a specific gravity of 0·856 and an optical rotation of +66° 20′. Under the head of citral (p. 63), they state that the employment of citral, both pure and mixed with lemon oil, increases enormously. Seventy-five grammes of citral are said to be equal to about a kilogramme of pure lemon oil, in actual practice. One ounce of citral in 15 ounces of 95 p.c. alcohol is considered equivalent to 16 ounces of lemon oil, and a mixture of 1 part of citral to 15 parts of lemon oil is said to be twice as strong as ordinary lemon oil. Even in liquids containing only 30 p.c. alcohol citral forms a clear solution. According to Semmler* citral is a technical term applied to an ethereal oil which is present to the extent of 6–8 p.c. in lemon oil; this substance proves to be identical with geranaldehyde, which is also found in a number of other essential oils. This substance is stated to boil at 224°–228° under a pressure of 760 mm., and at 110°–120° under a pressure of 12 mm.; the specific gravity is 0·8972 at 15° and it is optically inactive. In these respects citral obviously does not agree with the so-called "terpene free" essence of lemon of commerce.

* *Journ. Chem. Soc.*, 1891—Abstracts, pp. 30 and 540.

Oil of Lavender. A very interesting discovery has been made by Messrs. Schimmel concerning the oil of *Lavandula vera* (p. 35). The principle constituent of the oil has been determined to be an alcohol identical with linalool from the oil of Mexican lignum aloes and its acetic ester. By oxidation of the alcohol an aldehyde, which is stated to be identical with citral, geranaldehyde is formed. The acetic ester of linalool has a distinct odour of bergamot, which suggested its occurrence in the oil of bergamot. This was found to be the case, about 40 per cent. of this ester being found in oil of bergamot. Linalool and its acetic ester have also been found in oil of petit grain.

Otto of Rose. Messrs. Schimmel ("Report," pp. 44, 45) affirm that the test given by Panajotow (*Berichte*, xxiv., 2700) for the detection of geranium oil in otto of rose is not altogether reliable. They find that the blue violet coloration given with otto containing geranium oil is due to the presence of the aldehyde (citral), apparently formed by the oxidation of geraniol (*Berlin Ber.*, 23, 2965). As, according to Ekhart (Inaugural Dissertation, Breslau, 1891) otto of rose consists chiefly of an alcohol rhodinol, isomeric with and nearly related to geraniol, and yielding on similar treatment an aldehyde rhodinal, it was natural to suppose that on oxidation by exposure to the air this aldehyde might be formed in otto of rose and give rise to a similar reaction. This was found on experiment to be the case. A sample of Turkish otto exposed to light and air for some days gave a much more decided reaction than another sample of the same oil from a full, sealed bottle. Even German rose oil, distilled by the firm, gave the blue violet coloration. It is thus evident that it will be no easy task to distinguish between the principal ingredients of rose oil and geranium oil, owing to their being so nearly allied.

Costus Oil. Messrs. Schimmel, in their Report (p. 55), state that the "Kusht" root of India yields 1 per cent. of a light yellow essential oil, which possesses a sp. gr. of 0·982 and a rotatory power of +15° 29′ in a 100 mm. tube. It begins to boil at 275° C., and about one-half goes over below 315°; then complete decomposition takes place, producing a very disagreeably smelling vapour. When treated with soda a part of the oil combines with it and can be separated by acids. The "Kusht" root is attributed by Messrs. Schimmel to *Costus speciosus*, a plant of the natural order *Scitamineæ*. This is an error, the plant yielding the root being *Saussurea Lappa*, Clarke, of the natural order *Compositæ*.* The root has a violet odour, and it might have been supposed to yield an oil having a similar perfume; but this seems not to be quite the case. Messrs. Schimmel state that the odour of the oil resembles at first that of elecampane. After the volatilization of this odour, in about twenty-four hours, the violet odour developes, but not sufficiently strong to indicate that the oil could be of practical use. This statement is slightly at variance with the one given

* 'Pharmacographia Indica,' p. 296.

in 'Pharmacographia Indica,' where (p. 301) it is stated that the odorous principle appears to consist of two liquid resins, of which one is neutral, possesses in a marked degree the odour of the drug, is apparently unaltered by agitation with alkaline solutions, and may be distilled without any alteration in odour. The other has a musty odour, its alcoholic solution is strongly acid, and it combines with alkalies.

SYMBIOSIS AND SYMBIOTIC FERMENTATIONS.*

BY PROFESSOR MARSHALL WARD, SC.D., F.R.S.

(*Concluded from page* 871.)

Now I want to pass to a class of facts which are even newer. A few years ago, in examining a remarkable substance known as kephir, in the Caucasus, Kern found that the drink known as kephir was formed by the inhabitants of the Caucasus putting into milk certain substances which they called kephir grains. These kephir grains, as I daresay most of you know, are yellowish-brown masses of a horny nature when dry, which swell up into a jelly-like consistency when wet. In the jelly are found several organisms, particularly certain rod-like bacteria and certain yeasts. Kern, who could hardly be expected at that time to have made quite so close a study of these forms, because points now familiar to all of us had not then been raised, established that there was present a yeast, which he thought was the common *Saccharomyces cerevisiæ*. It was found that if you put the kephir grains into the milk it began to show signs of fermentation, and soon abounded in lactic acid; that then the yeast began to break up certain constituents of the milk, the sugar, and the bacterium began to peptonize certain other constituents of the milk, and between them they set up a complex series of fermentation changes, which resolved the milk into an effervescing fluid known as kephir, large quantities of carbonic acid, and traces of alcohol being produced. From a recent publication by Mix, who has examined a kephir-like organism in America, there is no doubt that Kern's yeast is a totally different one from the one now to be described, and everything about the Schizomycete is different. Of late years there has come to our knowledge another example, which is, perhaps, more remarkable even than this.

This is the so-called "ginger-beer plant." It consists of gelatinous masses shaped almost like the brains of animals, and it has been subjected to a prolonged investigation. In it, or attached to it, were found, during the course of two or three years, a number of organisms, the more important of which I will go into in detail. A yeast was found, which yeast was certainly not our common beer-yeast, and this yeast was traced through all its ordinary phases of life by means of cultures under the microscope, and in tubes, which could be made with comparative ease. It was traced to the formation of colonies. It was found to develope the film forms of Hansen, and these are so often characteristically pear-shaped that the name *Saccharomyces pyriformis* has been proposed for the yeast. It is a bottom yeast, allied to *S. ellipsoideus*, but different from it. It forms spores, and the temperatures at which these develope have been made out. The yeast has very definite characteristics, and will not ferment milk sugar. It grows in and ferments ordinary cane sugar, and induces ordinary fermentations. In a biological laboratory we do not use your beer wort, but usually employ materials made into solutions of known proportions; but the results are practically the same, and this yeast ferments cane sugar quite normally by inverting it into glucose, and then breaking it up into other substances, one of which is carbon dioxide.

There was also found in all the specimens that were examined from different parts of the world, not only this yeast, but also a form which is unquestionably *Mycoderma cerevisiæ*. There are some interesting points made out about it, but it does not concern the principal fermentation at all, and does not even flourish, unless air is allowed free access to the cultures, and, in fact, it can be very easily kept out of the vessels.

Thirdly, there was found pink yeast, which those of you who know Hansen's work will be able to recognize. This is a very curious fungus. At the ends of certain projections buds form, and the cells are remarkably translucent, as Hansen observed. But the mass is always pink. It is a plant which will not induce alcoholic fermentation. Traced from a single spore, more information was got concerning this "yeast." After about a week it becomes a large mycelium, with long branches springing from it. It forms a conidial form when sown in proper solutions, and from these conidia are produced the mycelia again. These mycelia are so like certain mycelia lately described by Brefeld, that one is strongly tempted to say that they will most likely turn out to be Hymenomycetes, so that the pink yeast is not a yeast at all. Whether that is the common pink yeast of the laboratory I do not know, but it looks very like it.

There was also isolated from certain specimens a form which appeared as brown, jointed hyphæ, or resting cells, and which on further growth turns out to be *Dematium pullulans*, a form which has been shown lately by Laurent to be a phase in the life-history of a very polymorphic fungus, and there is no doubt that the yeast-like bodies to which it gives rise give some trouble.

Besides these, there were found in the "ginger-beer plant" a number of bacteria. Now some of these were very well marked, and there is one which forms beautiful spores, which germinate upon and liquefy gelatine. It is an occasional visitor, and, curiously enough, it was traced in several cases to the ginger which is put into the ginger beer. I may say that it was proved to have nothing to do with the essential constituents of the "ginger-beer plant." In addition to that there were also several others, among which was the common acetic bacterium, and a curious-looking yeast, about which I should like to know more. This yeast formed most peculiar flower-like crusts, which crept up the sides of the tubes, and which in some cases was found to be associated with the acetic bacterium, and the formation of alcohol apparently by the yeast, and of acetic acid by the bacterium resulted in the formation of what was evidently acetic ether, the scent of which was extremely strong; moreover, it was possible to add them together to produce the phenomenon. It was found that on gelatine nothing could be got but these bacteria which have been described.

Now, in the ordinary fermentations induced by the "ginger-beer plant," it was observed that there were always a number of free bacillus-like forms mixed with brighter and stouter ones, and in some cases the bacillus-like body (which I may at once tell you is the true bacterium), was found sometimes inside this stouter form, in fact this stouter body is a gelatinous sheath of the true living organism. In some cases the bacterium is found to lie obliquely in the sheath, or it is found to be at the end, and even partly out and partly in the sheath. Under certain conditions the bacterium was found to grow out from the sheath.

It occurs first as a small bacterium in the sheath, then gradually the sheath becomes larger and larger in the form of a loop, until after a day or two it becomes a twisted and coiled mass. It was found that it would

* From the 'Transactions of the Institute of Brewing.'

not now stir any more. That culture was made in a solution of nutritive gelatine; but a curious point was noticed—viz., that during the first two or three days the isolated bacterium could not be got to grow. It was not a matter of temperature. As long as there were a few yeast-cells present in the neighbourhood, in the course of a couple of days it grew pretty freely. That led to the possibility that the organism was anærobic, and on making cultures in saccharine liquids in an atmosphere of carbonic acid it was quite easy to get a rapid growth, perfectly characteristic. As a matter of fact, under certain phases, the bacterium escapes from these sheaths. Under certain conditions it was found that the bacterium multiplied in the sheath, forming long rods. This is rather an interesting case. In some cases the bacterium gradually slips out, but sometimes grows in length before it does so; and in other cases, while still in the sheath, splits, and then the two halves go on growing; and in fact the vagaries of this curious form are too numerous to mention. These, however, are by far not the most peculiar things about it. The result of large cultivations in saccharine liquids is the conversion of the whole of the liquid in the tube into a mass of solid jelly, and you can invert the tube without losing any of the stiff contents. The solidity is due to the formation of a mass of gelatinous sheaths. The chemical constitution of that sheath would be well worth further investigation.

It only remains to add that it was found that the only two essentials for the formation of the "ginger-beer plant," as it is called, were the union of the yeast, described as *Saccharomyces pyriformis* and this *Bacterium vermiforme*. If they were put together under certain circumstances they then formed a symbiotic union. It was found that if one put a porcelain filter tube into solutions of sugar in tall glass jars, after of course sterilizing everything, and then put into the filter tube the yeast and into the glass tube the bacterium, then after a few days the bacterium begins to form its sheaths and adheres as a gelatinous coating to the tube and the fermentation goes on; but if the two are grown separately, and then mixed, some very curious phenomena result on which I must not now dwell.

I am now about to enter a region into which angels might fear to tread, but I want you to believe that one does not do it in the spirit of the proverbial fool. First, however, I would have you notice that this "ginger-beer plant" is directly comparable to a lichen. I have shown you that these bacteria are simply and solely derived algæ, and their behaviour still gives us remnants of their algal character; but the "ginger-beer plant" is not to be compared to a green alga. The yeast may be compared to the fungus of the lichen, morphologically, if not physiologically, though there can be no doubt, and there is no question about it, that the yeast is a very ordinary sort of yeast in many respects. We must regard the "ginger-beer plant," then, as a symbiotic dual organism; and the bacterium seems to form large quantities of lactic acid. What the exact meaning of this may be one is not quite clear. One most curious thing is that the yeast, when placed alone in the sugar solutions, comes very rapidly through the quick fermentation, and then, as you know is the nature of such yeasts, stops. The accepted explanation of this fact is that inhibition, due to the accumulation of the metabolic products, sets in when the sugar is fermented. If the bacterium is symbiotic, then fermentation goes on for a much longer period. So that it seems impossible to avoid the view that the reason these two organisms do so well together, is, that one of them, say the yeast, forms small quantities of certain materials which inhibit the yeast action, unless they are destroyed on the spot, and that the bacterium does probably destroy them on the spot. What the exact action is, it is not easy to foresee, as will be readily understood. This I think is a good instance of symbiotic fermentation.

The idea of symbiotic fermentation is probably not so new as might have been thought. The animal pathologists have, undoubtedly, been dealing with the outskirts of it for some time. Metschnikoff says that in certain phases of certain parasitic diseases, caused by bacteria, there is a struggle between some of the living elements of the blood (known as phagocytes) and the bacillus for a period; under certain circumstances these phagocytes destroy the bacteria. Of course, it does not lie immediately within one's province, but symbiotic fermentation must distinctly touch upon the question here raised. Moreover, it does not alter this, if the other view is the true one—namely, that secretions from the bacteria on the one hand, and from the other living elements of the blood on the other, have to fight it out; in either case you are face to face unquestionably with the possibilities of symbiotic fermentations; and I cannot help thinking that there is, therefore, a definite series of questions which should be attacked on the idea of fermentation of this kind.

But if one looks carefully through the literature a curious story turns up here and there. For instance, some years ago, only in 1887, Garré made a number of observations, showing that certain bacteria are destroyed by being placed in ordinary water, which always contains bacteria. He came to the conclusion that possibly these introduced bacteria simply had to fight it out with the latter. It was also known that some bacteria which live in water are apt to accumulate if the water stands. By taking certain of these forms and growing them side by side, he found that some bacteria rendered the substratum totally unfit for the growth of others, while others improved the substratum for the latter. Garré took plates of gelatine and made cultures of his water bacteria there in streaks, side by side, so that a streak of a given form alternated with one of another form. The first lot of these streak-cultures were made one millimetre apart, the next lot two, the next lot three, and so on; and in certain cases the activity of the water bacterium expressed itself by effects at a distance of a millimetre, or two or three, as the case might be. In some cases it inhibited the growth of the selected bacteria, while in a few cases it actually improved the growth. Now the latter look suspiciously like symbiotic fermentation, which is useful to both of them, and Garré observed that some of the forms do work symbiotically together.

Quite recently another instance has turned up. The isolation of a curious anærobic bacterium, which Perdrix found in water, led to the proof that it ferments starch into a glucose-like body, and that this glucose can be fermented by yeast; and he hit upon the idea of fermenting the starch by the mixed bacterium and yeast; he thus obtained a quantity of glucose by the action of the bacterium, and on adding yeast he got alcohol. You must not forget, however, that in a case like this it is not so much symbiosis as metabiosis which occurs: the one organism goes before, and prepares the way when the other follows, favoured by the altered conditions. Now, it is quite certain that in many cases where you have a group or groups of different organisms in a fermentation, it is metabiosis that you meet with, not symbiosis; and the two cases are worth distinguishing.

Here is another instance which illustrates what I have last said—a case of metabiosis, not of symbiosis. Some years ago it was ascertained that in the Rhine district which grows some of the finest wine which is produced, the grapes are allowed to go bad. These grapes are allowed to go mouldy, until they just look a dirty mess; and it is these grapes that yield the

best bouquet wines. Müller Thurgau looked into the matter, and he found the mould fungus alters the constitution of the grapes, before the yeast begins the fermentation. That is a case bearing not upon symbiosis, but rather upon metabiosis, as are many of the illustrations I have selected.

If I now sum up shortly the facts put before you to-night, you will notice that while many of the cases quoted are illustrations of what is usually known as parasitism—*e.g.*, those of *Monospora*, Uredinous fungi, pathogenous bacteria, etc.—and are therefore to be regarded as *antibiotic* organisms, which tend to destroy life; nevertheless, some of them show adaptations in their modes of life, which suggest a sort of compromise, as it were, between them and their hosts—*e.g.*, root parasites, mistletoe, the fungus of witch's brooms, Ustilagineæ, etc.

A step further, and we have the two organisms having become so adapted to each other's needs, that the condition of *Symbiosis* prevails over that of *Antibiosis*, and the essential point in typical *Symbiosis*—as exemplified by lichens, figs, yucca, the "ginger-beer plant," etc.—is that *both* the organisms concerned are benefited: not necessarily to the same extent, and never in the same way, and hence the various kinds and degrees of symbiosis.

Moreover, I have shown you how, of two organisms, one may help the other by preparing the medium for it, and so we get the idea of *Metabiosis*. The application of these notions to fermentations follows more or less obviously.

In conclusion, I only want to say that, as far as an outsider dare prophecy, it seems not at all unlikely that, in view of the splendid work which has been done already in connection with diseases of fermenting fluids, it seems to me that it will probably be worth your while to investigate this question of symbiotic and metabiotic fermentation, with a view to improvements in brewing. That such fermentations do exist is certain; and, at any rate, the question should be kept in view, and will some day or other have to be worked out. It is no easy task, the difficulties are enormous; but we cannot stand still in such cases, and it will have to be done, whether it is likely to lead to any results or not; the point is simply that there is a problem, and that that problem sooner or later will have to be attacked and solved.

AN OUTLINE OF THE APPLICATION OF MICROSCOPY TO PHARMACY.*

BY A. M. WHELPLEY, M.D., P.H.G., F.R.M.S.

The Use of the Simple Microscope.—a. The student of pharmacy learns early in his college days that the simple microscope is almost indispensable while pursuing the study of botany. The importance of botany is recognised in every pharmaceutical college, because its principles rest at the foundation of the knowledge of vegetable drugs. The proportion of animal drugs used to-day is very small, so that the study of zoology in colleges of pharmacy is usually overlooked.

b. In order to study drugs, the pharmacist classifies them according to their organileptic and other characteristics. This system is not without fault, but it is nearest perfect of any that has been devised, and it has been adopted by all works on materia medica which are intended solely for the use of pharmacists. While many of the physical characteristics of the vegetable drugs can be studied with the unaided eye, there remains a large proportion which requires the use of the microscope. Medicinal leaves, closely resembling each other, can be distinguished by a microscopical examination of the hairs found upon their surface; as an example, we take mullein leaves, which are thickly covered with beautiful stellate hairs; aconite leaves are sometimes adulterated with mullein leaves, but the stellate hairs enable the simple microscope to show the difference, even after the leaves have been pressed and otherwise mutilated. The hairs found upon aconite leaves are less numerous than the mullein hairs, and further distinguished from them by not branching. The fissures, ridges, warts, hairs, scars, etc., found on barks, leaves, rhizomes, woods and other parts of the plants employed in medicine, are physical characteristics which can be distinguished by means of the simple microscope, and aid the pharmacist in recognising vegetable drugs.

c. The simple microscope again comes into play for the pharmacist while examining many of the medicinal preparations, in order to determine their quality or prove their identity. In some instances the United States Pharmacopœia prescribes that the simple microscope should be used in testing the quality of preparations. As an example, we have the ordinary mercury ointment, which is a mixture of metallic mercury with animal fats. The Pharmacopœia states that this should be mixed until the globules of metallic mercury cannot be distinguished by means of a microscope magnifying ten diameters.

d. The simple microscope may also be made serviceable while testing the quality of some of the utensils used in a pharmacy. As a case comes in point, we cite the examination of sieves to see that they have the proper number of meshes to the linear inch. Some of the finer sieves would require the use of the compound microscope, while the simple microscope will answer in the examination of coarser sieves which are more commonly used.

e. The simple microscope is a convenience when attempting to make out the prescription number upon soiled labels which pharmacists receive when prescriptions are to be refilled. It is also convenient in the examination of bills which are suspected of being counterfeit. It can be used when it becomes necessary to remove a sliver of wood from the flesh, and there are a thousand and one other instances where pharmacists can conveniently make use of the simple microscope. Some of the insects which infest drugs are appropriately studied by means of the simple microscope. Customers may also be interested in the instrument, and its use is then turned to a commercial advantage by drawing trade.

The Use of the Compound Microscope.—a. The study of vegetable histology is of as much importance to the educated pharmacist as animal histology is to the qualified physician. While work in vegetable histology does not require the use of an instrument with as high powers, or present as many difficulties as are found in animal histology, still the microscope is just as essential in this line of investigation as in the one followed by physicians. The different vegetable tissues are as readily recognised as bone or muscle. A pharmacist can as easily distinguish a section of wood from a section of bark as an animal histologist can tell a section of bone from a section of epidermis. The arrangement of the various tissues in corresponding organs of different plants is quite characteristic; thus it is, that one who is versed in the work can distinguish a transverse section of dandelion root from a similar section of chicory root. This is simply one example of how the microscope will enable the educated pharmacist to identify a genuine drug or detect an adulteration.

b. The United States Pharmacopœia, the dispensatories which are commentaries upon the Pharmacopœia, and all works on materia medica for pharmacists, recognise the importance of studying the

* Read before the American Society of Microscopists, and printed in the *American Monthly Microscopical Journal*.

microscopical appearance of transverse sections of vegetable drugs. While the Pharmacopœia is not an illustrated work, it gives quite explicit descriptions of the appearance of drugs as seen under the microscope. In the commentaries on the Pharmacopœia and the works on materia medica, we find illustrations of the drugs as seen under the microscope. The study enables the pharmacist to identify drugs, tell the quality, detect substitutions, adulterations, sophistications and admixtures.

c. The study of the microscopical appearance of powdered drugs has not been carried to that degree of perfection which has been reached in vegetable histology; however, the field is an inviting one, and it is here that the pharmaceutical microscopists of the future will be able to do the most valuable work. Some idea of what can be done is shown by the work that the Department of Agriculture of the government is doing in the examination of spices. See "Bulletin No. 13" of this department. Many of the histological elements of plants are such that they are readily recognised, even in the mutilated condition found in powders. It is often possible to identify cells which constitute wood, cells from pith, and other characteristic cells, like the bast of cinchona, the stone cells of cinnamon and the pitted ducts of red cedar. I remember an instance where a sample of powdered red pepper was simply fine red cedar sawdust flavoured with the oleoresin of pepper. A glance at the mixture under the microscope revealed its true nature. In coarse powders it is sometimes possible to recognse the stomata of leaves.

d. Pharmacognosy, or the recognition of drugs, is studied by aid of a system based upon the physical characteristics of the substances. As an example, we study the structure and characteristics of a leaf, which is one of the sub-divisions of that great class of drugs derived from the vegetable kingdom. Leaves are again sub-divided into two kinds, the herbaceous and coriaceous. These two classes are readily distinguished from each other by an examination without the aid of the microscope. However, the case differs when we come to the study of several other sub-divisions of vegetable drugs. For instance, we take the root, which is a sub-division corresponding to the leaves. The roots are divided into two similar sub-divisions, known as the mono-cotyledonous and the di-cotyledonous. It is by means of examining a transverse section of these roots under the microscope that the pharmacist determines to which sub-division they belong. The di-cotyledonous are again sub-divided into woody, with thick bark; woody, with thin bark; and fleshy roots. As is readily understood, this classification is based solely upon characteristics revealed by the microscope. To continue with the sub-division one step further, we have the woody roots with thick bark, divided into those with oil, resin or latex ducts and those without oil, resin or latex ducts. The advantages of such a system of classification is an interesting subject, but does not directly concern us as microscopists. Its consideration usually occupies an entire lecture in the college of pharmacy.

e. The use of the microscope in micro-chemistry is not advanced as far in pharmacy as the use of the instrument in vegetable histology. The principal reason for this is owing to the difficulty of studying crystallography. A few of the more common salts like the cinchona alkaloids have been studied and their micro-chemical appearances are figured in the dispensatories. I have no doubt that micro-chemistry applied to pharmacy will be greatly advanced by the active pharmacist of the future.

f. The introduction of the compound microscope in the examination of urine is by no means recent. The value of the instrument in this work is so thoroughly recognised that it does not admit of debate. The examination of urine as a part of a pharmacist's work is fast gaining a similar position.

g. In conclusion, there are many incidental uses for the compound microscope in a drug store, such as the examination of the smaller insects which infest drugs, the study of moulds which are found in pharmaceutical preparations, and other uses which suggest themselves to pharmacists with an investigating turn of mind.

ANALYSIS OF NEW CINCHONA BARKS.

The following is the table furnished by Mr. David Howard, and referred to by Mr. Holmes at the last Evening Meeting in London, in his remarks reported on page 875 :—

	Sulphate of Quinine p. c.	Quinine p. c.	Cinchonidine p. c.	Cinchonine p. c.	Quinidine p. c.	Amorphous p. c.
Thomsoniana. .	5·94	4·45	0·27	0·82	0·26	0·74
Ledgeriana Verde . . .	4·90	3·68	0·00	0·01	0·20	0·44
Negra	7·30	5·48	0·00	0·10	trace	0·78
Morada. . . .	3·06	2·30	0 00	0·04	0·50	0·38
Tuna	9·04	6·78	0·40	0·38	0·18	0·42
Pombiana . . .	5·88	4·41	0·34	0·02	trace	0·26
Officinalis . . .	6·32	4·74	1·23	0·10	0·07	0·42
Succirubra . .	5·93	4·45	2·77	0·12	0·02	0·36
Hybrid β . . .	3·32	2·49	1·92	0·04	trace	0·52

PROTEIDS OF MAIZE.

R. H. Chittenden and T. B. Osborne find, as the result of a careful series of experiments, that the seeds of the maize contain several distinct proteids, of characteristic reactions and composition. Among these there are three globulins, one or more albumins, and a proteid soluble in alcohol. They call special attention to the presence in maize-seed of a peculiar proteid body known as maize-fibrin or *zein*, soluble in warm dilute alcohol, but insoluble in water. Zein is characterised by its high content of carbon (about 55 p.c.), by its resistance to the action of dilute alkalies, and by the ease with which it is converted into an insoluble modification on being warmed with water, or with very dilute alcohol. Its soluble and insoluble modifications have the same percentage composition; both respond to the ordinary reactions for proteids (*Amer. Chem. Journ.*, 1891 and 1892).

NITROGENOUS BASES PRESENT IN COTTON-SEED.

An alcoholic extraction prepared from cotton-seed is used in Germany as a diet for young cattle, but has been proved in some cases to have poisonous properties. These properties having been attributed to the presence of the poisonous bases choline and betaine, Mr. W. Maxwell has undertaken a chemical examination of the cattle-foods obtained from cotton-seed, and finds both bases present, in the proportion, in the sample examined, of 17·5 per cent. of choline and 82·5 per cent. of betaine. Professor Gaehtgens states that a dose of 0·3 grammes of choline given to a strong cat causes immediate paralysis, and a dose of 0·5 grammes immediate death. Toxic properties have not yet been observed with certainty in the case of betaine (*Amer. Chem. Journ.*, 1891, 469).

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, APRIL 30, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

IS PROGRESS CONTINUOUS?

IT is customary in these latter days to think well of our own times and surroundings, when compared with those that have preceded them. Perhaps it is but natural and very excusable that this should be so. Progress in science and the arts has been so great and so rapid in recent years, that the pride with which moderns regard their achievements may be pardonably overlooked to a great extent. At the same time it must be granted that researches into ancient history show that much of what we do, and are apt to consider novel and good, has been done centuries ago; done, too, in a better fashion than mankind of to-day is fitted to do it.

In an address recently delivered before the Alumni Association of the Philadelphia College of Pharmacy, Dr. DAVID CERNA dwelt upon the advanced civilization of the Aztecs, the ancient inhabitants of Mexico, with especial reference to the high pitch to which they had carried the medical art and developed pharmacy. This civilization was destroyed by the vastly inferior one, brought by the Spanish conquest; and it is only by the patient decipherment of the hieroglyphics on the ruined monuments of the ancient Mexicans, that it has been possible to gain an insight into their manners and customs. We find that the chief characteristic of their systems of training for the various professions was the thoroughness that was enforced. Students of pharmacy were compelled to master the history and classification of plants, some twelve hundred of which were used in medicine, as well as their geographical distribution, distinctive characters, and properties. Following on this came a course of instruction in the preparation of the simpler officinal medicaments. The practice of pharmacy was permitted only to thoroughly competent graduates, and their places of business were under the supervision of other regular pharmacists. The current materia medica was much as that of later times. Minerals, vegetables, and animals were all impressed into the service, but the main part in furnishing drugs was played by the plant world. Roots, barks, leaves, heart-woods, flowers, fruits, and seeds, with their extracted resins, gum-resins, balsams, and oils, furnished the chief stock-in-trade of the Aztec pharmacist. He prepared liquors, infusions, and decoctions from the leaves, roots, and flowers, much as his modern representative does. His skill, too, in making syrups, emulsions, ointments, powders, pastes, plasters, and mixtures may not be called in question. There is little doubt that the standard of qualification was a very high one in the case of pharmacists, no less than in that of the physicians or of the surgeons. For extreme differentiation was the rule even in those comparatively early times, and the various branches were kept quite distinct. Efficiency in the preliminary branches was rigidly enforced, and all the evidence tends to show that the graduates were not found wanting when called upon to practice what they had been taught.

It would appear, therefore, that the position at present occupied by pharmacy as a profession is not altogether without precedent, particularly when allowance is made for the undoubtedly superior means at present available. Scientific pharmacy in Britain is, as has been frequently pointed out, of quite recent growth, and has not even yet attained the level it occupies in other European communities. This is easily explained when we consider in what diverse fashions progress has been effected here and elsewhere. Whilst abroad, as amongst primitive peoples, the State has exercised a guiding hand and controlled the internal regulations of the various trades and professions, the English-speaking peoples have invariably developed their institutions by individual effort. True, recognition by the State is now in many instances regarded as essential, but this condition of affairs has only been arrived at after the numerous details had shaped themselves in the upward struggle of individuals and received the stamp of custom. The great advantage of this plan is that improvements and alterations in routine likely to be of public benefit are more readily effected than when the members of a profession are bound down by stereotyped official regulations. One all-sufficient reason for continually striving to improve one's self, and so being able, when associated with brethren in the craft, to co-operate for a general advance, is that by this means the necessity for vexatious interference by outside authorities is obviated. A self-controlled pharmacist voluntarily and faithfully acting in accordance with others of like nature, need entertain no alarm that restrictions will be imposed upon him against his will and unduly interfere with his legitimate pursuits. Fortunately the record of the past half century has been such as to justify dependence upon the principle of self-help, and to warrant the hope that it may continue to inspire us to work in

the right direction. Much has been done by pharmacists in extending the limits of their attainments to meet the wants of their time, but a greater task may yet be accomplished by self-reliance and honest endeavour. And though the rate of progress may be slow when compared with that of other countries, the resulting position is less likely to be wanting in stability than if it were bolstered up by artificial means instead of depending upon the integrity of the individual.

THE SALE OF POISON AND THE PHARMACY ACT.

We are informed on very good authority that the Treasury is about to institute a prosecution under the seventeenth section of the Pharmacy Act, 1868, for the sale of a well-known proprietary preparation, on the ground that as a preparation of morphine it has been sold without conforming with the regulations as to labelling prescribed by that section of the Act. This step may be regarded as a response to the urgent representations made by medical men and coroners' juries as to the danger attending the sale of poisons in the form of secret remedies, and it will raise the question whether such preparations are properly entitled to the exemption provided in the Pharmacy Act for patent medicines, the composition of which would not be a matter of secrecy. The decision of that question will, of course, be a matter of great importance to the general public as well as to others, and it will also materially influence the efficiency of the Pharmacy Act in regard to its primary intention as a measure for securing the public safety.

PROPOSED BOTANIC INSTITUTE FOR GLASGOW.

Although there has been ample provision for the purchase and keeping up of Botanical Gardens at Glasgow, the botanical department of the University has no home there, and it is at present confined to two small rooms and an attic in the University buildings. There is no class-room, and the laboratories are so small that the practical work has to be repeated three times daily to successive relays of students. The valuable herbarium, also, lies unused in an inaccessible attic. In view of these circumstances, Professor F. O. Bower, who now holds the chair of Botany in Glasgow University, has suggested to the trustees of the Steven Trust that a part of the property at their disposal should be applied to the purpose of erecting a suitable building in the Botanic Garden, to be placed under the control of the Professor of Botany. Professor Bower suggests that this building should contain a large lecture room capable of holding three hundred persons ; also two large rooms for a museum and a central hall, besides space for an herbarium, laboratories and private rooms for the Professor and students. It is estimated that the cost of the building and internal fittings would amount to twelve or thirteen thousand pounds. An income of four hundred pounds a year would be required for the current expenses of maintenance.

THE SOCIETY'S HERBARIUM.

We desire to direct the attention of botanical readers to the Curator's letter on page 908. It is essential that the Museum collection of plants should be as complete as possible, and any assistance rendered in this direction will be thankfully acknowledged and, if possible, reciprocated.

CHEMISTRY IN SPACE.

We are pleased to notice that among the new books published by the Clarendon Press, Oxford, a translation of Professor J. H. Van 'tHoff's "Dix Années dans l'Histoire d'une Theorie" is announced. The translation has been made by Mr. J. E. Marsh, B.A., and its publication will be welcomed by many chemists who have not been able to follow up the consideration of atomic formulæ in three dimensions so fully as they desired since the original work was published in the Dutch language.

THE RETAIL PRICES OF DRUGS.

We have been interested to note that the *Daily News*, of Monday last, whilst quoting from our leading article of April 23, appears in some degree to favour the arguments therein stated. It is particularly important that the exact position of the modern pharmacist should be thoroughly realized by the world at large, and there can be no better way of obtaining the desired publicity than by the friendly aid of the contemporary press.

UNIVERSITY EXTENSION AT EDINBURGH.

The sixth summer meeting in connection with the above scheme is announced to take place in August next. According to the circular issued by the Committee of arrangement there are to be courses of lectures on a variety of scientific subjects. Professor Geddes will deal with sociology ; Professor Haddon with anthropology ; and Professor Haycraft with physiology. Mr. A. Thomson will lecture on general biology and zoology, Messrs. Turbull and Henderson on botany, whilst a number of gentlemen, including representatives of foreign Universities, will give occasional lectures. Courses on the teaching of physiology and hygiene will also be given, and technical education will be in the hands of specialists, who will deal with the subject in a series of evening lectures.

We understand that Mr. William Dunn Joce, chemist, of Bideford, has been recently appointed by the Lord Chancellor a Justice of the Peace. Mr. Joce's family is of old standing in Bideford, his late father having been Alderman and Mayor of the borough.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

April, 1892.

Present:—Mr. Carteighe, President; Mr. Bottle, Vice-President; Messrs. Blunt, Bowen, Corder, Davies, Druce, Fletcher, Gerrard, Greenish, Holmes, Ransom, Saul, Symons, Tanner, and Taylor.

Dr. Stevenson was present on behalf of the Privy Council.

MAJOR EXAMINATION.

Thirty candidates were examined. *Sixteen* failed. The undermentioned *fourteen* passed, and were declared duly qualified to be registered as Pharmaceutical Chemists:—

Bridgman, William Herbert...Holsworthy.
Casewell, Job Parry .....Market Drayton.
Cross, Edward Robert .....Scarborough.
Gare, George Henry .....Blandford.
Lambert, Jas. Ernest Harold...Farsley.
Riding, John ....Preston.
Ridley, Alexander ....Ipswich.
Ringer, Frank Arthur .....Norwich.
Shove, Bertha .....London.
Stainer, John Ward .....Folkestone.
Summers, Stanley .....London.
Wellings, Arthur.....Buxton.
Williamson, Joseph .....Maryport.
York, Frank.....Richmond.

MINOR EXAMINATION.

One hundred and forty-nine candidates were examined. *Ninety-five* failed. The undermentioned *fifty-four* passed, and were declared qualified to be registered as Chemists and Druggists:—

Brown, Thomas .....Seaham Harbour.
Chaston, George Hunt .....Alresford.
Chippendale, John Richard ...Preston.
Cooper, John .....Farnworth.
Davies, David Jonathan .....New Quay.
Day, James Alfred .....St. Albans.
Dunn, Harold Stables .....York.
Dupuy, Arthur Edgar .....Guernsey.
Eakin, James .....London.
Eggleston, George .....Alrewas.
Fearnley, Fairfax .....Headingley.
Ford, Betsy .....Kirriemuir.
Forster, George Francis .....Dover.
Gane, Eustace Harold .....London.
Green, John Hugh Homer ...Swindon.
Gregory, George Henry.....Lincoln.
Guyer, Richard Glode .....Torquay.
Hazlitt, Frank.....Bury.
Heale, Thos. Albert Oakley ...Bury St. Edmunds.
Henshaw, Charles James .....Leek.
Heselton, Charles James .....Beverley.
Hill, Ernest William .....Wisbech.
Horrell, Wm. Foskett Edwd...Crediton.
Howard, Arthur .....Ely.
Hugill, Edwin Abbott .....Clifton.
Huntsman, Charles Sidney ...London.
Johnson, George Arthur .....Rugby.
Jones, David .....Llandilo.
Jones, Robert Haselwood .....Bury St. Edmunds.
Jones, Walter Herbert ..... Aberdare.
Jubb, Nathaniel .....Langworth.
Lee, John Edward .....Hull.
Marchant, David.....Eastbourne.
Morris, William Evans .....Portmadoc.
Murfet, Arthur Hugh.....Swaffham.
Owen, Alfred Herbert .....Atherstone.
Patchitt, Richard .....Nottingham.
Porter, Walton .....Whitehaven.
Scott, Henry .....Keswick.
Smith, Gilbert.. .... Bayswater.
Smyrk, Frank Alfred .....Evesham.
Sturton, Frank Ainsworth ...Peterborough.
Taylor, Frederick Hayden ...London.
Thompson, Alfred Tebbutt ...Grimsby.
Thompson, Thomas .....Ulverston.
Tremeer, Arthur John .....Barnstaple.
Walkington, Richard .....Church Fenton.
Waller, John .....Stanley.
Watkins, Henry Baskerville...Darlington.
Whitworth, John Handley ...Stockport.
Williams, Ernest.....Falmouth.
Willmott, Alfred Wade.....Darlington.
Wilson, George .....Wigan.
Wilton, Walter Ernest .....Birmingham.

MODIFIED EXAMINATION.

One candidate was examined, and was declared qualified to be registered as a Chemist and Druggist:

Cory, Charles .....London.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

The meeting of this Association, held at 103, Great Russell Street, on Thursday, April 21, Mr. W. Lloyd Williams, A.I.C., President, in the chair, was devoted to the answering of queries. The first, "What are the advantages of some of the new antiseptics?" was answered by the following—

Notes on New Antiseptics.

BY S. A. WALTON.

If we trace back the list of antiseptics and disinfectants to an early date we find that those mostly in use were sulphur, the halogen compound, mercury, coal tar products, and some essential oils. If we again follow up the development of antiseptics we find that these materials form the basis of most of our new antiseptics in a more defined and definite composition. Thus, in place of the old method of burning sulphur, sulphurous acid in many cases replaces it, and compounds of sulphur, as sulphonates, are used in combination, as in the case of ichthyol (ammonium-ichthyol sulphonate), soziodol (di-iodoparaphenol sulphonic acid), and many others. The same may be said of the halogens, iodoform, iodo and di-iodo-salicylic acids and iodol being iodine derivatives, while the other elements forming this group have corresponding compounds in a greater or less variety.

The mercurial preparations are well known to us, the mercuro-zinc cyanide being one of the developments of chemistry with regard to antiseptics.

The coal tar products are both numerous and varied, and many varieties of new combinations are continually being found that promise to be of use as antiseptics.

Essential oils have been combined with other elements to form valuable antiseptics, aristol (dithymoliodide) being one of these, while oxidized pine oil with camphoric acid forms one of the most popular disinfectants of the present day.

Time does not allow me to formulate or describe the following preparations fully. I will therefore give such description as is necessary, with the hope that the members of the Association will look into the matter for themselves for further information.

Amongst new antiseptics from coal tar derivatives may be mentioned pyoktanin, methyl-violet, the most antiseptic of the aniline colours. A solution of 1 in

1000 is used in various eye diseases, phthisis, ulcers, etc. There is a yellow variety commonly known as auramine, also used antiseptically.

Lysol is a saponified phenol derived from cresols, and contains the higher homologues of carbolic acid. It is said to possess higher antimycotic power than carbolic acid, and to be less poisonous. This preparation is much used in Germany at the present time.

Retinol, a distillation product of pine resin, is a viscid fluid hydrocarbon. It is a non-irritating and stable antiseptic.

Europhen, iso-butyl-ortho-cresyl-iodide, contains 23 per cent. of iodine, and is non-poisonous.

Dermatol, a basic gallate of bismuth, forms a powerful antiseptic and dessicant.

Sulphaminol, thiooxydiphenylamine, the antiseptic action of which is due to its decomposition in contact with the fluids of the body into sulphur and phenol.

Monochlorphenol is prepared by the action of chlorine on cooled phenol. It is a powerful antiseptic and less irritating than trichlorophenol.

Camphoid, though only a mild antiseptic in itself, is a valuable adjunct to this class of bodies, as it forms a ready method of applying antiseptics to the surface of the skin, and owing to its composition (of spirit, camphor and pyroxylin) it forms a valuable solvent for substances such as salicylic acid, resorcin, hydronaphthol and many others.

In conclusion, I have to thank Mr. Martindale for allowing me to make extracts from a new edition of the 'Extra Pharmacopœia' he now has in course of preparation.

A short discussion followed the reading of this note, in which the President, Messrs. McEwan, Parry and Pope joined.

The next item was a note on—

Commercial Gold Chloride.

BY JOHN C. UMNEY.

My attention was called recently to the fact that a sample of commercial gold chloride was the potassium double salt and not the sodium, the compound usually employed, owing to the deliquescence of the true and acid chlorides of gold. This has led me to examine a few samples from English and continental sources.

The weights of the contents of the tubes show considerable deviation from the proper "15 grains," the figures showing no improvement upon those recorded by Mr. Branson ('Year-Book,' 1882, p. 472).

Weights of Tubes.

Continental	A	12·56 grains.
	B	14·66 ,,
English	C	13·19 ,,
	D	14·02 ,,
	E	13·59 ,,

Samples A and B were found to contain potassium chloride equivalent to 17·5 per cent., which agrees with calculated percentage for the salt—

	$AuCl_3$, KCl $2\frac{1}{2}$ H_2O Calculated.	Found. A.	B.
Au (metal)	46·3 p. c.	47·4	47·6
KCl	17·6 ,,	17·5	17·5

The excess of gold over the calculated percentage in this salt is evidently due to its efflorescent character.

The samples of English manufacture contained respectively 48·9, 48·6, and 49·1 per cent. of gold, and were the sodium double salts, and correspond to the formula—

	$AuCl_3$, NaCl $2H_2O$ Calculated.	Found. C.	D.	E.
Au (metal)	49·4	48·9	48·6	49·1

It seems desirable to call attention to this difference in the relative gold value of commercial "gold chlorides" according as they are the potassium or sodium compounds, which may amount theoretically to as much as 3 per cent.

The President said that although gold chloride was used principally in photography, it had recently been recommended as a cure for inebriety, and for its use in medicine it was necessary that it should be definite and stable. He thought a partial explanation of the discrepancies noticed might be due to the manufacturer filling in the chemical when it was still moist.

Mr. McEwan thought it was a question of competition and low price.

In answer to the next query, "What is the best chemical test for cocaine salts?" the following note was read on—

Reactions of Cocaine.

BY J. C. STEAD.

The query read by the President is, "What is the best chemical test for cocaine salts?" To attempt to answer this would be presumptuous on my part, and I, in reply, can only enumerate the characteristic reactions of cocaine salts generally, and describe some of the tests which have been proposed for their identification.

The aqueous solutions of the freely soluble salts of cocaine are precipitated as follows by—

Carbonates and hydrates of ammonia, the alkalies and alkali earths	white.
Borax	white.
Picric acid.	yellow.
Tannin, in the presence of hydrochloric acid	white.
Meyer's reagent	white.
Thresh's reagent	brick red.
Iodine	brick red.
Stannous chloride	white.
Gold chloride.	pale yellow.
Platinic chloride.	yellowish flesh.
Mercuric chloride	white.

They are not precipitated by bicarbonates or tannin.

With the ordinary colour reagents for alkaloids, viz., sulphuric acid, sulphuric acid with nitric acid, sulphuric acid with sugar, sulpho-molybdic acid, nitric acid, hydrochloric acid, sulphuric acid and potassium bichromate, and ferric chloride, the alkaloid or its salts give no characteristic reaction. It has been stated that with the sulphuric acid and bichromate test cocaine gives a dirty pink, but with this I have not been able to obtain any distinct coloration.

The following are some of the characteristic reactions of which notices have been published from time to time as being useful for the identification of the alkaloid.

Cocaine treated with an alcoholic solution of potassium hydrate yields ethyl benzoate with characteristic odour.

Professor Flückiger, in a paper published in the *Pharmaceutical Journal* of March 20, 1886, draws attention to the fact that if cocaine or its salts be heated with sulphuric acid sp. gr. 1·84, white acrid vapours are given off which on cooling deposit crystals of benzoic acid. This reaction, he states, may be performed with minute quantities of the alkaloid.

Schell remarks that a mixture of cocaine hydrochloride and a small quantity of mercurous chloride moistened or simply breathed upon blackens. Atropine gives the same result, but only on heating. The alkaloid cocaine does not answer to this test, but only its hydrochloride.

Vitali proposes a test which consists in dissolving

the alkaloid in ½–1 c.c. of sulphuric acid in a porcelain capsule and adding potassium or sodium iodate or iodic acid, in the proportion equal to three times the weight of the cocaine, when on slightly heating on a water-bath light green streaks appear, then a grass green coloration, and last a dark blue.

There is a test proposed by de Silva, which was commented upon by Mr. Stark at a meeting of this Association last session. It consists in evaporating to dryness on a water-bath a solution of a minute portion of cocaine or one of its salts in nitric acid sp. gr. 1·4, and then treating the residue with an alcoholic solution of potash, when an odour similar to that of peppermint is developed. Mr. Stark, in his note, mentioned that he had tried this test with atropine, sabadilline, pilocarpine, cinchonine, eserine, veratrine, brucine, codeine, delphinine, narcotine, quinine, strychnine, and quinidine, none of which yielded a result similar to that of cocaine, though he thought the odour of the product from the latter suggested citronella rather than peppermint, and was not distinctive enough to render the test reliable. The odour that I have obtained with this test is similar to that produced on treating cocaine with alcoholic potash. The product appears to be ethyl benzoic ether.

Mezger has suggested the following for the detection of cocaine in the presence of other bases, cocaine hydrochloride 0·05 gramme dissolved in 5 c.c. of water and 5 drops of a 5 per cent. solution of chromic acid added. A distinct precipitate is formed on the addition of each drop, which, however, immediately dissolves; if, now, 1 c.c. of strong hydrochloric acid is added a heavy yellow precipitate of cocaine chromate is formed.

Müller also remarks that potassium bichromate precipitates the alkaloid from neutral solutions, while the normal chromate does not, and so serves to distinguish cocaine from other alkaloids. I have tried these chromate tests with aconitine, apomorphine, atropine, beberine, brucine, caffeine, cinchonine, cinchonidine, codeine, colchicine, emetine, gelsemine, hyoscyamine, morphine, pilocarpine, physostigmine, narceine, strychnine, and veratrine. Of these, gelsemine, strychnine, and veratrine behave very similarly to cocaine, so that with them the test is negatived, but with the remainder the reactions are distinct from that of cocaine.

Giesel, in 1886, proposed the following reaction for identifyiug cocaine. If 0·01 gramme cocaine hydrochloride is dissolved in 1–2 drops of water and about 1 c.c. of 3 per cent. solution of potassium permanganate added, a violet precipitate is produced at ordinary temperatures. Lyons remarks that with solutions containing less than 1 per cent. of cocaine crystals are only formed on evaporation.

In using this test I find that with aconitine, beberine, brucine, quinine, colchicine, cinchonine, emetine, gelsemine, codeine, morphine, physostigmine, pilocarpine, strychnine, veratrine, narceine, cinchonidine and apomorphine, the reduction of the permanganate is immediate, or occupies but a few minutes, whilst with hyoscyamine, atropine and caffeine, an indifference equal to that with cocaine is observed, but no precipitate of the permanganate of the alkaloid is formed. This is, in my opinion, one of the best tests for cocaine as yet published.

There are some other tests which I have not referred to because they are either useless or they do not admit of their use by the pharmacist with facility.

A short discussion followed the reading of this note, in which the President, Messrs. McEwan and Stead joined.

The query, "Can the B.P. Syrup of Lemon be improved?" was replied to in a note on—

Syrup of Lemon.

BY H. H. ROBINS.

This preparation, if made strictly in accordance with the official formula, produces a bright, good-flavoured syrup, depositing slightly after standing a few days.

The occurrence of this deposit makes the preparation somewhat unsightly, yet it is in so small a proportion and so readily diffusible that upon agitating the syrup it again assumes its original brightness; only to re-deposit, however, after a short time.

This deposit, consisting as it does of albuminoid and mucilaginous bodies not totally removed by heating the juice, is increased if care is not exercised in using lemon peel free from pith.

The lemon juice itself remains the great source of the mischief, and if we are to have any regard for its flavour, we are compelled to use it in only a semi-clarified condition.

There is much syrup of lemon used based on the formula of the French Codex; this preparation is made directly from citric acid and lemon flavouring, etc., and is therefore more stable than the one of the B.P., but it cannot be said that the flavour is as delicate. I would suggest as an improvement to our official formula that it be ordered to use fresh lemon peel, free from pith, to allow the strained juice to stand twelve hours in a suitably covered vessel, then carefully decant before heating.

Lemon syrup made even this way will still deposit; it then remains to allow this all to subside, to decant the clear syrup, and if necessary and desirable the residue can be filtered cold slowly through a suitable felt bag.

Mr. Strother said that the syrup of lemon of the French codex was slightly darker than the B.P. article. An addition of 2 drachms of glycerine to each half-pint of syrup had the effect of preserving the syrups for an indefinite period.

The President remarked that the syrup was a source of trouble to the manufacturing pharmacist. Mr. Cripps had recommended that the syrup before straining be heated on a water-bath and then filtered through wash-leather. He thought that in practice this process would prove somewhat tedious.

Mr. Sage thought that if the peel were carefully grated so as to exclude the pith and the syrup allowed to deposit before filtering, a satisfactory preparation could be produced.

Mr. Pope said that a syrup prepared with citric acid, tincture of lemon and syrup, was often used, and was a very satisfactory preparation, although the syrup so prepared was not so dark as that of the B.P.

Mr. McEwan observed that a syrup prepared in the manner described by Mr. Pope was more agreeable to the palate than the official preparation.

Mr. Walton said that the B.P. syrup, even after the separation of the first deposit, again threw down. He thought that a minute percentage of chloroform might be added. The quantity required would be so small as to be unobjectionable, and even if it were so it could easily be driven off on a water-bath at the time of using.

The query, "When Liq. Taraxaci is prescribed, what is generally intended, Succus Taraxaci or Extractum Taraxaci Liquidum?" was then submitted to the meeting.

The President, Messrs. Walton, Stead, Sage, Gabbelis, McEwan and Pope joined in the discussion of this question. The outcome of the discussion was that although prior to the issuing of the Pharmacopœia of 1885 either succus taraxaci or ext. taraxaci liq. was used for liquor tarax., according to the usage of the various pharmacies, and that at the same time some wholesale druggists sent out an article with a

label bearing both names, succus taraxaci and liquor taraxaci, still the word liquor was synonymous with fluid extract. The unanimous opinion of the meeting was that the fluid extract was the preparation which should be used, though in all cases the dispenser should as far as possible fulfil the intentions of the prescriber.

The last query, "Should repetitions of physicians' prescriptions be registered in the prescription book?" was generally discussed, and diverse opinions were expressed as to the advisability of such registration. Eventually it was shown that with prescriptions containing poisons within the meaning of the Pharmacy Act it was a legal necessity, and in all cases it was desirable to have some record of repeated prescriptions, either in a journal or the prescription book itself.

LONDON INSTITUTION.

Illuminating Flames.*

BY PROFESSOR VIVIAN B. LEWES, F.I.C., F.C.S.

Flame has always had an attraction for us, which has been rivalled by few other natural phenomena; and whether we look back to the times when the old fire-worshippers treated it as a deity, or take the present century and trace the work which has been done and the discussions which have been held as to its cause, and the actions which render it luminous or destroy its light-giving power, we are fain to admit that a subject which has drawn to it so much attention for upwards of 20 centuries must be a worthy object for research, until such time as we have mastered every detail that bears upon the subject. It is upon flame that we have up to the present always depended for artificial illumination; and whether that flame has been derived from the torch, the rushlight, candle, oil-lamp or coal-gas, it has played a part second to none in our domestic comfort; while with the birth and development of coal gas in the early years of this century, flame became an important commercial factor in the history of the country. It was not until the waning years of the last century that Lavoisier's historical researches upon combustion gave us the key to the action which leads to the formation of flame; and since that time its history has teemed with important researches, and still more important applications, which have to-day borne fruit in the improvements we see on every side, in our methods of utilizing flame both for heating and illuminating purposes.

Flame, be it luminous or non-luminous, is produced by the combustion of gaseous matter; and a moment's consideration will render this clear to our minds. Take a piece of Wallsend or Silkstone coal and note how it burns on the hearth—first swelling and giving out tarry vapours, which ignite and form jets of flame, and these, encircling the coal, carry on the action, and gives us the bright mass of flame which renders our English hearth so cheery a companion. On the other hand, take the coke which is derived from this coal from its destructive distillation in the gas retort, and watch the clear coke fire as it burns. Here you have no flame of the kind given by the coal, but simply the glowing mass of fuel; with, at most, a small blue lambent flame playing over its surface.

What is it that has happened during the conversion of the coal into coke which made so great a difference in its method of combustion? If we analyse the coal and then the coke formed from it, we can at once trace the cause which has given us in the one case flame and in the other none:—

	Silkstone Coal.	Coke from Silkstone Coal.
Carbon	79·0	89·0
Hydrogen	5·2	1·0
Nitrogen	1·5	1·0
Sulphur	1·5	1·2
Moisture	4 0	1·2
Ash	2·8	5·2
Oxygen	6·0	1·4
	100·0	100·0

The conversion of the coal into coke has been accompanied by the elimination of hydrogen, which, partly free and partly in combination with carbon, has been driven off, and has formed the coal gas, and with the destruction of the constituents capable of forming gas, the property of burning with flame has disappeared. Again, take a piece of pinewood and ignite it. Its combustion will be marked by a large and luminous flame: while after conversion into charcoal, by eliminating of its gas-producing constituents, it burns with a flameless combustion. From such experiments as these we are forced to the conviction that flame is gas or vapour undergoing combustion; and inasmuch as combustion is chemical combination, we can define flame as being gaseous matter undergoing active chemical combination.

In all the earlier experiments with flame and with the other phenomena of combustion, it was only those substances which ordinarily burnt in air that were studied and experimented with; those bodies which would burn in air being called combustibles, while oxygen and air were looked upon as supporters of combustion. This conventional limitation of the processes of combustion still exists. A little reflection, however, shows us that such terms must be purely relative, as, if flame depends upon active chemical combination taking place between gases, it can only exist where the combining gases are present, and it cannot matter which of them has the credit of being the combustible, as a jet of air or oxygen will burn just as well in an atmosphere of coal gas or hydrogen, as the hydrogen or gas would in air.

It might be imagined that, having come to these conclusions with regard to flame, it would be a comparatively simple matter to solve the other problems connected with it; but, on studying the subject, it is at once found that the physical and chemical actions taking place are of the greatest complexity, and are in many cases governed by laws of which we know but little. In the propagation of flame, for instance, the combination of the inflammable constituents at the first moment of combustion gives rise to a great increase in temperature, which in many cases is sufficient to check and alter the combination, and in some instances even to cause dissociation of the products formed in the earlier phases of combustion; so that the combination seems to take place in waves, and not evenly, as one might at first imagine, with the result that the maximum temperature of a flame is never so great as one would expect from calculations based on the heat of combustion of the gases and the specific heat of the products and residual nitrogen from the air. These points, together with the rate of propagation and burning of gases, have been the subject of historical researches by Bunsen, Deville, Berthelot, and others; but much still remains to be done before we arrive at any final conclusion on the subject.

By far the most interesting, and at the same time important, chapter in the history of flame, however, is the consideration of the causes which lead to the luminosity of those flames upon which we depend for most of our domestic lighting; and these offer so beautiful a field for both physical and chemical research, that they have attracted the attention of many observers, and form no inconsiderable addition

---

* A lecture delivered on Thursday, February 18.

to the chemical history of this century. In 1816, while engaged upon those celebrated researches which culminated in the discovery of the miner's safety-lamp, Sir Humphry Davy noticed certain facts which led him to work out and propound his theory of the causes which led to luminosity in flame—a theory which is generally stated as being that the presence of solid particles in the flame is essential to its luminosity. This theory remained unquestioned until 1868, when Professor E. Frankland, in his celebrated communication to the Royal Society, showed that although incandescent solid matter in a flame renders it luminous, luminosity is also in many cases produced when the flame contains very dense vapours at a sufficiently high temperature, and also that a non-luminous flame may be rendered luminous by increasing the pressure.

This gave rise to a storm of criticism, and the next few years drew forth a rich crop of papers on the subject. Professor Frankland not only showed that flames might be luminous without containing solid particles, but advanced the theory that the luminosity in the flame of a burning gaseous hydrocarbon was due to dense hydrocarbon vapours, and pointed out that the soot deposited upon any cool substance held in such a flame contained hydrogen. To this W. Stein replied, showing that the deposited soot contained less than 1 per cent. of hydrogen, which was, therefore, probably only occluded by the carbon; and also, that if it had been present as a vapour in the flame, it ought, on being heated to the same temperature as the flame to be once again volatile, which it undoubtedly is not. In 1874 Soret attempted to show that the cause of luminosity in flame really does depend upon the presence of solid particles, by focussing the sun's rays upon a luminous flame, and examining the reflected light by means of a Nicol prism; and rather later Burch pursued the same line of research, but employed the spectroscope for his examination of the reflected light. Their results point unmistakeably to the presence of solid particles; and at the present time I think there is very little doubt in anyone's mind that, as far as the flames of candles, gas and oil are concerned, Sir Humphry Davy's theory is the correct one. Indeed, I am strongly of opinion that, although in certain points Davy went a little too far in his theory, had he been still amongst us we should have found that, in his own mind, he applied his theory more especially to the flames of our ordinary illuminants, as in his original memoir he speaks of "common flames," and distinctly says that "when in flames pure gaseous matter is burnt, the light is extremely feeble," and again, "the intensity of the light of flames depends principally upon the production and ignition of solid matter."

While this war of solid particles *versus* dense vapours was raging, Hilgard, Landolt, Blochmann and Heumann were trying to trace the chemical actions taking place in various flames, and the causes which led to loss of luminosity when air was mixed with coal-gas before combustion in the Bunsen burner. Heumann added the further proof to the "solid particle" theory of luminosity, that all flames which owe their luminosity to incandescent solid matter give definite shadows, while those in which luminosity is due to dense vapours, give none; and that candle, oil and gas flame all cause well-defined shadows.

This brings the work done upon the cause of luminosity down to the present time. The accepted description of a luminous flame now is that it consists of several zones—an inner one, in which no combustion is taking place; a central one, in which, either by selective combustion or by direct decomposition by heat, carbon or very dense hydrocarbons are liberated; and, being heated to incandescence at the moment of production by the combustion of other gases present in the flame, give it luminosity; and an outer one, which consists of the products of combustion and atmospheric air heated to incandescence, and in which combustion is complete.

The work of Soret, Burch, and Heumann proves beyond doubt that our ordinary illuminating flames contain in the luminous zone particles of solid matter; and the only solid which could be present is carbon, either pure or containing the merest trace of hydrogen. The chief question now remaining to be solved, consequently, is the action taking place which leads to the formation of the solid particles in the luminous zone of the flame. During the last two years I have devoted a considerable amount of time and attention to the study of this subject, and I think I have found the key to this important problem—important from a practical point of view, because, until it is thoroughly solved, all efforts to improve our illuminating gases and the burners at which we consume them, can only be the outcome of experiments made without a definite idea of the means to employ in order to obtain the results we desire.

Coal gas is a mixture of hydrocarbons with hydrogen and small quantities of carbon monoxide; and it also contains traces of carbon dioxide, nitrogen and oxygen. The gas manager, however, does his utmost to eliminate the last three; which, if present in anything but the merest traces, would seriously injure the illuminating value of the gas. An analysis of the South Metropolitan Company's gas gives the following as its composition:—

Hydrogen	57·08
Hydrocarbons—	
Unsaturated (containing 0·035 per cent. of acetylene)	4·38
Saturated	33·99
Carbon monoxide	2·63
Carbon dioxide	0·79
Nitrogen	0·96
Oxygen	0·15
Bisulphide of carbon	0·02
	100·00

The unsaturated hydrocarbons consist of ethylene, benzene, propylene, butylene, acetylene and probably also traces of crotonylene and others; while the saturated hydrocarbons consist chiefly of methane, with traces of ethane, propane and butane.

Analyses made by Landolt of gases withdrawn from various parts of a luminous coal-gas flame, and also a long series of analyses which I have made, show that as the gas leaves the burner the hydrogen is the first to be consumed; and that in the passage up the non-luminous part of the flame the carbon monoxide largely increases in quantity, while at the same time the methane rapidly decreases, and the unsaturated hydrocarbons seem the least affected. In the luminous zone the unsaturated hydrocarbons rapidly disappear; while the carbon monoxide formed in the inner zone, and also the residual hydrogen and methane, undergo combustion. Professor Smithells, in a paper read before the Chemical Society in December last, also proved that, during the incomplete combustion taking place in the inner cone of a Bunsen flame, this same increase in the amount of carbon monoxide was to be observed. The fact that the decrease in quantity of the unsaturated hydrocarbons was but slow in the inner zone and then took place with considerable rapidity in the luminous zone, favoured the theory that they were broken up by heat in that portion of the flame, and liberated the carbon; which, by its incandescence, gave the luminosity. But it does not seem to have occurred to anyone to try to determine whether the unsaturated hydrocarbons at the top of the non-luminous zone were of the same description as those in the coal-gas.

It is a matter of common observation that the

checked combustion of a luminous flame at once gives rise to the escape of acetylene, and also that if a Bunsen burner catches light at the bottom, large quantities of acetylene are formed, of which the presence is at once detected by its distinctive and pungent odour. These facts suggested the idea that in the inner cone of the flame acetylene might be formed by decomposition of the original hydrocarbons; and experiment showed this to be the case. Of the unsaturated hydrocarbons present in coal gas, 0·8 per cent. consist of acetylene; while at the top of the non-luminous zone of a flat flame produced from the same gas between 80 and 90 per cent. of the unsaturated hydrocarbons present consist of acetylene; and in all the other luminous flames experimented with the same action was found to take place.

On taking the most important hydrocarbons present in the coal-gas, mixing them with about 20 per cent. of air, and passing them through a tube heated to the temperature existing near the top of the inner non-luminous zone, the following results were obtained: Methane gave rise to unsaturated hydrocarbons, acetylene and carbon monoxide; ethylene gave acetylene and carbon monoxide; hydrogen charged with benzene vapour gave the same; and ethane gave unsaturated hydrocarbons, acetylene and carbon monoxide. These experiments clearly show that in the inner non-luminous zone of the flame, the heat generated by the combustion of the hydrogen of the coal-gas in the presence of the small proportion of air drawn into the flame at this point, causes the conversion of the hydrocarbons present in the gas into acetylene and carbon monoxide.

Acetylene is a clear colourless gas, with a strong and disagreeable odour, and consists of 24 parts by weight of carbon, combined with 2 parts by weight of hydrogen. It is one of those bodies which, during their formation, take in heat instead of giving it out; and it is, therefore, called an "endothermic" compound. Such substances are especially liable to decomposition, as this is accompanied by a rise in temperature instead of, as is the case with most decompositions, an absorption of heat. Acetylene is decomposed at a bright red heat into carbon and hydrogen, together with traces of tarry matter and ethylene; while Berthelot has shown it to be so unstable that it can be broken up into carbon and hydrogen by detonating a percussion cap in it.

These important points being established, it is necessary to ascertain if the temperature existing in the various parts of a flame give any clue to the actions going on within them. The beautiful platinum and platinum-rhodium thermo-couple devised by M. Le Chatelier, and introduced to us by Mr. W. Chandler Roberts-Austen, gives a means of measuring the temperatures of flames with an ease and comparative accuracy which was never before hoped for. I made a small thermo-couple of platinum and 10 per cent. rhodium platinum wire, using it as thin as possible to reduce errors from loss of heat by conduction, and keeping the wires of considerable length to prevent any chance of rise of temperature introducing conflicting currents at the connections with the galvanometer wires. A reflecting galvanometer was employed, and sufficient resistance introduced into the circuit to keep the spot of light upon the scale at the highest temperature of the flame; and the scale was then graduated for temperature by taking water at 0° and 100° C., and checking the higher temperature by the fusing-points of the chlorides of the alkalies and alkaline earths, as determined by Dr. Carnelly.

With this arrangement I was able to map out the temperatures existing in the flat flame in which I had traced out the changes taking place in the constituents of the gas; and I found that the temperature rapidly rose from 500° C. half-an-inch above the burner, to a little over 1200° C. at the commencement of the luminous zone—the luminous edges having a temperature of 1216° C.; and these temperatures were further increased in the luminous zone until near the top of the flame 1368° C. was reached. This at once gives us the secret of the luminosity. From the mouth of the jet and up to a temperature of 1000° to 1200° C., we have the formation of acetylene from the original hydrocarbons; but the moment the requisite temperature is reached by the combustion of the hydrogen and carbon monoxide, the acetylene decomposes, with further rise of temperature, and the carbon heated to incandescence radiates heat and light.

If a luminous flame be cooled its luminosity is at once diminished, and may be destroyed; while as the propagation of flame requires a certain temperature, a further cooling will extinguish it. In the outer edge of a flame, the rapid inrush of air sucked into the flame so lowers the temperature that a thin envelope is rendered non-luminous, the actions checked, and traces of the gas unconsumed allowed to escape unconsumed by the exinction of the extreme limit of the flame; and delicate analysis shows that every luminous flame burning freely in air gives off distinct traces of carbon monoxide, acetylene, and even such highly inflammable gases as methane and hydrogen.

Ever since the structure of flame has been noted and discussed, it has been accepted as a fact beyond dispute that the outer almost invisible zone which is interposed between the air and the luminous zone of the flame, is the area of complete combustion, and that here the unburnt remnants of the flame gases, meeting the air, freely take up oxygen, and are converted into the comparatively harmless products of combustion carbon dioxide and water vapour, which only need partial removal by any haphazard process of ventilation to keep the air of the room fit to support animal life. The facts I have brought before you show that this is not the case; and they fully explain why gas is so oppressive in a badly-ventilated apartment.

It has always been the custom to speak of flames as built up of zones; and although there are no sharp lines of demarcation, in the actions taking place, which would warrant this, still, three distinct portions are visible to the eye. If we divide the luminous flame into zones it would be, perhaps, best looked at as consisting of three, viz.:—

(1) The inner zone, in which the temperature rises from a comparatively low point at the mouth of the burner to about 1000° C. at the apex of the zone. In this portion of the flame the constituents of the gas undergo various decompositions and interactions, which culminate in the conversion of the heavier hydrocarbons into acetylene—carbon monoxide being also produced; and these, with the products of combustion and residual hydrogen, pass into the next phase of action.

(2) The luminous zone, in which the temperature ranges from 1000° C. up to a little over 1300° C. Here the acetylene formed in the inner zone becomes decomposed by heat, with liberation of carbon, which at the moment of production is heated to incandescence by the combustion of the carbon monoxide and hydrogen, and gives luminosity to the flame.

(3) The extreme outer cone, in which, combustion being nearly completed, the cooling and diluting influence of the entering air renders a thin layer of the flame non-luminous, and finally extinguishes it. With ordinary coal-gas this results in the escape of traces of hydrogen, methane, carbon monoxide and acetylene; while with a very rich gas unconsumed carbon also escapes.

This description of a luminous flame is of necessity far from complete, as it leaves out of consideration the interactions which lead to the formation of acetylene and also the decompositions going on in the

various parts of the flame between the products of combustion and the flame gases; but I think it marks a considerable advance in our knowledge of the main actions which lead to luminosity—the other interactions being at best subsidiary to it.

Having obtained a clear idea of the causes which lead to luminosity in flame, we are enabled for the first time to clearly understand the actions taking place in the atmospheric or Bunsen burner, the invention of which revolutionized our methods of heating by gas, and made coal-gas one of the most important of our domestic fuels.

When it was first found that the admixture of a certain proportion of air with coal-gas before combustion caused it to burn with a non-luminous flame, it was at once accepted, as an explanation of the phenomenon, that the extra oxygen so led into the inner cone of the flame, by causing complete combustion in the central zone, burnt up the carbon before it could be heated to incandescence, and so destroyed its light-giving power. Some years later, however, Knapp and others showed that, by mingling inert diluents, such as nitrogen, carbon dioxide, or even steam, with the gas before combustion, non-luminosity could be produced. It was then recognized that the diluting and cooling action of the nitrogen in air played an important part; and some observers held that it was this, and not the oxygen, which was the cause of non-luminosity.

On measuring the amount of air and of nitrogen respectively able to render a Bunsen flame non-luminous, they are found to be practically the same, while the quantity of oxygen present in the air used, when passed into the gas by itself, still gives a very luminous flame. This certainly looks as if it were the nitrogen that was doing the work. If this were so the temperature of the flame rendered non-luminous by nitrogen should be the same as that of the flame rendered non-luminous by air, but on testing these the fallacy of such a supposition is at once exposed. This will be seen by the following table:—

Part of Flame.	Temperatures existing in a Bunsen Flame rendered Non-luminous by— Nitrogen.	Air.
½ inch above burner . .	30° C.	54° C.
1½ inch above burner . .	111° C.	175° C.
Tip of inner cone . . .	444° C.	1090° C.
Centre of inner cone . .	999° C.	1533° C.
Tip of outer cone . . .	1151° C.	1175° C.

These temperatures clearly show that a very considerable amount of combustion is due to the oxygen of the air, and make it perfectly manifest that both the oxygen and the nitrogen are acting in bringing about the loss of luminosity.

While working at these points, I found that if mixtures of nitrogen and oxygen, poorer in oxygen than air, were employed, it was practically only the nitrogen which acted—the diluting effect being so strong that the oxygen was prevented from taking any active part. With air, both act; while with mixtures richer in oxygen than air, the oxygen alone acts—the nitrogen being apparently unable to exercise any retarding influence. The same result is obtained if excess of air is mixed with the gas before combustion. If the quantity of air reaches a point at which the proportion of the oxygen in the air is to the gas as 0·5: 1, then the diluting influence of the nitrogen is lost, and the appearance of the flame becomes entirely altered. The normal Bunsen flame burns with a lilac-coloured inner and blue outer zone; but the moment the quantity of air reaches the ratio mentioned, the flame becomes short and fierce, and the inner zone changes to a greenish colour—the highest temperature in the flame at the same time increasing nearly 100° C. Experiments show that the nitrogen acts in the normal Bunsen flame by so diluting and protecting the carbons that a far higher temperature is needed for their decomposition; and this action gives time for the oxygen of the air to consume them without liberation of carbon, and hence without luminosity.

In conclusion, I think we may express the actions which lead to loss of luminosity in the normal Bunsen flame in the following way:—

(1) The chemical activity of the oxygen introduced in the air, which, by burning up the molecules of hydrocarbons before, in their diluted condition, they undergo decomposition, causes loss of luminosity.

(2) The diluting action of the nitrogen of the air, which, by increasing the temperature necessary to bring about the partial decomposition of the hydrocarbons, prevents formation of acetylene, and in this way will, by itself, cause non-luminosity; and in the normal Bunsen flame it acts by doing this until destruction of the hydrocarbons by oxidation has taken place.

(3) The cooling influence of the air introduced, which is able to add to the general result, although the cooling is less than the increase in temperature brought about by the oxidation due to the oxygen in the air.

Provincial Transactions.

GLASGOW CHEMISTS' AND DRUGGISTS' ASSISTANTS' ASSOCIATION.

The annual business meeting of the Association was held in the Waterloo Rooms on the evening of Wednesday, April 13, Mr. Jas. Robb, President, in the chair. There was a large attendance of masters and assistants.

The Chairman remarked that for some reason or other there was not a quorum on the night set apart for the business meeting, which therefore had to be adjourned. He was exceedingly pleased to see so many present to-night, and it only remained for him now to ask the Secretary to read the annual report.

This showed that although the attendance at several of the meetings had not come up to expectations the syllabus had been carried through in a very successful manner, each contributor having come forward to fulfil his engagement. The membership showed a slight falling off as compared with previous years, but there was still a good balance in favour of the Association.

The report having been adopted unanimously,

The Chairman called on Mr. Bruce to move the motion which he had given notice of at last meeting.

Mr. Bruce remarked that he thought the Association might be much larger than it was, and with a view to bringing in the masters he moved that the word "assistants" be deleted from the name of the Association.

Mr. McKellar, in seconding, said that it was perhaps rather ambitious for the assistants to take the initiative, but he had no doubt that by accepting Mr. Bruce's motion a strong Association could be formed.

Mr. Laing, in supporting the motion, thought that instead of keeping to the dry facts of pharmacy a change should be made, so as to introduce other subjects which would tend to make the meetings more enjoyable.

Mr. Findlay asked if only educational matter would be introduced, or if trade matters would also find a place in the work of the new Association.

The Chairman replied that that would be for the new Association to decide. In the meantime the idea was that the office-bearers of the past session should continue to hold office until the beginning of Septem

ber, when a general meeting of the trade would be held.

Mr. Robinson said that trade matters should certainly be introduced.

Mr. McKellar thought they should be very careful as to the introduction of trade matters, he being of opinion that the old Association came to grief over that subject.

Mr. Findlay, as a member of the old Association, denied this, and said that it was only when trade matters were introduced or being discussed that there was a really representative meeting. Mr. Carteighe's late campaign was an instance. He thought, however, that they should confide trade matters solely to qualified men, as very often outsiders carried the day.

Mr. Bruce said that as he was the mover of the motion he would side with Mr. Findlay, as it was really the introduction of trade matters he was aiming at, and he would move that a committee be formed consisting of Messrs. Findlay, Laing, Russell, and one or two others.

Some further discussion took place, in the course of which it was questioned whether the meeting was being conducted in a constitutional manner, and the Chairman called on the Secretary to give them an idea how they stood.

The Secretary stated that there was a proposal before the meeting to allow the Committee of last session to remain in office, and a motion to appoint a new committee. He thought the best way would be to appoint a committee, consisting of the assistants on last session's Council, together with Messrs. W. L. Currie, Findlay, Laing and Russell to represent the masters, and to arrange for a general meeting of the trade to be held at the beginning of September.

This was agreed to without dissent.

A committee was appointed to make the necessary arrangements in connection with the ambulance class, which is to be held during the summer months, provided a sufficient number intimate their intention of joining.

EDINBURGH PHARMACY ATHLETIC CLUB.

A general meeting of those interested in this club was held in the Pharmaceutical Society's House, on Wednesday, 20th inst., at 8.30 p.m., Mr. J. Laidlaw Ewing, Honorary President, in the chair.

The Secretary read the minutes of the meeting held on March 28. He then read the rules which had been drafted by the Committee, and these were adopted unanimously on the motion of Mr. Urquhart, seconded by Mr. Anderson.

It was resolved to form the following sections, viz., cricket, golf, cycling, swimming and rambling clubs.

The office bearers elected temporarily on March 28 were unanimously elected for the ensuing year.

The Secretary intimated that they had now ten honorary members and seventy ordinary members. It had been arranged that the golf and swimming sections should begin this week.

The meeting closed with a vote of thanks to the Chairman.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

A meeting of the above Association was held at the Mason College, on Tuesday, April 19, 1892, at 8.15 p.m., when a paper was read by Mr. W. T. Elliott, L.D.S., entitled "Some Observations Relating to the Structure and Disintegration of Tooth Tissues," illustrated by lantern slides. The attendance, owing no doubt to the holidays, was very small.

A meeting of the Cricket and Lawn Tennis Section was held at the Temperance Institute, Corporation Street, on Wednesday, April 20, at 3 o'clock, when the arrangements for the present season were made. The suggestion concerning a cycling club was also brought forward for discussion.

The annual meeting of the Association will be held on May 17, 1892.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith. Matter intended for publication should be written on one side of the paper only.*

What is Jalapin?

Sir,—We are pleased to see Mr. J. C. Umney's note upon the subject of jalapin, and entirely agree with him as to the necessity for some authoritative statement which shall put an end to the long-standing confusion regarding it. Flückiger and Hanbury, writing in 1874, say, "of numerous samples of jalapin we have examined (1871) every one is completely soluble in ether." We should be surprised to find this the case at the present time. By English manufacturers and in the wholesale trade generally jalapin is understood to be that resin which is *insoluble* in ether; but, as Professor Attfield points out in his 'Manual,' Keyser and Mayer transposed our terms, calling the resin insoluble in ether convolvulin and the soluble resin jalapin. Thus the jalapin of German manufacturers is not identical with that of English makers. Having regard to the difference in commercial value between the two products, the value of one being less than half that of the other, it is certainly desirable that the attention of the trade be again drawn to the matter and, if possible, something definite arrived at as to future nomenclature. T. Morson and Son.

Desiderata for the Museum.

Sir,—Will you permit me, through the medium of your columns, to ask members of the Society who are interested in botany, if they would be kind enough to secure specimens of any of the following species that may occur in their locality for the Herbarium of the Society: *S. fragilis*, L.; *S. purpurea*, L.; *S. Donniana*, Sm.; *S. rubra*, Huds.; *S. daphnoides*, *S. stipularis*, Sm.; *S. laurina*, Sm.; *S. phylicifolia*, L.; *S. nigricans*, Sm.; *S. ambigua*, Ehrh.; *S. Sadleri*, *S. Grahami*, Bhr. Well-marked varieties of any species will also be very acceptable. I shall be happy to send in exchange any duplicates of other British plants that may be at my disposal.

17, *Bloomsbury Square.* E. M. Holmes.
Curator of the Museum.

NOTICES OF MEETINGS.

Chemists' Assistants' Association.—Thursday, May 5.—Annual General Meeting.

Society of Chemical Industry.—May 2. Papers: "The Distillation of Wood," by Professor Wm. Ramsay, F.R.S., and Mr. J. C. Chorley; "Notes on the Composition of some Indian Gums of Known Origin," by Dr. S. Rideal.

We are requested by Mr. Llewellyn Thomas, of Woodfield Street, Morriston, Swansea, to state that he is not the person referred to in the report at page 806.

J. F. Eardley.—*Cotyledon Umbilicus*, a nerve tonic used in epilepsy.

George.—Please read notice at head of this column. The address is 67, Lower Mount Street, Dublin.

G. A. Thompson.—Your specimen is placed in the hands of medical experts for examination.

Communications, Letters, etc., have been received from Messrs. Betty, Munn and Co., Stead, Durrant and Poppelreuter.

ANNUAL REPORT OF THE COUNCIL,

To be presented at the Fifty-first Annual General Meeting of the Pharmaceutical Society of Great Britain.

The fifty-first annual report and financial statement now presented furnish indications that the second half century of existence which the Society has entered upon will be marked by progress as great if not greater than that recorded during the past fifty years.

The increase of income from subscribers, noted last year, has not only been maintained but materially augmented; and it may not be unwarrantable to assume that this satisfactory feature points to a growing conviction amongst registered persons that the advancement of their interests can best be assured by association within the ranks of the Society.

The natural development of the educational department of the Society's work has necessitated a considerable expenditure for fittings and alterations in the chemical and practical pharmacy laboratories, class rooms, and the Research Laboratory. The cost of furnishing the new premises also falls to a large extent in the account for 1891.

The number of candidates for examination during the past year shows a large increase. For the First examination there were 1455 entries; for the Minor there were 1516; and for the Major 157 entries; 3 candidates also presented themselves for the Modified examination.

The proportion of passes in the First Examination shows a slight improvement during the year; but in the Minor and Major examinations the large percentage of failures shows that the absence of systematic training is as general among the candidates as ever.

Certain alterations in the mode of conducting the Minor and Major examinations have come into operation during the current year as a result of the new Schedule. It is believed that these changes will prove of advantage to candidates, and the Council would once more urge upon all who intend to present themselves, the necessity for acquiring sound knowledge by systematic work before entering for examination.

Dr. Stevenson, the Government Visitor, in his report for the past year, refers to the First examination in the following terms:—

> "It is evident that many young men of defective education still unsuccessfully attempt to enter upon the business of pharmacy, most of them failing in simple arithmetic, and many in the other subjects also."

Of the Minor examination he reports:—

> "This, the qualifying examination, has during the year under review been altered and amended. More time is allowed for the examination, and practical pharmacy, *i.e.*, the actual making of some pharmacopœial preparation, is demanded. I am of opinion that the capabilities of the candidates will be better tested by the new examinations, and that it will be less possible for a candidate to pass on the strength of mere book knowledge.
>
> "Such a large proportion of failures points to great defects in pharmaceutical education, defects which the Pharmaceutical Society is making strenuous efforts to remedy. The ill-effects of attempts to acquire knowledge haphazard, and without systematic teaching, are painfully apparent at the examinations.
>
> "Since the new examinations are not as yet in full and complete operation, it is inadvisable to further comment upon them, except to state that the examiners seem anxious to render the transition as equitable as possible."

The additional shelving provided for the Library last year having been speedily filled, a new case has been erected. The total number of volumes and pamphlets now in the library is about 11,000; the additions during the past year having reached nearly 300.

The Museums of the Society both in London and Edinburgh have received valuable additions from various donors both at home and abroad. The Herbarium of the Society has been largely added to by various botanists. The collection of medicinal plants now includes about 1000 species, exclusive of the Hanbury Herbarium, which comprises 610 species and about 1150 specimens. The Herbarium of indigenous plants now numbers 1458 species and varieties. The Herbarium for the use of students has been altered and enlarged in accordance with the examination schedule. The Catalogue of the Hanbury Herbarium has been published and is ready for issue. That of the Society's Herbarium is already in the hands of the printer.

The attendance at the evening scientific meetings of the Society has been well maintained. The Council, with a view to increasing the interest in these gatherings, has thought it desirable to make arrangements for the renewal of the practice of giving lectures on subjects allied to the educational objects of the Society. Under these arrangements the Society's Professor of Botany, Professor J. R. Green, M.A., B.Sc., delivered a much appreciated lecture on "Evolution in the Flower," and Professor H. E. Armstrong, Ph.D., F.R.S., gave a series of four valuable addresses on "Fermentation." In Edinburgh a most interesting lecture on "Botanical Enterprise in Relation to Pharmacology" was delivered by Professor J. Bayley Balfour. The Council feels that the Society is deeply indebted to these gentlemen for their services.

The official celebration of the fiftieth year of the Society's existence was held on May 26, when congratulatory addresses from scientific and pharmaceutical bodies in all parts of the civilized world were presented. Such a hearty tribute of recognition and appreciation of the efforts of the Society to advance pharmacy is highly gratifying, and cannot fail to be of indirect value to every person following the calling of pharmacy, whether connected with the Society or not. These addresses show that pharmacy in Great Britain has been raised by the efforts of the Society, in the short period of fifty years, to a position which commands the respect of European pharmacists, the medical profession, and men of science of this country. The fraternal greetings from the various colonial Pharmaceutical Associations and the congratulations of the principal American Associations formed a most interesting feature in the celebration.

At the Jubilee meeting the presentation of the sixth Hanbury Gold Medal was made to Dr. Julius O. Hesse, whose contributions to the knowledge of the chemistry of alkaloids have given him a world-wide reputation.

In October the fiftieth session of the School of Pharmacy was inaugurated, and the prizes gained

Receipts. GENERAL FUND—FINANCIAL

	£ s. d	£ s. d.
Balance January 1st, 1891:—London and Westminster Bank	236 17 9	
In Treasurer's hands	76 12 7	
In hands of Chairman of Executive (Scotland)	21 6 11	
		334 17 3
Interest on Investments		266 12 11
Subscriptions:—1462 Members, Pharmaceutical Chemists	1535 2 0	
568 ,, Chemists and Druggists	596 8 0	
1340 Associates in Business	1407 0 0	
1000 Associates not in Business	525 0 0	
928 Students	487 4 0	
9 Entrance Fees	18 18 0	
	4569 12 0	
Fees paid upon restoration to the Society	28 7 0	
		4597 19 0
Examination Fees:—1752 First Examination	3136 14 0	
3 Modified ,,	3 3 0	
156 Minor ,,	4236 15 0	
157 Major ,,	682 10 0	
	8059 2 0	
21 Fees for Restoration to the Register	22 1 0	
		8081 3 0
Journal:—Advertisements	4028 9 4	
Sales	270 19 11	
		4299 9 3
Register:—Sales to the Government	147 10 0	
Sundry Sales	16 0 0	
		163 10 0
Calendar—Sundry Sales		25 3 0
Penalties and Costs for infringements of the Pharmacy Act		299 19 10
Sale of £2500 Stock		2328 1 6
		£20,396 15 9

STATEMENT FOR 1891.

Expenditure.

	£ s. d.	£ s. d.
Annuities:—Professor Redwood		100 0 0
Mr. Elias Bremridge		400 0 0
Carriage of Books and Parcels		17 12 1
Certificates of Death		21 19 3
Celebration of the Jubilee of the Society:—Meeting and Conversazione	183 10 4	
Gift to Clerks	50 0 0	
		233 10 4
Evening and other Meetings		55 3 6
Examiners, Boards of—	*England and Wales.* / *Scotland.*	
Fees to Examiners	2000 5 0 / 878 17 0	
Fees to Superintendents—First Examination	222 1 6 / 31 10 0	
Hire of rooms for conducting First Examination	70 6 0 / 7 0 0	
Travelling Expenses	224 19 3 / 57 11 3	
Refreshments for Examiners	102 15 10 / 41 16 5	
Apparatus, Drugs, and Chemicals for Examinations and sundry charges in connection therewith	138 13 7 / 29 19 8	
	2759 1 2 / 1046 14 4	
(*England and Wales*)	2759 1 2	
	8805 15 6	
Fees to the College of Preceptors	189 3 0	
		3994 18 6
Fixtures and Fittings		199 7 3
Furniture		237 10 2
Gas, Water, Coal, Cleaning Materials, etc.		395 19 5
House Servants—Wages		253 16 4
Journal:—Editor and Sub-Editor's Salaries	750 0 0	
Paper	785 0 3	
Printing, including cost of design for New Cover	2300 12 10	
Publishers' Commission	505 13 9	
Contributions and Engraving	378 11 10	
Reporting	118 12 6	
Attending Conference Meeting	12 9 3	
Sundry Charges	26 8 1	
		4877 8 6
School of Pharmacy:—Emeritus Professors		200 0 0
Endowment of the Chairs of Practical Chemistry, Chemistry, and Botany	450 0 0	
Teacher of Practical Pharmacy	50 0 0	
Subscription to Royal Botanic Gardens	21 0 0	
Lecturers' Assistants	98 11 0	
Apparatus, Chemicals, & Specimens for Lecture Classes, Prize Medals, Certificates, etc.	57 15 8	
Printing and posting prospectuses	24 15 7	
		702 2 3
Law Costs		328 12 11
Library:—Librarian's Salary	245 0 0	
Purchase and Binding of Books	99 17 1	
Attending Meeting of the Library Association at Nottingham	10 10 0	
		355 7 1
Museum:—Curator's Salary	350 0 0	
Assistant's Wages	52 0 0	
Specimens and Sundries	39 19 2	
		441 19 2
Expenses in Scotland:—Assistant Secretary—Salary	180 0 0	
Taxes	33 5 6	
Travelling Expenses—Members of Executive	17 16 2	
Fuel, Light, Water, Cleaning, Service and Miscellaneous Expenses	147 6 5	
		378 8 1
Postage:—General	251 17 9	
Journal (Cost of transmission to Members, Associates and Apprentices)	727 9 1	
		979 6 10
Grant to the Leeds Chemists' Association for educational purposes		20 0 0
Register, Printing and Publication		172 4 5
Rent, Taxes and Insurance of Plate Glass		691 13 10
Repairs and Alterations, largely in adapting rooms in the old building to present requirements		896 7 6
Stationery, Engraving, Printing, and Office Expenses	317 11 8	
Calendar—Printing and Publication	120 19 11	
		438 11 7
Salaries:—Secretary and Registrar	450 0 0	
Clerks	822 6 0	
		1272 6 0
Research Laboratory		339 10 0
Cost of Materials supplied to the Jacob Bell Scholars		10 0 0
Herbarium and Council Medals, and Sundries		8 16 3
New Premises:—15 and 16, Bloomsbury Square—Kirk and Randall, Builders	100 0 0	
Architects' Fees and Law Charges	175 15 0	
Strode & Co., Gas and Electric Light Fittings	119 19 6	
Research Laboratory	163 13 6	
		559 8 0
Travelling Expenses—Council and Committees		338 19 7
Refreshments for Council		40 9 8
Balance, December 31, 1891:—London and Westminster Bank	1360 11 10	
In Treasurer's hands	44 3 1	
In hands of Chairman of Executive (Scotland)	30 12 4	
		1435 7 3
		£20,396 15 9

BENEVOLENT FUND, 1891.

CURRENT ACCOUNT.

Receipts.	£	s.	d.
Balance Jan. 1st, 1891 :—			
London and Westminster Bank. . . .	928	6	8
In Treasurer's hands.	5	13	0
Interest on Invested Capital and Ground Rents . .	895	7	8
Subscriptions	1607	0	11
	£3,436	8	3

Expenditure.	£	s.	d.	£	s.	d.
Annuitants.						
37 at £35 per annum	1295	0	0			
8 at £30 ditto	240	0	0			
2 at £35 ditto (2 quarters). . .	35	0	0			
1 at £35 ditto (3 quarters) - - -	26	5	0			
48				1596	5	0
Casual Grants.						
Members and Associates of the Society and Registered Chemists and Druggists (17).	162	0	0			
Widows of ditto (31)	307	0	0			
Orphan of Registered Chemist and Druggist	10	0	0			
				479	0	0
Grant to the Secretary's Casual Fund . .				10	0	0
Payment from the Robbins Fund . . .				5	0	0
Printing, Stationery and Postage				39	19	8
Balance, Dec. 31, 1891 :—						
London and Westminster Bank				500	10	3
Do. on Deposit				800	0	0
In Treasurer's hands				5	13	4
				£3,436	8	3

DONATION ACCOUNT.

	£	s.	d.	£	s.	d.
Balance, Jan. 31, 1891 :—						
London and Westminster Bank	136	14	0			
Donations and Legacies	786	0	0			
	£922	14	0			
Purchase of £800 2¾ per cent. Consols . .				767	18	0
Balance, Dec. 31, 1891 :—						
London and Westminster Bank				154	16	0
				£922	14	0

We, the undersigned Auditors, have examined the accounts of the Pharmaceutical Society of Great Britain, as presented in the Financial Statement and Benevolent Fund Accounts, and find them correct. We have inspected the Deeds relating to the House Property and Ground Rents named below, and also find that the undermentioned Stocks were standing to the account of the Society at the Bank of England, and in the hands of the Society's Bankers, on the 31st December, 1891, viz.:—

		£	s.	d.	£	s.	d.
General Fund	2½ per cent. Consols	1,000	0	0			
	Freehold Ground Rents at Paddington Green, London, W., cost.	5,551	5	6			
	House in Edinburgh, cost	1,931	10	0			
	Leasehold Premises:—Galen Place, cost	10,606	10	2			
	„ 15 & 16, Bloomsbury Sq., cost	9,527	5	3			
					28,616	10	11
Benevolent Fund	2¾ per cent. Consols	3,750	0	0			
	Freehold Ground Rents at Strawberry Hill, cost.	1,020	12	6			
	Freehold Ground Rents at Battersea, cost.	12,213	0	0			
	Freehold Ground Rents at Broomwood Park Estate, Wandsworth, cost.	7,454	7	10			
					24,438	0	4
do. (Robbins Fund)	Gas Light and Coke Co. 4 °/₀ perpetual Debenture Stock.				125	0	0
Secretary's Casual Relief Fund	2¾ per cent. Consols	105	0	0			
Pereira Memorial Fund		100	0	0			
Bell Memorial Fund		2,050	0	0			
Hanbury Memorial Fund		400	0	0			
					2,655	0	0
Redwood Memorial Fund	Great Indian Peninsula Railway Stock				400	0	0
Hills Prize Fund	Russian Bonds				316	8	0
Manchester Pharmaceutical Association Scholarship Fund	Manchester Ship Canal Company 4 °/₀ Debentures	700	0	0			
	2¾ per cent. Consols	52	4	6			
					752	4	6

EDWARD N. BUTT,
F. HARWOOD LESCHER,
S. LLOYD STACEY,
CHARLES UMNEY,
FRANCIS YATES.
Auditors.

March 22nd, 1892.

by the students during the previous session distributed. Mr. Gainsford Bruce, Q.C., M.P. for the Holborn division of Finsbury, delivered an interesting introductory address.

The report of the Executive of the North British Branch, presented in May to the Council, shows that the various arrangements necessary for the conduct of the Society's business in Scotland during the past year have been most carefully and satisfactorily carried out, and that the Library, Museum, and House are all in good order.

Messrs. Boa and Jack have been elected to the Executive in place of Mr. Lawrence and Mr. Mackenzie, Mr. J. Laidlaw Ewing has been elected Chairman and Mr. Maben, Vice-Chairman. The Board of Examiners for Scotland has also two new members, Mr. Boa and Mr. Jack, who were appointed in place of Dr. Inglis Clark and Mr. Gilmour.

The draft bye-laws referred to in the last report, were confirmed at a special general meeting in May and received the approval of the Privy Council in December. The changes effected have been fully explained in the *Pharmaceutical Journal*, and have already been instrumental in adding to the strength of the Society, as well as permitting a better conduct of the official duties imposed upon it by the Pharmacy Acts. All chemists and druggists can now join the Society without entrance fee, and those members, associates, and students who have from various causes allowed their subscriptions to lapse, are invited to apply for restoration, the fee being now the nominal sum of one shilling only.

During the year a large number of cases of infringement of the Pharmacy Act has been reported and dealt with. Amongst these, several penalties have been paid into court for the illegal sale of weed-killers, which are strong alkaline solutions of white arsenic. One case of this class was keenly contested in court at Barnstaple by the manufacturers of the preparation, when judgment was given in favour of the Society. From the circumstance that the notice of appeal given at the trial by the defendant has been withdrawn, and from information obtained in other ways, it would appear that the manufacturers of these weed-killers and sheep-dips have been compelled to admit that these highly poisonous preparations of arsenic can be sold retail by registered persons only, and under the conditions imposed by the 17th section of the Act of 1868. The recent prosecutions for the illegal sale and dispensing of poisons in Glasgow, which resulted in the infliction of a number of penalties, furnish an insight into the danger to the public which exists in the practices prevailing in some at least of the so-called doctors' shops and medical halls.

The annual report of the Research Committee presented to the Council in April and published in the Transactions of the Society, shows that most important original work is still being carried out, and that the educational advantages which advanced students obtain by becoming workers in the Research Laboratory is more and more appreciated.

A sum of £150 from the Government Grant Fund of the Royal Society was obtained by the Committee for the work on the aconite alkaloids. This grant is an indication of the value in which the work of the Research Laboratory is held by the eminent men to whom the administration of the fund is entrusted.

In order to promote and encourage the extension of chemical and botanical knowledge in their relation to pharmacy and pharmacology by experimental inquiry on the part of those pharmaceutical chemists, who by reason of their special training, are competent to undertake it, the Council has resolved to grant under certain conditions to such pharmaceutical chemists, being members of the Society, as have carried out a satisfactory investigation, the title of Research Fellow of the Pharmaceutical Society.

The question of the desirability of holding meetings of the Society from time to time in the provinces and Scotland has been under the consideration of the Council, and is generally approved. In considering the details it was found that misgivings existed as to how far such meetings might detract from the success of the annual meetings of the British Pharmaceutical Conference. In consequence, a meeting of some of the members of the Executive of the Conference, with a small sub-committee of the Council, was arranged, but led to no result. It rests with the new Council to consider in due course how often and under what circumstances and conditions such meetings shall be held.

The Benevolent Fund account shows that the subscriptions during 1891 amounted to £1607, being an increase of £80 over 1890. The Fund has also benefited by several legacies, among others £500 from the executors of the late H. B. Brady, F.R.S., £100 under the will of Ralph Davidson, £100 from the executor of the late J. Willats, and £25 from the late J. H. Wagstaff. Nearly £1600 was expended in payment of annuities, and an additional £494 in relieving cases of temporary distress. The total amount disbursed during the year was £2130.

At its meeting in March the Council considered how far it would be possible to make more adequate provision for the annuitants on the Fund. It was felt that members of the trade or their widows who were compelled in their old age to apply to the Benevolent Fund for support, ought to have more comfort than it was possible to procure from the amounts at present paid. The Council therefore decided to increase the amounts payable to annuitants under 65 years of age from £30 to £40, and of those payable to annuitants over that age, from £35 to £50. This alteration will take effect as from October next. In taking this step the Council looks with confidence for a continued and augmented support from the whole trade, so that the additional annual charge of some £600 incurred may be met.

Under the will of the late Thomas Hyde Hills the sum of £1000 has been bequeathed to the Benevolent Fund. By the terms of the will it is to be invested, and the proceeds applied to the election into schools or asylums of the orphan children of members or associates of the Society who have subscribed to the Fund for not less than three years. The details for the administration of this bequest have yet to be arranged by the Council.

The Council has during the year made grants of £20 each for educational purposes to the Leeds Chemists' Association and the Chester Chemists' Association.

The Society has lost a most valuable officer by the death of Mr. F. Passmore, who for more than

twenty years filled the post of Sub-Editor with conspicuous zeal and ability. Mr. J. T. Humphrey, of Sheffield, has been appointed by the Council to the vacancy thus caused.

The other losses by death have been exceptionally heavy during the year.

In Thomas Hyde Hills the Society has lost a staunch friend, and the Benevolent Fund a munificent supporter. As a member of the Council, Treasurer, Vice-President and President of the Society he consistently identified himself with the best traditions of pharmacy, and did much to further the work inaugurated by his friend Jacob Bell.

Another name inseparably connected with the early history of the Society has also to be recorded on the death roll. Professor Redwood was a founder of the Society, and throughout its career had been an active worker in the development and advancement of the objects for which it was founded. As one of the Editors of the *Pharmaceutical Journal*, he ably assisted his co-workers in defining the true aims of the Society, whilst as a successful teacher in the School of Pharmacy his influence was still more widespread, and its extent and value it would be difficult to estimate. The Scholarship which bears his honoured name has been during the past year converted into a "*Research*" Scholarship and the conditions for the competition modified. It is gratifying that this change, which was much desired by the old Professor, was effected with his hearty approval last year.

Mr. John Barnard, who was associated with Professor Redwood as Sub-Editor of the Journal, is also amongst those whose death the Council has to deplore. In addition, the deaths have to be recorded of Wm. Scott Brown, a former member of the Council and Vice-President; Wm. Manning Watts, for many years an Auditor of the Society; R. Dresser, and T. Purdue (Founders); and the following local and divisional secretaries:—G. V. Ball, Banbury; J. M. Broad, North Islington; J. Ereaut, Jersey; W. E. Haden, Bow and Bromley: R. J. Manning, Wells (Somerset); T. Rowland, Epping; W. Smith, Abingdon; Felix Stevens, South St. Pancras; and J. T. Tupholme, South Kensington.

ON THE ADULTERATION AND IMPURITIES IN FATS AND OILS.*

Although it may not be readily admitted by those to whom the statement applies, it is a notorious fact that many soap manufacturers, even among the largest, more or less frequently buy fats and oils and work them up into soap without close examination, when these fats upon investigation would be found to contain impurities which would detract considerably from the apparent value of the fats as a soap-making material.

The impurities may be merely accidental or fraudulent additions, but in either case they merit much greater attention than they are now accorded by most soapmakers, for whatever may be the nature of the impurity, it signifies a loss to the soapmaker in every instance, unless allowed for in the price of the material.

Probably too well known to require comment here is the adulteration (up to the point of entire substitution) of olive oil by cotton-seed oil. A similar case is that of lard; a recent examination in Germany of the lard imported from this country showed that out of 110 different lots no less than 77 were adulterated more or less by the addition either of cotton-seed oil or of inferior qualities of animal fat, so that on an average the alleged lard was only half its supposed value.

The lower priced fats which are of greater importance to our soap manufacturers, such as tallow, grease, palm oil, and the commercial fatty acids, escape adulteration no less.

A correspondent recently reported a case in which a tallow received from a packing company was heavily adulterated with mineral soap stock. The tallow was of good colour, appearance and consistence, and the adulteration—not being suspected—would undoubtedly have passed unnoticed if the tallow had been used for boiled soap; but as it was used for cold soap the small amount of lye sufficient for its saponification attracted attention. This adulteration is evidently a novel one and calculated to take a great many dollars out of the pockets of the unsuspecting soap makers.

A more common adulteration of tallow and grease consists in the addition of water which has been incorporated by the aid of some emulsifying agent, as soda or lime. A very appreciable quantity of water may thus be worked into a fat without being detected, except upon close examination. Not only the weight but also the solidity and appearance of the fat are thus artificially added. When soda has been employed for the purpose the loss is simply one resulting from the lower yield of soap obtained from the fat; when lime is present, however, a double loss results, from the formation of lime soap in the fat which deteriorates the quality of the soap made from the latter as well as the quantity. Hager recently reported that a certain lot of grease intended for soap making, upon being closely examined by him was found to contain 18 per cent. of lime soap. After saponifying and "cutting" with salt a voluminous precipitate of lime soap was noticed. He concludes by saying that the presence of lime soap in the fat need not necessarily be the result of fraud, since it is possible that hogs infested with trichinæ had been treated with caustic lime in order to insure against their being consumed as food, and that on rendering the fat of the carcasses the lime was thus brought into the fat. For the detection of the lime soap in the fat he proceeded as follows:—The fat was dissolved on the water bath in five times its volume of petroleum, and set aside at a temperature of 15° C. (=59° F.). In the course of eight hours a precipitate had formed which was collected on a filter, washed out with petroleum benzine and dried between filter paper. The drying residue is the lime soap, which is soluble in hot, but insoluble in cold petroleum.

The partial saponification, which is the consequence of adulteration by weak lye, will be apparent when the fat is melted on water, when little or no clear fat is thereby obtained (but an emulsion instead) if lye is present.

The admixture of cheaper grades of fat to the tallow or grease cannot perhaps be called an adulteration, as it lowers the grade on which the price is based.

Another correspondent furnishes particulars regarding a certain large lot of grease stearine received, which contained about 2 per cent. of albuminous matter. His attention to this impurity, which was rather high considering that it was no doubt accidental, was directed by the circumstance that the stearine would not settle clear in the tanks. On saponifying it the lye was milky and remained so in spite of continued boiling; when a portion of the lye was set aside it became clear on cooling, but held in suspension numerous gray, gelatinous flakes which, on filtering and drying, were estimated at the above percentage.

Not exactly an adulteration, but rather an impurity,

* From the *Am. Soap Journal*. Reprinted from the *Oil, Paint and Drug Reporter*.

sometimes contained in tallow, is sulphuric acid which has been used in rendering, for the purpose of destroying the membranes of the suet, and is not always fully removed. Such tallow is apt to be turned yellow in iron tanks, by the action of the acid on the iron. This is more frequently the case with tallow brought on the market by the small country butchers who have less perfect facilities for rendering than the large slaughter houses.

In the absence of facilities for complicated tests, or as a simple preliminary test for fats suspected of adulteration, the following proceeding may often give useful indications concerning the purity of the fat. A fair sample of the fat is melted and placed in a graduated glass cylinder; into the latter is then poured about 35 parts (by volume) of dilute sulphuric acid to 100 parts of fat. After shaking well, let settle. The pure fat rises to the top while the sulphuric acid absorbs the impurities and settles to the bottom. The graduations will approximately indicate how much pure fat was contained in 100 parts of the sample. The line between the fat and the precipitate should be distinctly visible, and if it is not, then the experiment should be repeated with a somewhat stronger acid solution. Of course this test is of no avail in determining adulteration by cheaper fats, and can only be used in regard to such additions as water, lye, lime, flour, etc.

Tests have frequently been discovered by which various forms of adulteration in fats and oils may be determined with reasonable certainty, but unfortunately the sophisticator is no less expert, and no sooner is a valuable test discovered than he finds some way to circumvent it. A notable illustration of this is the nitrate of silver test, which for a time was the most reliable in showing the presence of cottonseed oil in olive oil; before long the fraudulent dealers in olive oil discovered that by heating cottonseed oil to a certain point before adding it to the olive oil, the mixture was no longer susceptible to the test mentioned.

And thus it will probably ever be; the only safety for the soapmaker lies in learning all he can about the materials he uses in his factory, and to systematically examine the materials he buys. If he buys by a sample he should examine the same, or have it examined, before placing the order at a certain price; for he would have no redress in any ordinary case where goods are found to be adulterated, so long as they correspond to the sample.

This rule applies also to numerous materials other than fats. Perhaps some of the readers remember the case in a foreign country where a manufacturer of potash some years ago was sent to jail and was forced to pay an enormous amount of damages for watering his potash. For years soapmakers had bought his potashes as of a certain strength, totally oblivious to the fact that his products were graded too high. The losses incurred by leaks of this nature in a soap factory may easily aggregate to a sum large enough to turn the profit and loss account the wrong way.

There is at all times room for more light on this subject. Soapmakers should submit cases of this kind that may come under their observation to the attention of their brethren in the trade. The more this important matter is ventilated, and the better and more generally it is understood, the more difficult will it be for fraudulent dealers to impose upon the soapmakers of the country.

COMPOSITION OF ALBUMINOIDS.

H. Arnaud describes a method of separating the albuminoids contained in vegetable tissues by the action of barium hydroxide and long boiling. He regards these substances as composed of hydrocarbons, fatty substances, and urates, in varying proportions, on which depend their various reactions. They may be regarded as compound ammonium polycyanates, or as compound polyurates, in which atoms of hydrocarbons and fatty substances have taken the place of those of hydrogen. The difference in the nutritive properties of the albuminoids depends on the combination of these three essential constituents (*Comptes Rendus*, cxii., 148).

INFLUENCE OF TEMPERATURE ON DIGESTIVE FERMENTS.*

Digestive ferments require for their efficiency a certain reaction and a suitable temperature. The best temperature is 39° to 40° C.—that is a little over that of the body. Higher temperatures destroy the ferment, and the present research is occupied with the determination of the temperature for this latter purpose.

The first ferment investigated was *trypsin*, and it was found that 45° C. markedly lessens its activity, and exposure for five minutes to 50° C. destroys it altogether. The specimens of trypsin employed were some pure, some impure, and certain exceptions to the above-stated rule were noted. It was found that small admixtures with certain salts had the power of increasing the resistance of the ferment to temperature; the activity of the ferment was often lessened by the salt (although this was more marked in the case of pepsin), but the best temperature was 50° C. A temperature of 50° C. lessened, and 60° C. destroyed, the activity of the ferment. The salts which acted thus were ammonium sulphate (a salt used in the preparation of some specimens of ferment used in the preliminary experiments), ammonium chloride, phosphate, and nitrate, and sodium chloride. If mixtures of two or more of these salts were used, the effect was more marked still.

Certain salts (ammonium carbonate and oxalate, magnesium sulphate, sodium sulphate, and phosphate), starch and sugar had no action, but certain products of proteolytic activity (albumose, amphopeptone, and antipeptone) act like salts just enumerated. All the materials that act in this way increase the alkalinity of the digesting medium, minute doses of caustic soda act in a precisely similar way, and the proposition is advanced that the whole of the phenomena are simply dependent on the reaction. Increase of alkalinity protects the ferment. It was found that increase of acidity (trypsin will act in an acid medium if salicylic acid be employed) acts in exactly the opposite way: in an acid medium 33° to 35° C. is the most favourable temperature; 40° C. hinders, and 45° C. destroys, the action of the ferment.

Pepsin was then investigated, and it was found that acidity acts towards this ferment precisely like alkalinity towards the tryptic ferment, the temperature necessary to destroy the activity rising from 65° to 70° C. In a neutral medium the destroying temperature falls to 55° C.

Unfiltered fresh saliva loses its diastatic properties at 75°, filtered saliva at 70°, diluted saliva at 60°, pure ptyalin at 70° C., unless its solution is much diluted, when the necessary temperature sinks to 60°. The influence of salts, reaction, etc., is exactly the same in kind as with trypsin. In all cases, if the pure ferment be used, the influence of temperature, and the influence of salts, etc., on the temperature, are more easily observed than if the ferment be impure, as contained, for instance, in the digestive juice.

The explanation of these occurrences probably lies in the formation of loose compounds with the enzymes, analogous to the pepsin-hydrochloric acid of Schmidt and other authors.

* From *Zeitsch. f. Biol.*, xxviii., 49–71, after *Journ. Chem. Soc.*, 1891, 1271.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, MAY 7, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE SALE OF SECRET OR PROPRIETARY MEDICINES CONTAINING POISON.

THE prosecution instituted by the Treasury in regard to the sale of chlorodyne will open up a question, as to the efficiency of the Pharmacy Act, which has been for many years in abeyance, though it has frequently attracted attention by reason of its importance in various respects. The magisterial decision now given points to the probability that the provisions of the Pharmacy Act will in future be found to be of greater utility than has been supposed, both as the means of protecting the public, and of preventing those invasions of the pharmacist's recognized functions which have been a cause of so much dissatisfaction among members of the craft. In view of the importance of the subject, we have provided a verbatim report of the proceedings, which we recommend to the careful consideration of our readers. For many years past it has been a question of increasing urgency, whether the exemption of patent medicines provided for by the sixteenth Section of the Pharmacy Act, 1868, is to be accepted as conferring a sanction of the sale of poisons in a concealed form as in some of the secret medicinal preparations which are subject to medicine stamp duty. There is no question as to the fact that many of these preparations, which have a large sale, contain ingredients which are poisons within the meaning of the Act, such as morphine, strychnine, aconite, arsenic, chloral, prussic acid, etc. It is well known that such preparations are being sold by all kinds of dealers without any indication of the fact that they contain poison, or of the necessity for caution in their use. The medical profession, coroners and coroners juries have long been unanimous in the expression of the opinion that this practice constitutes a grave source of danger to the public, and that it is consequently at direct variance with the especial object of the Pharmacy Act. This subject has frequently been brought under the notice of Parliament and of various Government departments; it has been commented upon in the public press as calling for more effective administration of existing law, or, if that be inadequate, for further legislation; but hitherto that has happened only on occasions when some fatal result has occurred, by the accidental or improper use of some one or other of the preparations in question. However, the question at issue is a simple one. If the restrictions imposed upon the sale of poisons are, as the law declares, expedient for the safety of the public, any sale of poison regardless of those restrictions must be a breach of the law, or the exemption by which it is made legal must be an inconsistency calculated to neutralize the value of the law in respect to public safety, and to make it to a great extent inoperative. The present state of things is therefore obviously anomalous, both in regard to the public interest and in regard to the class of persons who are legally authorized to act as vendors of poisons. That persons holding recognized medical or veterinary qualifications should be exempt from the restrictions of the Pharmacy Act in regard to poisons is natural. It is their especial function to make use of or to order the use of poisonous articles in the treatment of disease, and it is reasonably assumed that they will do so with due care. But in the dispensing of physicians' prescriptions ordering poisons within the meaning of the Act certain formalities have very properly to be observed by the dispensers. The supply of poisons, in the ordinary course of wholesale dealing, by wholesale dealers is also, in some respects, exempted. But even in that case the poison label is required to be used as a warning against possible accident. Lastly, there is a further exemption in regard to the making or dealing in patent medicines, and it is at this point that the question now arises as to the construction of the Pharmacy Act, in regard to which the Treasury is taking action that will lead to a definite settlement.

It has been contended on a previous occasion that for the purposes of the Pharmacy Act, 1868, every medicinal preparation sold under the Government medicine stamp is to be regarded as a patent medicine, and therefore by reason of the provision in section 16, as not coming within the statute. That argument is again put forward in the chlorodyne case as the main ground of defence. But in reply to that argument it has been pointed out that it is a little too good. If the term patent medicine is to be so interpreted, and if section 16 is to be read as exempting the preparations, so named, from all the preceding provisions of the Act the articles declared by section 2 to be poisons would not, in the eye of the law, be poisons at all in regard to those preparations, and, as a consequence, any of the poisons named in the schedule to the Act could be sold without restriction if the Government medicine stamp was put upon them. One part of the Act would, therefore, undo the other. It is scarcely

possible to imagine this to have been the intention of the Pharmacy Act or that such a construction can be put upon it. Such was, however, the effect of the argument put forward by the counsel for the defence in this prosecution, and it was further contended that such must be the correct reading of the Act, because if that were not the case an article containing a scheduled poison like chlorodyne could only be sold by legally qualified persons! This was, indeed, a *reductio ad absurdum*, though the magistrate's interlocutory, "What injury would that do?" showed that it did not appear to him to apply exactly in the sense it was intended.

It will be useful here to point out what was considered by the counsel for the defence to be the position of vendors of the secret medicinal preparations for which he claimed the designation patent medicines, and likewise entire exemption from the provisions of the Pharmacy Acts. Without ignoring the facts that these are secret preparations, possibly containing potent poisons, he denied that the sellers of them need be qualified persons, and he held that since nothing more was necessary than to hand the sealed packets across the counter, they might be sold by stores, grocers, and general dealers as well as by qualified chemists. If on any grounds such a view could be upheld it would result in making clear the necessity for further legislation. It would amount to an absolute overthrow of the Pharmacy Act, for nothing would then remain beyond the paper on which it is printed, unless it were unfair restraint of persons qualified to sell poisons with due regard for public safety. But without further reference to the argument that the term "patent medicine" means anything sold under a licence and for which a stamp is required, it is of more importance to mention that the real question in this case is whether chlorodyne is a patent medicine. On that point the magistrate decided in favour of the prosecution that it does not come within the definition given in the Medicine Stamp Act, inasmuch as it has never been the subject of letters patent. He therefore held that exemption from the provisions of the Pharmacy Act could not be claimed on that ground, and that since chlorodyne contained a scheduled poison, the person who sells it without complying with the requirements of the seventeenth section, is liable to the penalty therein specified. The consequence of this decision will be far-reaching, if it be upheld in the appeal to a higher court, of which notice was given. If the actual facts of the case be considered it will be evident that there are really no such things as patent medicines at the present time, and as Mr. ALPE has well pointed out in his useful history of the medicine stamp duty it is questionable whether the specification of a medicine containing one of the scheduled poisons would now pass the Great Seal in violation of the Pharmacy Act. The immunity of patent medicines conferred by that Act is therefore merely nominal. The secret remedies containing poison do not and should not enjoy any such immunity, and whether the presence of poison be disclosed, as in the case of the solution of chloral, or concealed, as in the case of many other preparations, it cannot be doubted that it will be held, in consideration of public safety, that such preparations are all subject to the provisions of the seventeenth section of the Act. This decision of the question must, as Mr. POLAND justly pointed out, go still further, and to the extent that neither chlorodyne nor any similar preparation can be sold by any person unless he be an actual chemist and druggist or pharmaceutical chemist within the meaning of the Act. That is the position in which we have always contended that the sale of these preparations should be placed, and we congratulate the members of the craft upon the prospect there now is of that position being established as a requirement of the Pharmacy Act, 1868.

PHARMACEUTICAL SCHOLARSHIPS.

IT appears desirable that the attention of students in pharmacy should be directed to the fact that the competitions for the JACOB BELL Memorial Scholarships and the Manchester Pharmaceutical Association Scholarship take place on July 12. BELL scholars, in addition to free laboratory instruction and admission to the lectures at the Society's School during an entire session, receive thirty pounds each to defray incidental expenses, together with books of the value of fifty shillings, given by the late THOMAS HYDE HILLS. The total value therefore exceeds eighty pounds. For the Manchester Scholarship the sum of about thirty pounds is available annually, and must be expended by the successful candidate in defraying the cost of a course of instruction in the Society's School or in a provincial school approved by the Council of the Society. Full particulars as to the regulations under which the scholarships may be competed for and held, can be had by application to the Secretary of the Society, 16, Bloomsbury Square, W.C. It will be a matter for congratulation if a larger number of students avail themselves of these opportunities. In past years the scholarships have not been so ardently competed for as might be naturally expected seeing what advantages are offered, and we trust this reproach upon the ambition of junior pharmacists may be speedily effaced. Even though a very limited number can expect to be successful in the competitions the knowledge and experience gained will prove of incalculable value in the after career of each one who makes an attempt, after fitting preparation, to obtain one of these prizes.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

May 4, 1892.

Present—

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Messrs. Allen, Atkins, Cross, Evans, Greenish, Hampson, Harrison, Hills, Leigh, Martindale, Newsholme, Richardson, Schacht, Southall, and Warren.

The minutes of the last meeting were read and confirmed.

The Late Professor Redwood.

The President read a letter which he had received from Mr. Boverton Redwood, expressing the appreciation of himself and the other members of the family of the resolution passed at the last Council meeting, and of the high terms in which his father was referred to by the President and other members of the Council.

Diplomas.

The undermentioned, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Bridgman, William Herbert.
Casewell, Job Parry.
Cross, Edward Robert.
Gare, George Henry.
Lambert, James Ernest Harold.
Riding, John.
Ridley, Alexander.
Ringer, Frank Arthur.
Shove, Bertha.
Stainer, John Ward.
Summers, Stanley.
Wellings, Arthur.
Williamson, Joseph.
York, Frank.
Grayson, John Henry.
Meldrum, Alexander.
Williams, William Rees.

Elections.

MEMBERS.

Pharmaceutical Chemists.

The following, having passed the Major examination and tendered their subscriptions for the current year were elected "Members" of the Society.

Casewell, Job Parry .....London.
Cocker, Horace Edward .....Ripponden.
Fillingham, John .....London.
Gare, George Henry .....Bath.
Gillies, William .....Glossop.
Grayson, John Henry..... ...Whitehaven.
Lambert, James Ernest H. ...Bradford, Yorks.
Ralph, William .....London.
Randall, Bruford Henry..... Wareham.
Ridley, Alexander .....Bury St. Edmunds.
Ringer, Frank Arthur.....Norwich.
Shakespear, William .....Syston.
Shove, Bertha .....Lewisham.
Stainer, John Ward .. ..Folkestone.
Summers, Stanley .....London.
Williamson, Joseph .... Maryport.
York, Frank.....Barnard Castle.

Chemists and Druggists.

The following, who were registered as being in business before August 1, 1868, having tendered their subscriptions for the current year, were elected "Members" of the Society:—

Brelsford, James.....Oldham.
Fawcett, Thos. Wheelwright...Leeds.
Lund, Thomas .....York.
Mayor, Thomas ....Sheffield.
Wilkinson, George .....Manchester.
Wyatt, Harold.....Bootle.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Addison, Charles Samuel .....Cambridge.
Birch, John ... .Heywood.
Bond, Ernest Greensill .....Liverpool.
Bradley, Frederick William ...Wisbech.
Brassington, Herbert William.Horsham.
Broumpton, Frederick Richard.Chiswick.
Brown, Ernest Ansell.....London.
Carlton, Herbert .....Horncastle.
Caunt, John William .....Kington.
Clarke, William Ernest .....Kingston-on-Thames.
Cole, William Henry .....Bristol.
Coleman, John David.....Cardiff.
Cumber, Charles Davis .....Bournemouth.
Curtis, George ....Chiswick.
Eastwood, Frederick Allen ...Chesterton.
Ebbage, Henry Edward.....Southend.
Eberlin, Albert ....Nottingham.
Egginton, John Tertius ... .Sedgley.
Fast, John Percival .....Walsall.
Graham, Andrew Ward.....Sheffield.
Green, Joseph William .....Croydon.
Harrison, James Hughes .....Sheffield.
Hinde, Albert Henry .....Banbury.
Hoblyn, Edward Robert .....Exeter.
Holt, James Hartley .....Skelmersdale.
Horne, Joseph.....Salisbury.
Jackson, John Thomas .....Ipswich.
Johnson, Charles Ernest .....London.
Jones, James .....Cape Town.
Knott, Herbert .....Astley Bridge.
Knott, Percy .....Bolton.
Last, Alfred John .....Wickham Market.
Lloyd, James Clement .....Lewes.
Neale, George ....Bacup.
Ness, Thomas .....Tranent.
Page, Robert Steele .....London.
Palmer, James Taylor .....Richmond, S.W.
Pattison, Thomas Dowson.....West Hartlepool.
Roadknight, Joseph Rees .....Sidcup.
Roberts, Rowland ....Ellesmere Port.
Saunders, William Henry.....London.
Shaw, Alfred .....Liverpool.
Stockdale, Richard..... Liverpool.
Strachan, John .....Jedburgh.
Taylor, Joseph.....Woodhouse
Tierney, Thomas.....Marple.
Waldron, John Henry .....Hanley.
Watson, Edward..... .....West Ham.
Wilson, Alexander William ...Sydenham.
Wilson, Richard Henry .....Freshfield.

Modified.

Furnival, John Daniel ....Hanley.
Taubman, Robert.....London.
Taylor, Alfred .....Kendal.

ASSOCIATES.

The following, having passed their respective examinations, and tendered (or paid as Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Minor.

Bennett, George .....Stockport.
Brown, Thomas .....Seaham Harbour.
Bushby, George Frederick.....Manchester.
Chadwick, Milner Bright .....Manchester.
Chaston, George Hunt .....Alresford.
Cooper, John .....Farnworth.
Davies, David Jonathan .....New Quay.
Davies, John, jun. .....Torquay.
Day, James Alfred .....St. Albans.
Dupuy, Arthur Edgar .....Guernsey.
Eakin, James .....London.
Eggleston, George .....Alrewas.
Fearnley, Fairfax .....Headingley.
Forster, George Francis.....Dover.
Freeman, Henry Swift .....Preston.
Gane, Eustace Harold .....London.
Green, John Hugh Homer ...Swindon.
Gregory, George Henry.....Lincoln.
Grier, James..... Peebles.
Hargreaves, Henry .....Leeds.
Harrison, Ernest .. ..Tranmere.
Heale, Thos. Albert Oakley ...Bury St. Edmunds.
Helsby, Fred.....Sheffield.
Hill, Ernest William .....Wisbech.
Horrell, Wm. Foskett Edwd...Crediton.
Howard, Arthur .....Ely.
Hugill, Edwin Abbott .....Clifton.
Huntsman, Charles Sidney ...London.
Jones, Lewis Morris .....Holyhead.
Jones, Robert Haselwood .....Bury St. Edmunds.
Jones, Walter Herbert ..... Aberdare.
Jubb, Nathaniel .....Langworth.
Keir, Charles .....Stirling.
Lee, John Edward .....Hull.
Marchant, David.....Eastbourne.
Morris, William Evans .....Portmadoc.
Mould, Charles .....Chorley.
Owen, Alfred Herbert .....Atherstone.
Patchitt, Richard .....Nottingham.
Plomley, Francis John .....Maidstone.
Porter, Walton .....Whitehaven.
Rhodes, Thomas George .....Keighley.
Robison, Ebenezer .....Hawick.
Scott, Henry .....Keswick.
Simpson, Jas. Wilson.....Perth.
Simpson, Robert .....Aberdeen.
Smyrk, Frank Alfred .....Evesham.
Sturton, Frank Ainsworth ...Peterborough.
Swinton, Thomas Henry .....Crewe.
Treadwell, Samuel Ernest D...W. Dulwich.
Tremeer, Arthur John .....Barnstaple.
Walkington, Richard .....Church Fenton.
Waller, John .....Stanley.
Watkins, Henry Baskerville...Darlington.
Watkinson, Harold Arthur ...Farnworth.
Williams, Ernest.....Falmouth.
Willmott, Alfred Wade.....Darlington.
Wilton, Walter Ernest .....Birmingham.

Modified.

Cory, Charles .....London.

STUDENTS.

The following, having passed the First examination, and tendered their subscriptions for the current year, were elected "Students" of the Society:—

Clark, Alexander..... .....Norwood.
Cobley, Percy M. C. .. ..Torquay.
Coupland, Henry Snart ..... Bootle.
Dolman, Thomas Tustin .....Cheltenham.
Duckit, Frank .....Liverpool.
Evans, William Maurice .....Narberth.
Field, Reeve Holyoake ... . ..Birmingham.
Ford, Jessie ....Denhead.
Gledhill, William .....Steeton.
Harland, Robert Kirby .....Bexley Heath.
Harrison, Thos. Blair.....Sunderland.
Hill, Aubrey Thomas .....Boston.
Hodgson, Alfred .....Leicester.
Johnson, Charles .....Normanton.
Ker, William .....Stranraer.
Llewellyn, James Howell .....Pembroke Dock.
McMillan, James McMillan ...Glasgow.
Maunder, John Hannaford ...Teignmouth.
Moultrie, George Briggs .....Eastleigh.
Moore, Clifford Bond .....Kings Bromley.
Norman, Charles Henry.....London.
Richards, Ellis.....Sarn.
Robinson, James Frederick ...London.
Rowlands, Robert .....Tamworth.
Scott, John .....Newcastle-on-Tyne.
Shellcross, John .....Chiswick.
Snelling, Edith Harriet ....London.
Sproston, Francis John .....Ardwick.
Stephens, John Richard Cook.Swindon.
Symonds, George P. ....St. Leonards.
Webb, Joseph John .....London.
Waddington, Isabel .....Thornton.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a nominal restoration fee of one shilling.

ADDITION TO THE REGISTER.

The Registrar reported that

Roderick McGill, 49, Thistle Street, Glasgow, having made a declaration that he was in business before the passing of the Pharmacy Act, 1868, and the declaration having been duly supported, his name had been placed on the Register.

The name of the following person, who had made the required declaration and paid a fine of one guinea, was restored to the Register of Chemists and Druggists:—

Charles Davies, 45, Hamilton Road, Brighton.

CORRESPONDING MEMBERS.

The PRESIDENT moved that the following gentlemen be elected corresponding members of the Society:—

Professor Tschirch, University of Bern.
Dr. Arthur Meyer, University of Marburg.
Professor Herlant, University of Brussels.
Dr. J. Wiesner, University of Vienna.
Dr. H. Paschkis, University of Vienna.
Dr. Peckholt, Rio de Janeiro.
Dr. Kobert, University of Dorpat.
Wm. Saunders, Agricultural Department of Canada.
Professor R. Godeffroy, Vienna.
E. Collin, Paris.
Dr. J. Hérail, Algiers.
L. Trabat, Algiers.
Dr. L. Radlkofer, Munich.
Sir F. Von Mueller, K.C.M.G., F.R.S., Melbourne.
Dr. W. Treub, Java.
Dr. A. Burck, Java.
Dr. H. Trimen, Ceylon.
Dr. E. Heckel, Marseilles.
Dr. L. Pierre, Saigon.
G. King, LL.D., F.R.S., Calcutta.
Professor Van Eeden, Haarlem.
Hugo Finck, Vera Cruz.
Professor H. K. Hausknecht, Weimar.
Leonard Wray, Perak.
H. N. Ridley, M.A., Singapore
J. Medley Wood, Durban.
J. Horne, F.L.S., Mauritius.
Dr. Daruty, Mauritius.
F. M. Bailey, F.L.S., Brisbane
J. H. Hart, F.L.S., Trinidad.
W. B. Fawcett, B.Sc., Jamaica.

Dr. Domingo Parodi, Buenos Ayres.
J. H. Maiden, Sydney.
C. A. Barber (B.A.),
Dr. Alfonso Herrara, Mexico.
Dr. A. Ernst, Venezuella.
Dr. Bayon, New Granada.
Dr. Lagerheim, Quito.
Dr. D. Philippi, Santiago.
Hon. H. G. Hawtayne, Administrator General, B. Guiana.
Dr. D. Brandes, Calcutta.
Professor Lawson, Ootacamund.
Thomas Hanbury, Ventimiglia, Italy.
Dr. J. E. Bommer, Brussels.
A. Todaro, Palermo.
Dr. R. Yatabe, University of Tokio, Japan.
Dr. Bretschneider, Pekin.
Dr. Augustin Henry, Ichang.
Dr. J. Möller, Innspruck.

The names were selected by the General Purposes Committee last month, and had been suspended in the Library during the month according to the bye-laws. This was the first occasion on which the Council had had the power to elect distinguished men as corresponding members, and he was sure the Council would agree with him that it was very desirable that the Society, representing as it did the best phase of certain sciences, such as chemistry and physics in relation to pharmacy, and more especially the botanical and materia medica side of the craft, should be in touch with all those interested in these matters all over the globe. The very notion of a corresponding member implied that, and this list, therefore, included only the names of those whose domicile was mainly or entirely abroad. Amongst them were some whose names would not be known to every one, because those who were distinguished in some out of the way parts of the subject of materia medica, and who had done work in certain branches of botanical knowledge were not always known in England. The Committee, however, had selected the names to the best of its ability, and had been assisted by competent persons, the endeavour being to choose those who would not only reflect honour on the Society, but also be of use to it.

Mr. GREENISH, in seconding the motion, said he was glad of the opportunity of giving his recognition of the merit of many of these gentlemen, whom he had had the privilege of meeting from time to time at the Apotheker Verein in Germany. From what he had seen of them and from their public works, he was satisfied that they were among the most able men on the continent. He might add that he hoped some day to see the term "materia medica" superseded by the much more comprehensive word "pharmacognosy," which more fully expressed what was meant, and was now coming into universal use.

Mr. HAMPSON said this was an admirable means of holding out the hand of fellowship to the friends of the Society in America, Canada, India, the Colonies, and in fact in all English speaking communities. He was sure the membership would be counted an honour by those on whom it was conferred, as well as by the Society.

The resolution was adopted unanimously.

THE NORTH BRITISH BRANCH.

The PRESIDENT moved that the report from the Executive of the North British Branch which had been circulated amongst the members of the Council be received and entered on the minutes. Some portion of it had been already published, giving a *résumé* of the work of the year and a report on the condition of the Museum and the House generally, and referring to certain changes in the internal arrangements necessary for carrying on the examinations satisfactorily. It also referred to the resolution respecting the appointment of local secretaries in Scotland, which was now under the consideration of the Library Committee. In the nature of things the Executive in Scotland were not able to present anything very startling in the report, but he could not help congratulating their Scotch friends on the care with which they had carried on the business of the Society, and on the excellent report presented with regard to the premises and fixtures, which were in very good condition. He was glad to know also how successful the evening meetings had been, and with what loyalty the new officers of the Executive had served the Society. He would call particular attention to the manner in which Mr. James Laidlaw Ewing, the Chairman of the Executive, had fulfilled his duties; he had proved an excellent administrator, and had already produced a remarkably good effect, not only in Edinburgh but outside it. Those who did not know him could hardly appreciate the advantage which every portion of the Society derived when a capable man took the trouble to help drive the pharmaceutical machine satisfactorily. The difficulty in Scotland, as in England, had always been to get enough men to take an active interest in the work; and it was a great advantage to find that the successor of Mr. Gilmour was not only a successor from an official point of view, but that in encouraging the younger men, taking the chair at the Evening Meetings and so on, he was forming a kind of nucleus round which pharmacy in Edinburgh might very pleasantly rotate.

The motion was adopted unanimously.

THE GOVERNMENT VISITOR'S REPORT.

The PRESIDENT said a letter had been received from the Privy Council enclosing the report of Dr. Thomas Stevenson on the examinations which had been already published. (*P.J.*, April 16, p. 850).

REPORT OF THE FINANCE COMMITTEE.

The report of this Committee was of the usual character and recommended certain accounts for payment.

The PRESIDENT (as Chairman of the Committee) moved the adoption of the report and recommendations. The receipts included a number of penalties which had been paid, and a large number of subscriptions with a few examination fees. On the Benevolent Fund account there were a good number of receipts in the shape of subscriptions, the total amount being about £650, which was very encouraging. On the donation account he had for the first time for a good while neither a legacy nor a donation to acknowledge. The payments were of the usual character, and called for no special remark.

The report and recommendations were unanimously adopted.

REPORT OF THE BENEVOLENT FUND COMMITTEE.

The report of this Committee included a recommendation of the following grants:—

£10 to the widow (age 53) of a former member, an unsuccessful candidate at the last election of annuitants, who died in March last. (Yarmouth).

£15 to the widow (age 43) of an associate. Applicant has had two previous grants, and is supporting herself and family; the grant is made for the education of two daughters. (London).

£10 to a registered chemist and druggist (age 73) who has had to give up business, and receives a trifling weekly allowance from his successor. (Croydon).

£10 to the widow (age 68) of a registered chemist. She has had five previous grants. (Birmingham).

Two cases were deferred.

The question of formulating a scheme for carrying out the conditions of the Hill's Bequest was discussed and the further consideration of the subject deferred.

The consideration of Mr. Harrison's resolution with regard to annuitants was also deferred.

The VICE-PRESIDENT (as Chairman of the Committee) moved the adoption of the report and recommendations. There was nothing requiring any comment in the work done by the Committee, but—and this was quite unprecedented in his experience—a large amount of work was handed over to their successors, not because the Committee was unable to deal with the applications for want of funds, but because it was felt that some of the applications exhibited an amount of thrift which though perhaps commendable in the individual, the Committee could hardly regard as an indication of want of assistance. For instance one man stated that he was in possession at present of £120 a year, and would be for the next two years, and afterwards would have something like £40 a year, but he was desirous of providing himself with an annuity in future, and applied accordingly. There was another application from a person who had a grant in March, and applied again in May for an annuity. That case had been deferred for the consideration of the Committee in October next. A question of formulating a scheme with regard to the Hills' bequest had been deferred in order that Mr. Walter Hills might have a conference with the next Committee, with a view to promoting some scheme for investing the money. The consideration of Mr. Harrison's resolution was deferred in consequence of that gentleman not having been present at the Committee meeting.

Mr. ALLEN said in view of the recent changes which had been introduced with regard to the amount to be paid to annuitants, he had hoped that more interest would have been taken in the Fund, and he had expected to see a very substantial increase in the amount of subscriptions received. There was nothing at present to be alarmed at, but the sum received was slightly under that received last year up to the same time. He had had the pleasure the previous day, as a member of the Finance Committee, of going through a large number of very small subscriptions to the Benevolent Fund, and he could not help thinking that a large number of members and associates could well afford to give rather more. They could not despise 2*s.* 6*d.* or 5*s.* subscriptions; but considering the good the Benevolent Fund had done and what it was likely to do in the future, he hoped the subscribers would seriously consider what an assistance it would be to the Committee if they could slightly increase their subscriptions.

The PRESIDENT, in putting the motion, said he sympathized very much with Mr. Allen's observations, but he thought the Committee would be encouraged in due time. Their friends did not always read the proceedings, and as there were a few months before the altered arrangements came into force he believed their members and friends would respond. The subscriptions during the month were encouraging in many respects, and as soon as the position was realized he believed the subscribers would come forward and support the Committee.

Mr. EVANS suggested that the Fund might be materially augmented if the local secretaries' wives and daughters or other ladies would take part in collecting subscriptions.

The PRESIDENT said the Secretary might perhaps correspond with the local secretaries with that view.

Mr. EVANS thought it would be more useful if public attention were called to the matter in the Journal.

The resolution was then put and carried unanimously.

REPORT OF THE LIBRARY, MUSEUM, SCHOOL, AND HOUSE COMMITTEE.

Library.

The report of the Librarian had been received, including the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
March	Day . .	622	34	13	23
	Evening .	226	20	3	10

Circulation of books.	Total.	Town.	Country.	Carriage paid.
March . . .	277	137	140	£1 17*s.* 0½*d.*

Donations to the Library had been announced (*P. J.* April 16, p. 851), and the Committee had directed that the usual letter of thanks be sent to the respective donors.

The Committee recommended that the undermentioned works be purchased:—

For the Library in London—

Carpenter, Soaps and Candles.
Massee (G.), Monograph of the Myxogastres, 1892.
Meyer (A.), Wissenschaftliche Drogenkunde, 2. Teil.
Year-Book of Science, 1892.

For the Library in Edinburgh—

Parkes, Hygiene.
Blyth, Foods.
Lee, Microtomist's Vade Mecum.
Helbing, Modern Materia Medica.
Roscoe, Elementary Chemistry.
Beasley, Book of Prescriptions.
— Pocket Formulary.
— Druggists' General Receipt Book.

Museum.

The Curator's report had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average
March	Day . .	572	36	8	21
	Evening	90	12	1	3

Donations to the Museum had been announced (*P. J.* April 16, p. 852), and the Committee had directed that a letter of thanks be sent to each of the donors.

The Staff of the Society's School had attended and reported on the various classes.

The Committee had recommended that every subscriber of the Society be furnished with a copy of the Catalogue of the Hanbury Herbarium, gratis, on application.

There being only fourteen nominees for the fourteen vacancies on the Council, the Committee had recommended that voting papers be not issued.

The draft annual report was submitted and discussed.

The PRESIDENT (as Chairman of the Committee) in moving the adoption of the report, explained what was intended to be done with regard to the notices for the annual meeting. They would in future be sent in an envelope without the annual report. It was hoped that on future occasions, when there was an election, this would lead to more votes being sent in than when the voting papers were accompanied, as had hitherto been the case, with a large amount of other printed matter.

The resolution was unanimously adopted.

RESEARCH COMMITTEE.

The following report was presented:—

Report of the Research Committee on the Subject referred to them for Consideration by Resolution of Council, February, 1892.

The resolution of the Council, passed at the February meeting, asking the Committee to formulate a scheme for the establishment of a title of honour to be conferred on pharmaceutical chemists who have proved themselves to be competent scientific investigators, has led to the further consideration of a question which, as the Council are aware, has been discussed by the Committee on many occasions during the past three years. That the object which is sought to be

attained is in every respect a desirable one for the Society to promote, there can be no doubt. But its accomplishment is beset with a number of difficulties and dangers, which must be completely safeguarded, if any such scheme is to be productive of good to pharmacy as a whole. The Committee have succeeded in drafting a scheme, which they now unanimously recommend for adoption by the Council, as being, in their judgment, free from objection and eminently calculated to further those objects for the promotion of which the Society was granted a Royal Charter.

For convenience, the proposals have been cast in the form of the following resolution:—

"In order to promote and encourage the extension of chemical and botanical knowledge in their relations to pharmacology and pharmacy, by experimental inquiry on the part of those pharmaceutical chemists who by reason of their special training are competent to undertake it, the Council resolves as follows:—

"That any pharmaceutical chemist, being a member of the Society, who has systematically worked for at least one session in the Research Laboratory of the Pharmaceutical Society of Great Britain or in another similar laboratory approved by the Research Committee, and is, in the judgment of the Director of the said laboratory, proficient in the principal methods of chemical research, especially as applied to pharmacology and pharmacy, shall be eligible to receive from the Council the title of Research Fellow of the Pharmaceutical Society on the following conditions:—

"That the candidate carries out to the satisfaction of the Research Committee, or of some person or persons appointed by them, an investigation, the subject of which shall be set or approved by the Committee, to which the candidate shall have devoted at least three months' independent work in the Research Laboratory of the Pharmaceutical Society, or in another laboratory approved by the Research Committee, without receiving any such assistance as would deprive the investigation of its independent character from the officers of the said laboratory, one or more of whom may, however, be requested by the Committee to watch the progress of the inquiry and furnish a report as to the manner in which the work has been done, and also a signed declaration as to its independence.

"The candidate shall submit to the Committee an exact and orderly account of the experiments he has made and of the conclusions which he has drawn from them, and this account shall be written in the usual form of a scientific memoir and when necessary shall include, as an introduction, an adequate discussion of the previous literature of the subject.

"The Research Fellowship may be awarded to a pharmaceutical chemist, being a member of the Society, upon evidence of botanical training and capacity for research and upon conditions in respect to training and investigation similar to those laid down for chemistry in the foregoing clauses.

"The Committee recommends that no person other than a pharmaceutical chemist and a member of the Society shall hold the title of Research Fellow."

MICHAEL CARTEIGHE, *President.*
ALEXANDER BOTTLE, *Vice-President.*
THOMAS GREENISH, G. F. SCHACHT, } *Members of Council.*
T. LAUDER BRUNTON, CHARLES EKIN, MICHAEL FOSTER, EDWARD FRANKLAND. } *Additional Members of the Committee.*
(Signed) March 31, 1892.

The PRESIDENT, in moving the adoption of the report, said the Council in February last considered how recognition could be given to members of the Society who had done good work, and had gone somewhat beyond the stage of ordinary scholars. It was also thought that possibly the Research Committee, or some other, would be able to award, or to recommend the Council to award, such recognition when agreed upon, for certain investigations or published papers, without reference to antecedent training. When the Committee went into details it found the subject was beset with a great many difficulties, that of determining the relative value of work as reported in a paper—where in many cases the work could not be repeated—being one of the chief. Many investigations were made in various branches of science which there was reason to believe would not bear repeating, and work of that sort was always difficult to gauge and recognize properly. On this point the external members of the Committee were very strong, contending that the best form of recognition was that which, while it required original work, also involved proof of proper training; that great difficulties were encountered directly this principle was abandoned; and that definite training and independent original work must be conjoined. The report was drafted therefore with the view of encouraging men to go through systematic research, either in the Laboratory of the Society, or in any other laboratory where original work was carried on. It was not intended to insist that the Research Laboratory of the Society should be the only place in which the necessary training could be acquired; anyone who produced evidence that he had been trained in a biological or chemical laboratory which the Committee approved, would be allowed to attempt an investigation, or if it had been already carried out, to prove that he had done so without the assistance of any professor, and he would be in the same position as if he had worked in the laboratory of the Society. The Committee recommended that the title of honour to be granted should be that of Research Fellow of the Society. The Society was founded for the promotion of chemistry and pharmacy, and in various ways it had always stimulated the advance of education. While on the one hand desirous of providing the necessary education for those who simply wished to obtain the legal qualification, it had always been anxious to encourage extended knowledge amongst its own members. Every member of the Society who had done original work in the past tended to increase the respect felt for the whole body, and although under the new arrangement many applicants could not be expected to come forward annually for the title, still those few would shed considerable honour on pharmacy as a whole, and if the scheme turned out as satisfactorily as the Committee hoped and believed, there would be an additional stimulus given to young men at the most impressionable age—when they had just passed their examination—to devote another year or two to original work, and so equip themselves for the battle of life by acquiring a title which would be respected all over the world. The question of *cui bono* was always before the candidate who had passed the examination, and before his parents and guardians. The Society had not the means as universities and colleges had of making annual payments to students of exceptional ability. Some day it might even be able to found bursaries or to provide a fund out of which a Research Fellow might continue to work, receiving a small sum per annum while doing so, but at present that was premature, though he should like to see it established later on. This scheme aimed at the encouragement of the young, not by a direct money payment, which could not be made, but by giving them increased knowledge and an honourable title, which would be of value both to them and to the Society. The defect of this scheme was that the

Society was not in a position to reward the older men. That question had been considered in all its bearings, but the Committee could not devise a scheme which would not involve a number of difficulties and possible dangers which were better avoided in a complex body like theirs. Medals could be given for certain kinds of work and sometimes money prizes, but it was found more difficult day by day, even by those who had to award such medals as those of the Royal Society, to properly assess the value of the work upon which they were granted. Here, however, the Council was on safe ground. It was proposed that the young men should go through a certain amount of training, and on the basis of that and doing an original piece of work, the award should be made. Whether that investigation was as successful as the candidate wished or not he would be eligible to receive the title because the essence of original investigation was not in one particular experiment to discover what you were looking for, but to be able to show that you knew how to make discoveries. Even if a man failed to get the precise results he looked for, if he gave a correct and careful report of what he had done, he was in a position to carry on future investigation on his own account without assistance, having attained the training necessary to do so. He therefore asked the Council to accept the report.

Mr. HAMPSON seconded the motion. He entirely coincided with the President in the hopes he expressed as to what might come out of this step. The intention was especially to help those who were aspiring to distinction, and this would give them the opportunity they sought. If the title were safeguarded, as he hoped it would be, a deal of good might result, not simply in encouraging thorough training, but in the actual discovery of new truths. It might be feared that in a sense the title would lessen the value of "pharmaceutical chemist," but inasmuch as all who competed must have already passed the Major examination, it simply gave them a higher platform on which to work, and instead of lessening the value of the title of pharmacist, it would rather lead to more entering the Society and becoming pharmaceutical chemists. The scheme would require very careful management, and would no doubt be looked on by some outside the Society with a little suspicion. Much would depend on the constitution of the Committee in future, and the care with which it conducted its operations, whether the result was beneficial or not. He, however, felt no doubt on that point. It was a step in the right direction and could only lead to good results.

Mr. EVANS asked if it would not be possible to get some happier name, though he supposed it had been fully considered.

The PRESIDENT said yes, it had been well considered.

Mr. EVANS said he was sorry he could not suggest a better himself, unless it were Bachelor of Pharmacy.

The PRESIDENT said the Society could not give a name which implied a university degree.

Mr. HAMPSON said in the course of a few years pos sibly the Society might obtain statutory powers with regard to the granting of such degrees.

Mr. ATKINS said he had hoped some better title would be found, and it was hardly generous to criticise the one suggested when he could not suggest a better. Some few years ago there was a suggestion that the higher workers in the Society might enjoy the title of Fellow in Pharmacy. It struck him as a somewhat new departure, the great stress which was laid on the importance of training, and that the title of Research Fellow would be given largely as an indication of good training. But then, again, further stress was laid on original work, and he was rather surprised to find that this work might be done outside the Research Laboratory. No doubt it had been carefully considered, but that was a very important step to take, and he should have thought the *raison d'être* of the title would have been work done within the Laboratory. It seemed to him that any man coming to the Society with an indication of an exact careful training, and with proof of some original work done, might submit his claim, although it was outside the Research Laboratory altogether. In the last paragraph but one he noticed that not only the work had to be done, but a thesis had to be written, which indicated that there must be proof of some literary power. This was analogous to what prevailed in Germany, where scholarship had to be evidenced in the same way by all students competing for degrees. Another important point was that the title was in no sense retrospective. He had no doubt the Committee had thought of men, some of whom he had known, who had done work in this special line, whose names, if the honour had been retrospective, would have at once occurred to them, but he understood there were complex difficulties in the way of doing so, and, therefore, he would not press it. Whilst sharing with the Treasurer the full hope that this would be an incentive to young men to prosecute the higher branches of pharmacy he trusted it would in no sense lower the value of the title pharmaceutical chemist, which it was their duty to uphold to the best of their ability.

Mr. NEWSHOLME said the only objection he had to the scheme, which was very slight, was the acquisition of a new title, because it had been previously considered by many that there were too many titles already. As far as the present Council was concerned he had no doubt that the matter would be so safeguarded that the Research Fellow would not take the place of the pharmaceutical chemist of the day, and he trusted the matter would be so managed by the Committee that nothing would ever interfere with the title of pharmaceutical chemist.

Mr. MARTINDALE thought the title Research Fellow was an advantage. It might some day be possible to give the title of Fellow to the ordinary pharmaceutical chemist. He was glad that the Committee had hedged in the requirements as closely as possible, which was very necessary; and after carefully reading it over he cordially approved the plan suggested. He should have liked the work done to have come before the Society, if possible, at the evening meetings, so that the Society, rather than others, should have had an opportunity of judging what the work had been of the candidate who applied for the fellowship.

Mr. SOUTHALL regretted that the Committee had not succeeded in going a little further in encouraging research, not only in connection with the Laboratory but with pharmaceutical students all over the country. It would be very hard for any person to go to any other laboratory than that of the Society to prosecute such work. It was stated, no doubt, that it might be done in any similar laboratory; but the Council had been told many times that there were no similar research laboratories to their own, so that it pretty well confined the work to the Research Laboratory. He would remind his colleagues that some encouragement to research had come from the Pharmaceutical Conference, which had endeavoured by making grants to encourage work of this kind; and it seemed to him that that was what the Council ought to aim at. A young man after he left Bloomsbury Square, and possibly had spent six months in the Research Laboratory, in two or three years' time might have a little time on his own hands, when he could in his own laboratory prosecute useful research; and if that sort of work could be encouraged, it would be well. He knew it was a very difficult thing to do, but he was in hopes that the Committee would have been able to encourage general research work amongst the members.

Mr. WARREN thought the title very appropriate and fully descriptive, and it was much less likely to clash with the existing title than if it were Fellow of the Pharmaceutical Society. Those who went in for this extra training would not be very numerous, and would not therefore compete with pharmaceutical chemists, but would rather add dignity to the whole body, and might in time lead to England being able to compete on better terms with the Continent in the manufacture of organic compounds.

Mr. RICHARDSON said there were many good research laboratories in this country connected with large commercial undertakings; unfortunately there was no encouragement afforded by the Government but quite the reverse. They were all looked upon with the greatest suspicion, especially when alcohol entered into the operations conducted, and their places of business were constantly the scene of extensive researches on the part of Excise officers, who seemed to think they were desirous of breaking the law. In Germany every encouragement was given to research; only the other day a barrister of eminence who had recently visited Berlin, was describing to him the state of things in that city, and suggested that the English Government ought to be approached with the view of obtaining greater facilities. He hoped the President would bear that in mind, for until things were put on a better footing they would have to remain far behind Germany in the matter of scientific research.

Mr. HILLS said he hardly liked to criticise this report, seeing the names appended to it; but he did did not quite like the last paragraph referring to botany. The third paragraph referred to chemical research "especially as applied to pharmacology and pharmacy," and he failed to see the necessity for the second word; surely pharmacology would cover all that was intended, and it occurred to him that botany might be put in there and pharmacology referred to in either its chemical or botanical aspect. He did not see that the Society had a right to recognize botanical knowledge except as connected with pharmacology. Pure botany should be recognized either by a botanical society or by a university.

The PRESIDENT said it was intended to refer only to botany as applied to pharmacology.

Mr. SCHACHT said the paragraph had reference to the possibility in future of a research laboratory in botany being established similar to that now established for chemistry.

Mr. HILLS said he thought botany should be distinctly limited to the pharmaceutical aspect. He agreed with the report on the whole and had not the least fear that the new title would interfere with that of pharmaceutical chemist.

Mr. MARTINDALE thought the word pharmacology as used in the report applied rather to the action of drugs, while pharmacognosy applied to materia medica.

Mr. SCHACHT said he sympathized with the remarks of Mr. Southall, and felt with him that it would have been very nice, if possible, to extend the sphere of encouragement to investigators a little more widely than was done here, and he could assure him that that sentiment prevailed very largely among the members of the Committee, but they were compelled to recognize the difficulties that attended it. Personally he found himself a convert to the altered aspect of matters, although somewhat unwillingly on account of the immense difficulties which would attend the selection of those really entitled to receive the distinction if the limitations imposed were less restricted. The intention was not only to recognize original work but also scientific training; in other words, the object was twofold: first, the training for competent men in higher work, and then to recognize that higher work when it was done.

Mr. CROSS said personally he was not much in agreement with the previous speakers beyond this, that he considered the thanks of the Council were eminently due to the Research Committee for the pains they had taken in promoting one of the most useful institutions of the Society, the Research Laboratory. He had some misgivings whether they were not travelling rather too fast in granting titles after the Laboratory had only been established two years. He had no misgiving as to the clashing of the titles, and did not care much about the title of Research Fellow in itself. Possibly had the Committee waited a little longer it might have found a better title, and he thought it would have done no harm if they had waited a little longer.

Mr. ATKINS said Mr. Schacht's remarks had recalled to his mind something he had intended to say before, viz., that he took exception simply to the recognition of good training. He thought the title should have been awarded simply and solely for work accomplished, not for previous training.

Mr. GREENISH expressed his entire concurrence with the report. He believed the Research Laboratory would do more than anything else to raise the Society in the estimation of scientists of the day, and by and by it would be found that it would enable the Society to approach the Government and possibly to have important work committed to its charge. The title of honour was a very good one, and would do very well for the purpose for some time to come, and at no distant date it would be much sought after. The only difficulty would be for the Committee to determine who were worthy of receiving it. He was very pleased to find that the members of the Council generally were so favourable to the scheme, and hoped succeeding Councils would take great care to watch carefully the composition of the Committee, for upon it would depend entirely the success of the enterprise.

Mr. ALLEN said he was rather startled on first reading the report, and thought the Committee had gone rather farther than it was authorized to do; but he found on reference to the resolution that that was not so, and what he had heard that morning somewhat qualified the fears he had formerly expressed as to the value of the title of pharmaceutical chemist being lowered. The title now chosen, with the conditions accompanying it, was rather different to what was in his mind at that time, and no doubt the number of Research Fellows would be very limited. The title in itself seemed fully descriptive, and he did not think it could be improved upon. He was glad that competitors would be eligible without having worked in the Society's Research Laboratory, but there was one of the regulations which he should like to see embodied if possible; viz., that which provided that no inquiry for commercial purposes should be conducted in the Research Laboratory. He should be glad if the Committee could see its way to make some provision, precluding the title now proposed being used in connection with trade purposes. It was a very important point that no one but pharmaceutical chemists could bear this title, so that the moment he left the Society by going on to the medical register or otherwise, he would cease to enjoy this distinction.

Mr. EVANS desired in connection with what Mr. Richardson had said, as to Government encouraging research, to call attention once more to the provisions of the Technical Instruction Act. Under this Act large sums of money were being used in many counties in promoting education in mining, chemistry, and other branches of knowledge, and if the trade looked carefully after the way in which the Act was applied, it was quite possible that in the larger centres at any rate some funds might be made available for assisting the scientific training of the younger members.

The VICE-PRESIDENT suggested a verbal correction

in the first paragraph, which was accepted, and thanked the Council generally for the cordial reception it had given to the report.

Mr. ALLEN asked if any pharmaceutical chemist now on the Register would be eligible to apply for this title?

The PRESIDENT said certainly, if he fulfilled the conditions. He must spend a certain time in a research laboratory approved by the Committee, and undertake some original work. With reference to the remarks of Mr. Southall, he wished to remark that wherever the conditions were obtainable, as they certainly were at Birmingham, Manchester and Edinburgh, and in many places abroad, the training required could be obtained. It was purposely left somewhat vague in order that the Committee might have a discretion in the matter; but supposing a young man after passing the Major examination went to Germany and spent twelve months in the laboratory of Professor Dragendorff, or any other similar establishment, he would be perfectly eligible to come back here and compete. Even if he had done his investigation abroad, and could satisfy the Committee by the evidence of the director of the laboratory that the piece of work had been done satisfactorily, it would be considered a *bonâ fide* application. Training in an ordinary teaching laboratory was a different thing, but there was generally either a private laboratory of the professor or a small laboratory for research work, and the number of such places was increasing day by day. He wished to impress on the Council very strongly the opinion of the external members of the Committee as to the danger of not insisting on this point of training and knowing for certain that the man had known how to work and had done the work. The moment that principle was departed from the difficulty would arise that had been felt in the Royal Society and elsewhere in making awards. A prize might be considered a desirable thing in itself, but evidence of such training as enabled a man to gain other prizes, or pursue original investigations on his own account was, after all, of much greater value to him and to the whole body to which he belonged. He believed the results of this scheme would be altogether satisfactory. He did not expect there would be any large number of competitors at first or that all would come up to the standard required, but he thought it must do good and could do no harm. The work of the Society from its foundation had been done by the highest intellectual pharmacists of the country and was being carried on now by similar men. The work of the Society in future would have to be carried on by those who early in life and through life were interested in the advancement of the craft in the intellectual as well as in the ordinary commercial sense. Those would be the men who would take part in raising the pharmacy of Great Britain, and not only ordinary pharmacy but manufacturing pharmacy; in fact, the manufactures of this country might be almost revolutionised in favour of England as against the Germans in that respect. We were immensely behind in the matter of education, and a large part of manufacturing work was lost, not solely on account of the restriction of the use of alcohol, but largely from the want of skill and knowledge. There was plenty of capital, but brains and education had not kept pace with it. In reply to Mr. Martindale, he said the title would not be granted retrospectively, but any pharmaceutical chemist, whatever his age, who liked to study in the Research Laboratory, or any other approved laboratory for a certain time, and then made an original investigation, would be eligible for the honour. Practically, the younger men would be most likely to compete, but no one who fulfilled the conditions was debarred.

The resolution was then put and carried.

THE BOARD OF EXAMINERS IN SCOTLAND.

The PRESIDENT said a communication had been received from the Board of Examiners in Scotland, asking that more ample space should be provided for the practical chemistry examination as soon as possible. It was agreed that the President be requested to communicate with the Scotch Board on the subject, and report to the next meeting of Council.

THE SALE OF POISONS.

The PRESIDENT said the Boards of Examiners for England and Wales and for Scotland had sent in the following schedule for approval by the Council:—

Examination of Minor Candidates in the Law relating to the Sale of Poisons.

Candidates will be required to enumerate the poisons contained in schedule A of the Pharmacy Act, 1868, and those since added thereto, in pursuance of the provision contained in section 2 of that Act, viz.:—

(*a*) Poisons within Part I. of the schedule.

(*b*) Poisons within Part II. of the schedule.

They will be required to describe minutely the conditions required upon the sale *by retail* of poisons, both in Part I. and Part II. of schedule A; and to write the proper entry required, according to schedule F of the Act, for the sale of a poison coming within Part I. of schedule A. They will also be required to state the conditions imposed on the sale of scheduled poisons *by wholesale and for export*; and upon the sale of a scheduled poison when forming an ingredient in a medicine dispensed.

A knowledge of the conditions imposed on the sale of arsenic by the Arsenic Act will also be required.

The above regulation to come into force on and after January 1, 1893.

He would move that this regulation be adopted. Very serious difficulty and danger often arose from members of the trade not being acquainted with the law in this respect, and very naturally, therefore, the Government Visitor had recommended that it should be included in the Minor examination.

Mr. ATKINS remarked that the amount of carelessness and ignorance sometimes displayed was quite alarming.

Mr. CROSS said several members of the Council were anxious to include such a regulation in the bye-laws.

The motion was unanimously adopted.

REPORT OF THE GENERAL PURPOSES COMMITTEE.

The report of this Committee included the reports from the professors on the examinations.

Practical Chemistry.

Professor Attfield reported that 23 students competed for the Council prizes, the three first of whom obtained 90, 83 and 78 per cent. of the marks respectively. With a single exception the pupils had worked assiduously and satisfactorily.

Chemistry.

Professor Dunstan reported 12 candidates for prizes in this class, and gave the mottos and marks of each. The marks included those awarded at the revision classes held weekly throughout the session. He added that he could not speak too highly of the general good conduct and diligence of the whole class.

Botany.

Professor Green reported 10 candidates for prizes, of whom the first six obtained over 70 per cent. of marks. The practical work was satisfactory, and the papers were fully up to the average of former years

Materia Medica.

Mr. H. G. Greenish reported that the number of this class had been thirty-three, the attendance regular, and the progress satisfactory. Eighteen competed for the bronze medal out of twenty-six who were eligible and the mottos and marks were appended. The first three had obtained over 90 per cent. of the marks; and the next three came very close behind.

Pharmacy and Practical Pharmacy.

Mr. Ince reported fourteen competitors for this prize, seven of whom obtained 75 per cent. or upwards of possible marks.

In accordance with the above reports the following awards were recommended:—

Practical Chemistry.

Bronze Medal .....Hooper Albert D. Jowett.
Certificates of Honour ... { Robert H. Jones. / E. W. Hill.

Chemistry and Physics.

Bronze Medal .....Eustace Harold Gane.
Certificates of Honour ... { George A. Shaw. / Hooper Albert D. Jowett.

Botany.

Bronze Medal .....Hooper Albert D. Jowett.
Certificates of Honour ... { Eustace Harold Gane. / George A. Shaw.

Pharmacy and Practical Pharmacy.

Bronze Medal .....George A. Shaw.

Materia Medica.

Bronze Medal .....Eustace Harold Gane.
Certificate of Honour .....George A. Shaw.

The above recommendations were agreed to by the Council.

Solicitor's Report.

The report of the Committee also included the usual letter from the Solicitor stating the progress made with cases placed in his hands.

Several cases of alleged infringement had been considered by the Committee and proceedings recommended.

The Committee considered a resolution forwarded from the Executive of the North British Branch with reference to the sale of methylated spirit, but having regard to the interviews which the President had already had with the Inland Revenue authorities it was not thought desirable to take any further steps in the matter at the present time.

The PRESIDENT said the only portion of the Report on which he had to make any comment was that referring to the sale of methylated spirit. The Committee did not think it desirable to take any steps in the matter, as the Inland Revenue authorities were contemplating some slight difference in the methods by which rectified spirits might be sold. He could not say definitely it was the intention, but possibly means might be devised by them within a short time by which a rectified spirit properly medicated, but not nauseous, might be allowed to be sold by chemists for certain purposes. It was extremely difficult for anybody like the authorities at Somerset House to do what the executive of the North British Branch proposed, contrary to the Act of Parliament. The subject was threshed out last night, and the Committee was of opinion that at the present moment the Council could do no good in the matter except by acting as assistants and advisers to the Somerset House authorities. Those authorities were anxious not to interfere with the legitimate sale of methylated spirit or any other exciseable compound more than was necessary, but in these days pressure was put upon them in many ways, and methylated spirit was said to be used as a beverage in small quantities and to be obtained from chemists for that purpose. They must be content to bear the restrictions which the Government imposed, and if in a case of extreme sickness or otherwise they had to deal with exceptional cases, no doubt their Scotch friends might find an exceptional way of dealing with them.

Mr. EVANS said English manufacturing chemists had to suffer a great deal from the competition of German tinctures, especially in the export trade to India; thousands of gallons were exported there containing an infinitesimal quantity of some bitter substance in the spirit.

The PRESIDENT said those tinctures never came into the market here, but were kept in bond.

Mr. EVANS said it was impossible for English tinctures to compete with the German under those circumstances.

The PRESIDENT said that point was rather beside the one now under discussion. So long as spirituous preparations from abroad remained in bond the Excise authorities could not touch them; and so long as respectable people, boards of directors and others would buy things which could not be examined here, but were exported direct the Excise could not interfere. It was very common for these things to be sent to India and the Colonies without ever being examined.

The Council went into Committee to read and discuss the legal portion of the report.

On resuming the report and recommendations were unanimously adopted.

REPORT OF EXAMINATIONS.

April, 1892.

	Candidates. Examined.	Passed.	Failed.
England and Wales:—			
Major	30	14	16
Minor	149	54	95
Modified	1	1	0
	—180	—69	—111
Scotland:—			
Major	4	3	1
Minor	83	43	40
	—87	—46	—41
First Examination. ,	376	170	206

Twenty-seven certificates by approved examining bodies were received in lieu of the Society's examination.

THE ANNUAL REPORT.

The Council went into committee to consider the draft annual report; which, with verbal amendments, was approved and ordered to be published in the Journal.

FIRST EXAMINATION.

A meeting of the Board of Examiners for England and Wales was held on Thursday, April 28.

Certificates by approved examining bodies were received from the undermentioned in lieu of the Society's examination:—

Bryan, Robert George..... . ....Deptford.
Clark, George Harrington .....Hammersmith.
Coupe, Douglas Henry .....Douglas.
Coupland, Henry Snart .....Bootle.
Coverdale, Henry.....Howden.
Cruse, Thomas E. C. .....Southsea.
Forsyth, Richard Patterson ...Dunbar.
Fowlie, Alexander .....Aberdeen.
Harris, John Flinton ....Bournemouth.
Henderson, Alexander Kello...Kirkcudbright.
Hill, Aubrey Thomas .....Boston.
Hogwood, Haley Percival .....Rotherhithe.
Kaberry, William Todd .....Faversham.

Lewis, Arthur William Bankes.Crewe.
Maclachlan, Hugh .....London.
Marshall, Henry Herbert .....Birmingham.
Martindale, William Harrison.London.
Munro, George N. .....Lochee.
Oliver, Gwilym Emvys .....London.
Osborne, Ernest .....Pershore.
Peacocke, Peter A. P.....Dalkey.
Poole, Arthur Walter .....Birmingham.
Potts, Albert Edward .....Sheffield.
Rowse, William James .....Reading.
Sproston, Francis John .....Ardwick.
Symonds, George P. .....St. Leonards.
Westlake, Alfred John .....Sutton.

The Report of the College of Preceptors on the Examination held on April 12 was received.

Three hundred and seventy-six candidates had presented themselves for examination, of whom *two hundred and six* had failed.

The following *one hundred and seventy* passed, and the Registrar was authorized to place their names upon the Register of Apprentices or Students :—

Abraham, Herbert .....Wainfleet.
Ainsworth, Granville .....Walkden.
Almond, Thomas William.....Stockton-on-Tees.
Amos, Charles John .....London.
Andrews, Martha ... .Leamington.
Atkins, Philip Charles .....Birmingham.
Atlay, Charles Henry.....Northallerton.
Bailes, Arthur Thomas .....Stockton-on-Tees.
Baker, Thomas .....Oldham.
Bancroft, Albert John T. .....Derby.
Bannatyne, Ebenezer, jun.....Irvine.
Barber, Albert Edward .....Plymouth.
Barrass, Ernest .. ..Doncaster.
Barrie, Joseph .....Lasswade.
Bates, George Percival .....Lindfield.
Beath, John .. ..Fossoway.
Benzie, Robert .....Aberdeen.
Birnie, James Murison .....Aberdeen.
Black, David.....Perth.
Bland, Ernest Harry .....Boston.
Bolus, George ....Berwick-on-Tweed.
Breeze, George Almond .....Fakenham.
Britton, Alfred Brook.....Huddersfield.
Burnitt, Ernest William.....Goole.
Burridge, Archibald E. .....Portsmouth.
Burton, Harry ....Lichfield.
Butcher, Robert Johnson .....Barnsley.
Calder, James.....Bathgate.
Callander, Thomas Gardner ...Falkirk.
Chambers, Ernest James ..... Nottingham.
Chappell, Percy Harold Howe.Brighouse.
Cheetham, Ernest George .....Louth.
Clark, William John .....London.
Cleave, Thomas William .....Leeds.
Cobley, Percy Maurice C. .....Torquay.
Cockroft, George Cleminson...Lancaster.
Cooper, Egbert Frederick .....Saffron Walden.
Corder, Herbert Scott.....Newcastle-on-Tyne.
Cornish, Arthur William .....Bridgwater.
Cowley, Harry James .....Nottingham.
Craven, Edgar Ashworth .....Melton Mowbray.
Crofts, Lionel Gordon.....Hucknall Torkard.
Crombie, Peter Rintoul .....Glasgow.
Dalgarno, Robert Bruce.....Aberdeen.
Denness, William .....Uddingston.
Dewdney, Albert Victor..... ..Newton Abbot.
Dixon, Frederick Spalton .....Dalton in Furness.
Doughty, Thomas Herbert ...Lewisham.
Downie, George Horn.....Glasgow.
Duffus, John..... .....Aberdeen.
Duncanson, James R.....Glasgow.
Ellis, Bernard ....Sheffield.
Evans, David .. ..St. Dogmaels.
Exalby, George Henry .....York.
Exell, Arthur .....Sheffield.
Fairley, Charles Ernest..... Sunderland.
Ffoulkes, Herbert .....London.
Finlay, James .....Edinburgh.
Floyd, Harry Victor .....Soham.
Forster, William .....Seaham Harbour.
Fowden, William Jos. V. .....Altrincham.
Freeman, Andrew John.....Newbury.
Gardner, William ....Manchester.
Gilpin, Percy William .....West Bromwich.
Goodwin, Allan .....Spilsby.
Gould, Sydney Hartforth .....St. Leonards.
Grant, Peter.....Tomintoul.
Griffiths, Frank Foxall .....Birmingham.
Guthrie, James S. .....Edinburgh.
Hall, John William.....Great Grimsby.
Harland, Robert Kirby .....Bexley Heath.
Hatrick, Osbourne Ronald.....Pollockshields.
Hay, George William.....Newcastle-on-Tyne.
Hayes, Ernest Paul.....Blandford.
Heely, Walter Frederick .....London.
Hemingway, George Garrett...Liverpool.
Henville, Leopold Arthur D....Parkstone.
Hill, Wilfred.....Hastings.
Hipkin, Ernest Albert.....Barton-on-Humber.
Hogley, Percy .....Milnsbridge.
Holdsworth, Joseph .....Bradford.
Horsfield, Jessie Agnes .....Rotherham.
Hovenden, Sydney Churcher...Croydon.
Hudson, William Henry .....Montrose.
Hughes, John Elias.....Wrexham.
Hutchinson, Herbert .....Northallerton.
Hutt, Sydney George .....Cambridge.
Ibbetson, William Thomas ...Goole.
Jack, James .....Arbroath.
Jackson, Percy Geo. William...Preston.
Jipson, Herbert ....Hull.
Johns, Aneurin Vaughan .....Llanelly.
Jones, Arthur Llewelyn .....Liverpool.
Jones, David.....Aberystwith.
Jones, Thomas William.....Talsarn.
Jones, William.....Holyhead.
Kennedy, Robert Ker.....Hawick.
Kirk, William Grant .....Kirkcaldy.
Kirkman, Albert Henry B.....Cardiff.
Kirkman, William Ernest .....Merton Park.
Knight, Harry Herbert .....Rock Ferry.
Knowles, Charles Haley.....Cleckheaton
Laird, James Craigie .....Edinburgh
Lane, Harry Richard .....London.
Leach, Herbert .....Leeds.
Lenton, Walter Henry .....Thrapston.
Lewis, Arthur Daniel.....Pontypool.
Lord, Walter.....Dobcross.
Lowe, William Joseph .....Bridgnorth.
Lycett, Herbert .....Workington.
McAllan, John.....Aberdeen.
MacEwan, Archibald .....Glasgow.
McEwen, Duncan .....Dysart.
McKenzie, Donald .....Inverness.
McLaren, Arthur.....Dunkeld.
McLaren, William .....Perth.
MacLennan, Roderick .....Edinburgh
McMillan, James McMillan ...Glasgow.
Maitland, Allan Eaton .....Aberdeen.
Mander, Charles .....Coventry.
Mann, George Stephen .....Turriff.
Marshall, Robert.....Edinburgh.
Miller, John .....Kirkmahoe
Mitchell, William .....Glasgow.
Morgan, Alfred Houlston .....Rhayader.
Moultrie, George Briggs .....Eastleigh.
Nicol, Simon Soutar .....Dundee.
Norman, Charles Henry .....London.
North, Llewellyn.....Colchester.

Nuttall, John William Lord ...Oldham.
Oliphant, Joseph Ross .....Fraserburgh.
Ordish, Francis Prior.....Leighton Buzzard.
Paine, Frederick James .....Newport (Mon.)
Palmer, Ernest .....Bath.
Panchaud, Frederick .....Cambridge.
Pilgrim, Walter Ernest .....Northampton.
Pringle, Nicholas Dunn.....Newcastle-on-Tyne.
Quénet, George Alfred .....North Shields.
Raistrick, Frank Evan .....York.
Richards, John Vaughan .....Cardiff.
Roach, William Frederick .:Swindon.
Sayers, Stephen Percy .....Ardingley.
Sencicle, Fred .....Burringham.
Shellcross, John .....Chiswick.
Simm, John Nicholson .....Gateshead.
Simpson, John Forsyth .....Kinross.
Slack, Arthur Bernard .....West Bromwich.
Sletcher, George Harry .....Bedford.
Smith, Anthony Adrian.....Portsoy.
Spafford, Alexr. N. D. E. .....Hull.
Spink, Richard.....Gateshead.
Steel, Cecil Thomas ....Titchfield.
Swaffin, John Phillips..... ..Dartmouth.
Symons, William Heywood ...Ulverston.
Tanner, William Edward .....Cheltenham.
Taylor, Alexander Nicol.....Dundee.
Taylor, James Alfred .....Burnley.
Taylor, John Henderson .....Craigie.
Thomson, Peter .....Aberfeldy.
Trebilco, Arthur James .....Bristol.
Treharne, David .. ..Trecynon.
Turner, George.....Reddish.
Waters, Joseph .....Wooler.
Webb, Joseph John .....London.
Welch, James Henry .....Monmouth.
Whitby, Harold Cuthbert.....Widnes.
White, Francis.....London.
Whiting, William .....Hornsea.
Williams, Charles Alfred .....Falmouth.
Williams, Thomas Henry .....Swansea.

The questions set at this examination were published in the *Pharmaceutical Journal* for April 16, p. 850.

The following is a list of the centres at which the examination was held, showing the number of candidates at each centre and the result:—

	Candidates.				Candidates.		
	Examined.	Passed.	Failed.		Examined.	Passed.	Failed.
Aberdeen	18	10	8	Lancaster	3	3	0
Aberystwith	3	3	0	Leeds	16	7	9
Birmingham	15	7	8	Lincoln	14	5	9
Brighton	6	4	2	Liverpool	11	5	6
Bristol	11	4	7	London	45	14	31
Cambridge	6	4	2	Manchester	26	8	18
Cardiff	8	5	3	Newcastle-on-T.	13	9	4
Carlisle	6	2	4	Northampton	3	3	0
Carmarthen	5	3	2	Norwich	6	1	5
Carnarvon	2	1	1	Nottingham	12	5	7
Cheltenham	3	2	1	Oxford	2	1	1
Darlington	6	2	4	Penzance	2	1	1
Douglas	1	0	1	Peterborough	4	1	3
Dundee	20	10	10	Plymouth	5	1	4
Edinburgh	25	13	12	Sheffield	13	5	8
Exeter	10	3	7	Shrewsbury	2	2	0
Glasgow	20	9	11	Southampton	13	5	8
Hull	12	7	5	York	6	4	2
Inverness	3	1	2				

EXAMINATIONS IN EDINBURGH.

April, 1892.

Present—Messrs. Boa, Dott, Gibson, Jack, Kinninmont, Maben, Nesbit and Stephenson.

Professor Sir Douglas Maclagan attended on behalf of the Privy Council.

MAJOR EXAMINATION.

Four candidates were examined. *One* failed. The undermentioned *three* passed, and were declared duly qualified to be registered as Pharmaceutical Chemists:—

Grayson, John Henry.....Whitehaven.
Meldrum, Alexander .....Leith.
Williams, William Rees.....Carmarthen.

MINOR EXAMINATION.

Eighty-three candidates were examined. *Forty* failed. The undermentioned *forty-three* passed, and were declared duly qualified to be registered as Chemists and Druggists:—

Ballingall, Andrew Watson ...Glasgow.
Bamford, Harry .....Stalybridge.
Beath, Andrew Gibb .....Dollar.
Bell, William Smith .....Aberdeen.
Bickerton, Richard Exley .....Barnsley.
Carter, Henry .....Kendal.
Cass, John William .....Guisborough.
Chadwick, Milner Bright .....Manchester.
Cook, Robert .....Thornhill.
Corrigall, Peter ....Newcastle-on-Tyne.
Duffton, Robert .....Huntly.
Edward, George .....Musselburgh.
Freeman, Henry Swift .....Preston.
Gelling, William Clucas.....Douglas.
German, Charles MacKenzie...Kendal.
Gilderdale, Frederick.....Wakefield.
Guttridge, George Needham...Dewsbury.
Halmshaw, William .....Brigg.
Harrison, Ernest ... .Tranmere.
Helsby, Fred. .....Sheffield.
Holl, George.....London.
Inman, Joseph Henry..... ...Pitsmoor.
Keir, Charles .....Stirling.
Lawson, Frederick .....Workington.
Lonnon, Walter .....Sheerness.
Mackenzie, Thomas.....Inverness.
Michie, Alexander .....Hawick.
Mould, Charles .....Chorley.
Murray, Alexander .....Stirling.
Pattinson, Joseph .....Wigton.
Preston, James Bateson .....Oxenhope.
Raine, James Arthur .....Over Darwen.
Shennan, Robert James... .....Castle Douglas.
Simpson, Austin Johnson .....Castleton.
Simpson, James Wilson.....Perth.
Simpson, Robert .....Aberdeen.
Spence, Annie Young Wilson..Linlithgow.
Staward, Richard .....Berwick-on-Tweed.
Stevenson, Robert .....Kirkcaldy.
Tidswell, Foster .....Denholme.
White, William Henry .....Bolton.
Whitehead, John.....Manchester.
Wilkinson, William Franklin..Blackpool.

Parliamentary and Law Proceedings.

IMPORTANT DECISION UNDER THE PHARMACY ACT, 1868.

PROSECUTION FOR THE SALE OF A PROPRIETARY MEDICINE, CONTAINING POISON, WITHOUT A POISON LABEL.

Mr. John Thistlewood Davenport, of Great Russell Street, appeared at Bow Street on Saturday last in response to a summons taken out by Inspector Moore, at the instance of the Public Prosecutor, for not affixing a poison label to a bottle of chlorodyne.

Mr. C. F. Gill and Mr. Crayes appeared for the pro-

secutor, Mr. Poland, Q.C., and Mr. Besley (instructed by Messrs. Allen and Edwards) for the respondent.

Mr. Gill, in opening the case, said: In this case, sir, I appear on the part of the Public Prosecutor to support a summons that has been taken out against the respondent, Mr. John Thistlewood Davenport, who is a chemist carrying on his business at 33, Great Russell Street, Bloomsbury. The summons is framed upon the first part of sec. 17 of the 31 and 32 Vict., c. 121, which is known as the Pharmacy Amendment Act of 1868. It is alleged that he unlawfully sold by retail, at No. 33, Great Russell Street, certain poisons, to wit, opium and chloroform, contained in a preparation known as Dr. Collis Browne's chlorodyne, without distinctly labelling the wrapper of the bottle in which the poison is contained with the word "poison," in contravention of the 17th section of the Sale of Poisons and Pharmacy Amendment Act. That Act was passed for the purpose of regulating the sale of poisons, and for altering and amending the Pharmacy Act of 1852, and the earlier sections, up to the 15th section, deal with the examination and qualification of persons who should be entitled to act as chemists. The 17th section contains, in the first four lines of it, the offence charged against the present defendant. The Act was passed for the purpose of protecting the public with reference to this question of the sale of poisons, and in a case where a question of this kind was considered and judgment was given by Mr. Justice Hawkins he used the observation that nothing could be clearer than that the object of the Act was beyond all other considerations to provide for the safety of the public.

Mr. Poland: What is that case?

Mr. Gill: It is the case of the Pharmaceutical Society *v.* Wheeldon, in which Mr. Justice Hawkins gave judgment, which was, I believe, a considered judgment. He there makes the observation I have just quoted. There it was an action against an unqualified person in the employment of a chemist who was qualified for selling poisons, and it was there argued that it was unreasonable to suppose that a qualified chemist should at all times be present at the time that some poison was being sold, and that all the requirements of the earlier part of the section would be complied with without the actual presence of the person qualified, but in considering that case, and in delivering the judgment of the Court, Mr. Justice Hawkins deals with the Act generally; he deals with this 17th section amongst others, and makes use of that observation. Of course, there can be no doubt that the object of the Act was to protect the public. What is said here is that this chlorodyne, this proprietary medicine which is the property of Mr. Davenport, is sold without the protection to the public of having upon the outside cover of the bottle or upon the label actually on the bottle the word "poison," which is a protection and a warning to the public. I, in the first instance, desire to disclaim any intention whatever to question the merits of this preparation. That is entirely beside the question. Chlorodyne may be, and for anything I know it is, an excellent preparation, and it may for aught I know be a cure for all the complaints that are mentioned on the label. It is described as an invaluable remedy in coughs, colds, consumption, asthma, bronchitis, croup, fever, neuralgia, diarrhœa, dysentery, cholera, etc. For aught I know it may be an excellent remedy for all these complaints, but for the prosecution it is alleged here that being sold as it is it should bear, having regard to the ingredients of which it is composed, both upon the wrapper and the label on the bottle the word poison, so as to comply with this 17th Section of the Pharmacy Act, which says: "It shall be unlawful to sell any poison either by wholesale or retail, unless the box, bottle, vessel, wrapper or cover in which such poison is contained, be distinctly labelled with the name of the article and the word 'poison,' and with the name and address of the seller." The question how it is sold does not arise here, because what I am concerned with is the offence of selling this without the name of the article and the word "poison" on the wrapper of the bottle. Having made that interlocutory observation as to disclaiming any intention or desire to discuss the qualities of this preparation, what the prosecution contend for here is that upon the evidence which I shall place before you this is clearly an offence within this section, having regard to the poisons which are specified in part 2 of the first schedule to this Act, that is to say, that it is a medicine which contains chloroform and a preparation of opium. It will not be seriously contested—not contested at all in fact—that this preparation, which is known as Collis Browne's Chlorodyne, which I have no doubt is a very valuable preparation to Mr. Davenport, is sold largely throughout the country; sold not only by qualified persons, but sold by stores, linen drapers, chandlers, grocers, and people who now in addition to other business sell what are popularly known and called patent medicines, which are not patent medicines at all, but that is the general description under which they are known. Therefore it is an article that is sold freely, sold widely, sold without any sort of restriction, or without any care, or without any knowledge on the part of the party selling, of the nature of the article which they are selling. In consequence of matters which have come to the knowledge of the authorities, in relation to inquests and other matters—presentations of coroner's juries with regard to deaths by misadventure, or deaths of children—this matter has been directly brought to the attention of the public prosecutor and to the attention of the attorney-general, by letters from persons who have a knowledge of what has taken place within their observation, with the result that it was thought desirable to have a test case upon this question, and amongst the medicines that are sold in this way throughout the country, by the persons I have described—grocers, stores and other people—this preparation, which is called Dr. Collis Browne's chlorodyne, was selected, having regard to the quantity in this preparation of opium, and also the quantity of chloroform that is contained in it. The persons who actually sold would be liable under this section, the ordinary shopkeeper, the ordinary assistant who sold for his master would be liable; but upon consideration it was thought not desirable to proceed in the first instance against persons selling in that way without taking proceedings against the person who was the proprietor and manufacturer of the article which was the subject of the prosecution, because you can well understand that if we went to some small country town, or in any part of the suburbs, and bought from a grocer an article of this kind he would suppose from the fact of there being a Government stamp upon it, or from the fact of it being sold freely in other places, that he was doing that which was quite innocent. He could not be supposed to have any knowledge of what the contents of the bottle were, and although, as a matter of fact, it is well that it should be known that what is called the *mens rea* is not necessary for the purpose of constituting this offence, and that any ordinary vendor of an article of this kind would be responsible under the section, however ignorant he would be of the contents of the bottle he was selling, still having regard to the fact that without its being generally known that steps were taken against the actual proprietor it would be perhaps a little unfair to take steps against the ordinary retail vendors. We, therefore, had a purchase made from Mr. Davenport's own premises for the purpose of taking your decision under the section against him as the manufacturer and vendor, he being within the section which provides for an offence of this kind. Now, sir, what is said in the interests of the public by

this 17th section is that any bottle containing a poison, such as the poisons mentioned in this schedule—poison, of course, being one of the ingredients of the preparation, whatever it is—that it should be distinctly labelled with the word "poison." The object of that is that either the person who is taking the medicine should exercise great care and caution in using it, or what, perhaps, is still more important, should, in dealing with the bottle, place it out of the way, either of children, or persons who, attracted by the word "poison" on the bottle, might be disposed to take it, with the intention in some instances of taking their lives. The idea of putting such a label on such a bottle is obviously that the people should be warned themselves, and that they should protect the children in the house and protect other persons who might be liable to take advantage, or through negligence might be liable from any reason to take such a quantity of the contents of a bottle of this kind as might be very injurious. or might be, as it has been in many cases, fatal to life. I have said that the person selling this might suppose or might say, as in fact we know they have said, when the matter was mentioned, that they were selling something that had authority, something that was a patent medicine. The question of patent medicine does not arise under this section, because the protection that was given to patent medicines is dealt with under the 16th section; and no doubt when the Act was passed there were certain patent medicines which were then being sold where the ingredients were perfectly well known, where they were specified, where there there was a right which it was thought proper to protect at that time, and so protection was given to those existing rights. But it would be impossible to suggest that this was a patent medicine, even if it were contended that a patent medicine would be protected from the provisions of this section. This is simply a medicine which is sold with a Government stamp upon it, and any person who exposes for sale or sells a proprietary medicine is required to take out an Excise licence as provided for by 38 vict., c. 23, sec. 18. Then the 44th Geo. III., c. 98, sec. 6, sets out the kind of medicines that are required to bear a Government stamp. It mentions the medicines, drugs, herbs, pills, waters, essences, tinctures, powders, which are to be used or applied externally or internally as "medicines or medicaments for the prevention, cure or relief of any disorder or complaint incident to or in anywise affecting the human body, which shall be uttered or vended in Great Britain, where such packet, box, bottle, pot, phial, or other inclosure with its contents shall not exceed the price or value of 1*s.* 1½*d.*," and when it exceeds 1*s.* to 2*s.* 6d., 3*d.*, and so on upon a scale. Then there are other provisions with respect to the kinds of articles that are liable to the stamp duty; for instance, when any article is advertised, or advertisements issued either upon the bottle itself, or in the press where it is brought under the public notice that it is alleged that any secret preparation is a cure for some complaint or other. Then that is required to have upon it a Government stamp according to the value of the article sold, and amongst the articles which are liable to stamp duty are articles which "have at any time heretofore been, now are, or shall hereafter be prepared, uttered, vended or exposed to sale under the authority of any letters patent under the great seal." That is one of the matters mentioned in the schedule to the Act which would render the article sold liable to the stamp duty. This you may take it, sir, is what I may describe as a proprietary article made from some formula known to or acquired by Mr. Davenport, made by him and sold as a proprietary article and as an article which is represented to be a cure or a remedy or a desirable thing to take for these complaints that are mentioned on the label outside the bottle, the covering of the bottle, and also upon the label itself. Therefore Mr. Davenport would be a person who would be required to take out the Excise licence, and a person required by that statute to pay the stamp duty upon the bottles he sent out from his place. I only mention this because there is a confusion by persons who sell an article of this kind, and also in the minds of many members of the public who buy an article of this kind that they are buying something that is a patent medicine, whereas as a matter of fact it is in no sense a patent medicine; it is simply a nostrum, some compound invented or acquired by the person who manufactures or deals with it, and who if it is successful, or if it is sufficiently advertised or is actually a good remedy for the complaints it is recommended for, acquires a large sale and it is distributed all over the country, and unquestionably this particular article, Dr. Collis Browne's chlorodyne, is sold and distributed very freely.

Mr. Poland: To prevent my friend being under a misapprehension I may say that I am going to contend that it is a patent medicine within the meaning of section 16 of the Pharmacy Act, 1868.

Mr. Gill: I am much obliged to my friend for stating that, because I will draw his attention—and yours, sir—to the fact that it is provided by section 16, in the first words of the section, that "nothing hereinbefore contained shall extend to," amongst other things, patent medicines; and, therefore, the protection given by section 16, supposing this was a patent medicine—which I shall show it was not—and the onus of proving that it is a patent medicine will be upon my friend, to show that there were letters patent giving the exclusive right to Mr. Davenport, or to whoever was the inventor, to the sale of it, and setting out the ingredients it contains, as they are set out in the specification of every patent where a patent is granted for a medicine, or for any other invention; but apart altogether from that, I draw your attention to the first words of this section 16, which provides that "nothing hereinbefore contained," that is in the first 15 sections, shall apply to certain individuals who are there specified, or to persons selling patent medicines. But, however, it would not be desirable perhaps that I should discuss that question further at the present moment, until I have an opportunity of hearing my learned friend both on the evidence, as to whether he is going to give evidence that this is a patent medicine, and also on the construction which he puts or invites you to put on section 16. At present I shall confine myself to dealing with the offence created by section 17, which is an entirely new departure in the statute, the first fifteen sections dealing with the qualifications of chemists, the examinations, and so on, and provisions which would apply directly to chemists, then this section 17, applying to the sale by any person of a poison mentioned in the schedule.

The Magistrate: The second section refers to the schedule as defining what are poisons.

Mr. Gill: The first schedule and the second schedule.

The Magistrate: I mean the 2nd section of the Act; there are several articles named in the schedule.

Mr. Gill: That is so, sir. With regard to the 17th section the offence created by the first part of the section is with regard to the sale of any poison of any sort or kind; and then the section goes on to create further offences with regard to the sale of poisons contained in the first part of the schedule. Now, the course adopted in the present case was to purchase at Mr. Davenport's shop a certain number of these bottles. I propose to go back for an instant, with regard to the 16th section, and point out that, although there is a provision there that persons selling patent medicines are protected from certain offences created by the preceding section, there is no protection of any kind given in the 17th section to patent medicine vendors,

although there is protection given to persons who sell poisons, that is to say, the ordinary wholesale vendor of something that is a poison is protected by this section. I think my friend will have to meet those difficulties in dealing with the facts of this case. I do not for a moment think he will suggest that his client has the protection given by the 17th section to any person who is a wholesale vendor of poison, because he is only charged here with the offence of selling an article which contains a poison, which is a poison within the earlier part of that section, and which only requires that he should put the word "poison" on the bottle, not that he should be that which is required by the latter part of the section, that he should be a qualified person, that he should know who it was that he was selling to, that he should have practically an introduction to the person who was obtaining the poison, and that he should record in his book all the details of the sale of the poison to the individual so that the matter should be placed on record so that there might be a means of tracing the sale and ascertaining the circumstances under which it took place in the event of any unfortunate result occurring.

The Magistrate: That is a restriction only applying to preparations in the first part of the schedule.

Mr. Gill: That is so, arsenic, prussic acid, and so on.

The Magistrate: The constituents of this medicine are in the second part, I understand.

Mr. Gill: In the second part.

The Magistrate: Not in the first part.

Mr. Gill: In the second. The ingredients complained of are chloroform and a preparation of opium. Those are mentioned in the second part of the schedule. That is an outline of the case. No doubt it is one of very considerable importance. It is of considerable importance to the defendant, because I can well understand that he would oppose this case, because it would be most damaging or it might be most damaging to the sale of a popular drug of this kind, a popular remedy, if the word "poison" was put upon it; it might affect the sale, and that is the only ground upon which I can conceive his contesting the case, and the only ground on which I can conceive his objecting to put this warning to the public on the bottle. It does not affect the merits of the concoction that he is selling. It may be all that he represents it to be, and if taken carefully in the ten to thirty-drop doses out of the 1-ounce bottle, or 2-ounce bottle, or 4-ounce bottle it is sold in—if the greatest care is taken by the person who is using it, the best results may accrue to that individual. But upon the part of the public those who are instructing me have thought it right to, as far as possible, protect the public from the danger of the results of a mixture of this kind being sold widely by absolutely unqualified persons to people who are utterly and totally ignorant of the contents, and who would deal with a bottle of this kind as though it were perfectly harmless, regardless altogether of the small dose that is fixed as the proper dose for a person to take, so that either children or persons of weak mind, or persons with a tendency to suicide, or persons who require protection—because it is people of that kind who require protection—should be protected either by what they see or by the persons who are the purchasers putting out of their way what may be the means of doing them very serious injury, or of their losing their lives. On consideration of the whole of the facts, as I have said, it was thought not desirable to take steps against the ordinary retail vendor, but to make a purchase of Mr. Davenport himself. Accordingly, Mr. Moore, an inspector of the Criminal Investigation Department, on instructions from his superiors, went with Mr. William Williamson, a serjeant in that department, to Mr. Davenport's. Serjeant Williamson went in and bought six 2-ounce bottles of this chlorodyne and six 1-ounce bottles. The six 2-ounce bottles are sold at 4*s.* 6*d.*, but by buying six he seems to have got them for 4*s.* For the 1-ounce the price is 2*s.* 9*d.*; he bought them at 2*s.* 6*d.* He was asked by the person selling whether he was in the trade. He said that he was not; that he was buying them to send into the country. He was told that if he was in the trade he might have them cheaper. He paid the price asked for them, buying them in that way, and paid the sum of £1 19*s.* for the dozen bottles. Immediately the purchase had taken place Inspector Moore went into the shop, told the object for which the bottles had been purchased, secured them and retained them in his possession. Then on the 15th of March he handed them to Dr. Dupré, who was instructed to make the analysis in the matter, with the assistance of Dr. Paul, and they made an analysis of the contents of two of the bottles, taking two of the bottles and putting them together. Of course we have retained the other bottles in our possession. They agree as to what the result of the analysis is. It is described as a dark brown, slightly turbid and viscid liquor, smelling strongly of chloroform. It contains about 15 per cent. of chloroform and 2 grains of morphine to the ounce; that is putting it at an absolutely safe point. They are both of course poisons within the schedule, both chloroform and morphine, and the fact of chloroform being there would make the morphine more dangerous. The effect of the one upon the other would make them more likely to be injurious to the person taking it, and both Dr. Paul and Dr. Dupré will tell you that not only are they poisons within the schedule, but that a very small quantity indeed would prove fatal to an infant, and they will express an opinion to you as to what quantity of this would prove fatal in the case of an adult. But if they are poisons, if you are satisfied on the evidence that amongst the ingredients of this mixture there are those two poisons which are mentioned in the schedule, I shall ask you to say that this offence within the earlier part of the 17th section has been committed by Mr. Davenport, and that this concoction should be labelled with the word "poison" in order to give the protection to the public which it was contemplated would be given to it if the provisions of this Pharmacy Act were carried out to the letter. It is a matter of considerable importance—of more importance to the public than to Mr. Davenport—although I am far from attempting to conceal the fact that it is desirable in his interest that he should contest this matter. My learned friend has intimated that he is going to contend before you, and attempt to prove that the matter complained of is protected in some way by the Act, and that it is in fact a patent medicine. If that proposition is put before you I shall have to address you again, but at present I shall put technical evidence before you, and wait until I have heard my friend's view before addressing you further on the law.

The following evidence was then called:—

William Williamson sworn, examined by Mr. Gill: You are a sergeant of the Criminal Investigation Department, New Scotland Yard?—Yes.

On the afternoon of the 12th of February last did you go with Inspector Moore to 33, Great Russell Street?—Yes.

Is that the shop of the defendant, Mr. John Thistlewood Davenport?—Yes.

A chemist's shop is it?—Yes.

Leaving Inspector Moore outside, did you go into the shop, and did you there purchase six 1-ounce bottles?—Yes, and six 2-ounce bottles.

Of what is described as Dr. J. Collis Browne's chlorodyne?—That is so, sir.

Did the person from whom you bought ask you any questions?—He asked me if I was in the trade. I said "No;" he said, "If you were I would let you have it

cheaper." I told him I wanted it for a friend in the country.

Did he make up the bottles in a parcel?—Yes.

Did he give you this invoice? [Producing same]—Yes.

Having completed the purchase, did Mr. Moore come into the shop?—He did.

Mr. Gill: This is the invoice: "London, 12th February, Dr. to J. T. Davenport, manufacturing chemist, 33 and 34, Great Russell Street, to Dr. J. Collis Browne's chlorodyne, half-a-dozen 2*s.* 9*d.*, 2*s.* 6*d.*, 15*s.*; half-a-dozen 4*s.* 6*d.*, 4*s.*, £1 4*s.*, £1 19*s.* Received February 12, 1892, John T. Davenport per J. Sherburn." There is a provision I did not mention to you, sir, that a sale by a servant is the same as a sale by the proprietor.

Did you hand to Mr. Moore the two parcels?—I did.

Henry Moore sworn, examined by Mr. Gill: You are an inspector of the Criminal Investigation Department, New Scotland Yard?—Yes.

You have had the conduct of the inquiries that have taken place with regard to these proprietary medicines?—I have.

On February 12, 1892, did you go with the last witness to Mr. Davenport's shop at Gt. Russell Street?—I did.

Upon your instructions he made the purchase he has mentioned?—Yes.

The purchase having been made did you enter the shop and receive from him the parcel and the invoice? I did.

Did you speak to the assistant there, I think a Mr. Sherburn?—Yes.

What did you say to him?—I told him who I was, and that the purchase had been made for the purpose of analysis, as it was considered by the Treasury authorities that the ingredients came within the Pharmacy Act, 1868.

Do you produce here the bottles except those that you handed to Dr. Dupré?—Yes, the remainder of them.

Neither wrapper, bottle nor label contains the word "poison"?—No.

On March 15 did you hand to Dr. Dupré at the Westminster School of Medicine two of the 2-ounce bottles of chlorodyne?—Yes.

Were they marked "O" and "OO" and with your name?—My name and rank.

I think on March 17 you handed him a 1-oz. bottle?—Yes.

Marked with "OOO?"—Yes.

Before you purchased from Mr. Davenport you had purchased from ordinary tradesmen?—I had.

Cross-examined by Mr. Poland.—Have you one of the unopened bottles here?—Yes.

[a bottle was produced.]

They were all like this, sealed up with the Government stamp outside?—Yes.

I see the trademark is the name of the article, "Dr. J. Collis Browne's Chlorodyne, sole manufacturer, J. T. Davenport, operative chemist and pharmaceutist to the Duke of Cambridge," and the address, 33, Great Russell Street, Bloomsbury; "None genuine without the name Dr. J. Collis Browne on the Government stamp"?—That is so.

You have opened one, I suppose. Inside, when you open the bottle—I may see one, I suppose—you destroy the Government stamp by opening it—there is a description on the bottle inside?—Yes.

I will just get that [opening the package.] There is a label on the bottle inside and "an infallible remedy for coughs"—as my friend read it—"colds, consumption, asthma, bronchitis, croup, fever, neuralgia, diarrhœa, dysentery, cholera," etc. Then there is the dose to be taken: 10 to 30 drops to be taken in one glass of water every three or four hours, until relief is effected. Then there is the name and address again?—Yes.

Then inside—I want you to see this, sir—there is this paper?—Yes.

There is inside a paper which is the one produced?—Yes.

Mr. Poland: My friend Mr. Gill has one and I have one; perhaps Mr. Alexander will kindly mark that as the one enclosed in all these bottles. Amongst other things you will see—I will not read the whole of it now—a description of it by name, and the original manufacturer and vendor of it, and the date 1848 referred to its use. Then there is the dose, the description of the scale of infantile doses and upwards, in the body about the centre, and then there is the name and address again, and then the description of the use made of it, which is said to have been on these occasions of considerable benefit.

Re-examined by Mr. Gill: Have you read this?—I have read it.

Do you find that it is described as a remedial agent which has been found to succeed in a few doses where, amongst other things, morphine, chloroform, and other preparations have produced no curative result whatever?—Yes.

Mr. Poland: "It has been found to succeed even in a few doses where quinine"—take the whole sentence.

Mr. Gill: I said, amongst other things, I have only extracted two.

Mr. Poland: I am not complaining, only I think you should read the whole. "It has been found to succeed in even a few doses where quinine and 1½ dr. doses of iron, morphine, chloroform, prussic acid, and all the powerful pharmaceutical preparations produced no curative result whatever, a fact which at once established its repute as one of extreme utility to all classes of the people."

Dr. August Dupré, sworn, examined by Mr. Gill.—What are you, Dr. Dupré?—I am Professor of Chemistry at the medical school, Westminster Hospital.

You have had large experience as an analytical chemist?—Very large.

I think you were instructed by the Treasury authorities in this case to make certain analyses?—I was.

On the 15th of March last did Inspector Moore hand you two 2-ounce bottles of this preparation, called Dr. J. Collis Browne's chlorodyne?—He did.

Similar to the one now shown you?—Yes; only that is the smaller quantity. This is the bottle.

They were marked as Mr. Moore has described?—Yes.

Did you in the presence of Dr. Paul mix the contents of the two bottles?—Yes, on the 18th of March.

Did you give to Dr. Paul 2 ounces of the liquid?—Yes.

And retain two yourself?—Yes.

Did you afterwards make a careful analysis of this liquid?—Yes.

With respect to your examination and analysis what do you say as the description of the contents of the bottle?—I got 15 per cent. of chloroform out of it, and rather more than 2 grains per ounce of morphine.

Chloroform is one of the poisons mentioned in the second part of the schedule to the Pharmacy Act?—Yes, it is.

What is morphine?—Morphine is the active alkaloid of opium. The chief active ingredient.

Would you describe that as a preparation of opium? The second part of the schedule says, "opium and all preparations of opium or of poppies." What do you say as to morphine?—Morphine is certainly a preparation of opium.

Is morphine a dangerous poison?—It is very dangerous in some cases.

Would the presence of chloroform increase the dangerous qualities of the morphine?—It would to some extent, no doubt.

What quantity of morphine might prove fatal in the

case of an infant?—$\frac{1}{20}$ grain has proved fatal in the case of an infant.

What should you say with regard to the case of an adult?—$\frac{9}{10}$ of a grain is the smallest dose on record that has proved fatal.

I think afterwards Mr. Moore handed you one of the 1-ounce bottles?—On March 17.

Did you carefully analyse the contents of that bottle also?—I did.

What percentage of chloroform did you find?—I am under the impression that it was 20 per cent., but I am not quite certain. I did not bring my notes.

We have your report?—I was informed we should only deal with the 2-oz. bottles. I did not look up the result.

You know the results?—Yes, I think it was 20 per cent., I am not sure.

Do you know what quantity of morphine?—A little more than two grains of morphine to the ounce.

Cross-examined by Mr. Poland.—I suppose, Dr. Dupré, besides chloroform and morphine there were other ingredients?—Certainly.

Do you know what those are?—I do not. Oil of peppermint is one.

Were there others?—I believe there is a little capsicum.

Do you know from your analysis. Can you say certainly that there was some oil of peppermint?—Yes, certainly.

Are you certain with regard to that?—It smelt of peppermint strongly. But I may say at once that I did not analyse carefully, except for chloroform and morphine.

I am not complaining; you only analysed for the morphine and the chloroform?—Yes.

Did you not analyse for anything else?—No.

There are other ingredients?—No doubt.

Several others?—Several others.

Five or six?—I do not know at all. It is a very complicated mixture.

There may be as many as four or five other ingredients?—There may be.

As a medicine can you say to what extent those would control the action of the morphine and the chloroform?—No, without knowing what they are I cannot tell. I only know from what is published; not from personal knowledge.

Speaking from personal knowledge you do not know—you are in a high position as a chemist, and I want to get it as your own knowledge. You are not a medical man, you are a chemist?—I am chemist and toxicologist.

You do not practice?—I do not practice medicine.

You have known this Dr. Collis Browne's chlorodyne as a common article sold for the last forty years?—I do not know it as long as that, but I have known it a great many years.

As long as you can remember?—Yes.

I forgot, you would not go back as long as forty years, but as many years almost as you can remember?—Quite so.

As a common article sold like other patent medicines under the name of chlorodyne?—Yes.

And in common parlance all this description of medicines are called patent medicines, I think?—They are commonly called so.

Do you know a single medicine of the present day that is actually the subject of an existing patent?—I do not; in fact, patents are avoided, because if you took out a patent you must give the ingredients.

Oh, we know the patent law of specification. If a man takes out a patent for anything, say for a steam engine, it must be disclosed in the specification; so that when the patent runs out, the world may have the benefit of the invention?—Quite so.

Do you know a single medicine which was the subject of an existing patent in July, 1868?—I do not remember any.

Re-examined by Mr. Gill: You said you did not know of patent medicines existing in 1868. You do not know one way or the other, do you?—No, I do not.

There is a very useful little book, called Alpe's Stamp Act, which mentions that. You tested, of course, for poisons; your analysis was for the purpose of ascertaining what proportion of morphine there was?—Quite so.

The Magistrate: How many grains are there in an ounce?—437½.

Mr. Gill: Might I ask a question on that. How many doses would there be in a 2-ounce bottle?

Mr. Poland: What sort of dose; an adult or infant?

Mr. Gill: How many 10-drop doses?—About eighty doses of 10 drops in a 2-ounce bottle.

My friend asked you with regard to the other ingredients whether you know what the effect of other ingredients would have on the morphine or chloroform; whether they would lessen the poisonous effect.

The Magistrate: He said he did not know.

Dr. Benjamin Horatio Paul, examined by Mr. Gill: What are you, Mr. Paul?—A chemist.

What is your qualification?—A Fellow of the Institute of Chemistry.

Have you had large experience as an analytical chemist?—Yes.

Did you on the 17th of March receive from Dr. Dupré 2 ounces of this preparation called Collis Browne's chlorodyne?—On the 18th of March I did.

Did you analyse it for the purpose of ascertaining the quantity of morphine?—Especially for the presence of morphine.

What quantity of morphine to the fluid ounce did you find?—Exceeding 2 grains.

Do you agree with Dr. Dupré that a very minute dose would prove fatal in the case of an infant?—Certainly, according to all established authority.

You did not ascertain the quantity of chloroform, but were you conscious of its presence?—Yes, it was palpably present.

It is one of the preparations of opium mentioned in the Pharmacy Act, morphine?—Morphine is a constituent of opium, and this preparation may be described either as a preparation of opium or as a preparation of morphine.

Either description would describe it. It could either be described as a preparation of opium or of morphine?—Yes.

In the other constituents of the mixture was there anything that would lessen the poisonous qualities of the morphine?—Not that I am at all aware of.

Nothing that you as a chemist know of?—Nothing at all. There is a small quantity of hydrocyanic acid present—a small quantity of prussic acid.

The Clerk: Do you mean that they are synonymous—hydrocyanic and prussic acid?—Yes, they are the same thing.

Mr. Gill: There is nothing you as a chemist could suggest as an antidote in the mixture?—No, nothing at all.

Cross-examined by Mr. Poland.—In your analysis you did not ascertain how much chloroform there was?—I did not try to.

You did not try, and therefore you did not succeed?—I was not instructed to.

You did not find out how much chloroform there was?—No.

You only tested for the morphia?—Morphine.

For that alone?—Yes.

You cannot say at all what the other ingredients were?—According to general repute and general knowledge——

From your personal analysis—not general repute—

did you find out what the other ingredients were?—I made no analysis of the other ingredients.

You have known, of course, this chlorodyne in the chemical and medical world for years and years?—Oh, yes.

Dr. Collis Browne's chlorodyne?—Oh, yes, a long time.

How many years?—I dare say forty.

During all that time it has been sold to the public?—It has, I believe.

Do you know of a single medicine which is the subject of an existing patent?—I cannot tell you one, but I can say that there are a great many patent medicines at the present day.

Can you tell me one?—James's powder is a patent medicine.

An existing patent. James's powders go back almost to the beginning of the century?—Quite so.

An existing patent?—There are some.

Do you know one?—I cannot tell you one. By reference to the Patent Office that can be ascertained.

Or a single medicine which was the subject of an existing patent in 1868?—No doubt there were.

But you do not know of one?—I do not.

Re-examined by Mr. Gill: You have been asked whether you have known the use of chlorodyne for a great many years. Have you known of fatal results occurring from taking it?—They have been of frequent occurrence.

Is that matter of common knowledge?—It is.

Without stating what the specific ingredients were as to quantity of other ingredients could you say from the result of your analysis what the character of the other ingredients were?—The other ingredients, from general observation, I should say, were chloroform, which was very distinctly present, a small quantity of prussic acid, some sugar, and hot spice.

Mr. Gill: That is the case, sir.

Mr. Poland: In this case the prosecution on the part of the police is a somewhat remarkable one. Upwards of forty years ago, this medicine—which I venture to call a patent medicine, which was originally a prescription of Dr. Collis Browne, who was a properly qualified medical man, as stated in the paper before you, was prepared, and to that he gave the name of "chlorodyne," and it has been known as a patent medicine, as a protected medicine, which no other person can make and sell, for over forty years. Now we come to 1892, the Act of Parliament in question under which these proceedings were taken having passed in July, 1868, and the present owner of this valuable property is brought before you, on a summons in this court, for an infringement of what I venture to call the salutary provisions of this statute. Of course, having done this openly and above board and known to the medical world and the chemical world and the Treasury authorities, for the first time this defendant is said to have infringed this statute. Well, sir, if he has infringed it, of course, notwithstanding these circumstances, he must, like all other persons, be made amenable to the law; but I venture to submit to you with very great confidence, he has not infringed the statute. Of course, like other of Her Majesty's subjects, he must obey the law. Now, sir, the summons is for the sale of poisons which are prohibited by this Act of Parliament from being sold, unless there is put upon the bottle containing those poisons the word "poison;" and my friend Mr. Gill suggested, that which is most important, that there should be put upon these bottles the word "poison," so that if anybody wants to commit suicide, they may know what to take, because that is what in plain language my friend's statement comes to. He says it is most important that people who have this stuff in their possession should know that it is poison, and that by that means they may know that it is a thing which if they take beyond what is described in the paper as the proper medicinal dose they may take it and they may commit suicide. I should have thought that it was very much better to let it be undescribed as a poison, and let it be known as a medicine, because if a thing is described and known as a medicine nobody would take it unless as a medicine for the purpose of relieving pain and removing disease. I should have thought if there was a way of keeping persons from taking anything that was injurious, who ought not to take it, the best way would be to describe it, as this is described and known, as a medicine, because we all, except when we are obliged to take it, shrink from having anything to do with medicine, more particularly young persons who, if there is anything they hate more than another it is anything in the shape of medicine. Now let us see if the statute has been disregarded. I think you will be of opinion that this question is one of very great importance. My friend says from his point of view it is of very great importance to the public, and I think it is also of very great importance to my client, and to all persons who have for years and years dealt in similar articles. In the first place I am not desirous of contesting the question that if a man sells a poison which is as defined by Part 2 of the schedule of this Act of Parliament, which in terms mentions chloroform, opium, preparatious of opium and poppies, that he does not the less sell poison because those two things are mixed together. I do not for a moment contend anything so ridiculous or absurd as that. But you have here a mixture of an occult nature which consists of chloroform, of a preparation of opium, and it consists, according to the last witness, although Dr. Dupré did not mention it, of a little prussic acid, and as Dr. Dupré said there are several other ingredients in it—oil of peppermint may be one—but what the other ingredients are he does not profess to state, because he does not know. He did not analyse for anything, but for morphine and chloroform. Dr. Paul also said that there was sugar and hot spice, but the other things he had not analysed for, and did not even know the amount of chloroform which was in this stuff. He said so far as his evidence was concerned that he was satisfied with finding that there were 2 grains of morphine to the fluid ounce. Now of course I am not going to let every person in the world know what is the real composition of this medicine. It is a preparation originally of Dr. Collis Browne's which has descended to members of his family, and Mr. Davenport is one of the proprietors, another member of the family being another. They are in possession of this valuable medicine, which is a very valuable property, and which no person can make or sell under the name of chlorodyne without having an injunction at once moved for against him. For it is not only a patent medicine sold under a Government stamp but it is a protected medicine, because no person can infringe the trade mark or the name of another person, and this is known and the article is sold under the name of "chlorodyne" by the owner of the article and no one else can sell it, You will no doubt hold, there being in this medicine morphine and chloroform, a mixture of the two, that *primâ facie* that is a poison within the meaning of the Act, because there are two of the articles which are mentioned in Schedule 1, part 2. But now, sir, the next question is whether this Act in any way applies to this article which is known as "chlorodyne." What I want to point your attention to, sir, is this. That it is not merely putting the name of "poison" on the bottle; but if this cannot be sold, if this is within section 17, every person who sells it must not only have on the bottle the word "poison," but it must be labelled with the name of the article, the word "poison," and the name and address of the seller of the poison. So that there are two things here

if my friend is right, and you hold that this is contrary to the law. The whole of the first part of section 17 applies and the proprietor in future must put on the word "poison," and every retail dealer must, when he sells that article, also put on his name and address. I will establish that by authority. Of course, in trade that is a very inconvenient thing, because the name and address is on the actual label of the bottle, and must be to comply with this on the bottle itself, and the name is J. T. Davenport, with his address, 33, Great Russell St., Bloomsbury, on the bottle. If, therefore, this comes within the Act, and is liable to be considered and dealt with as a poison, there must be put on by the vendor of each bottle the name and address of the actual vendor. It must be on the box, bottle, vessel, wrapper or cover in which the poison is contained. That is established by the case of Templeman *v.* Trafford in the 8th Queen's Bench Division, 397.

Mr. Gill: I do not contest that. I say it must be so.

Mr. Poland: There the actual retailer was convicted because his name and address were not on it, but the name and address of the person from whom he got it, which would be here the name and address of Mr. Davenport. That is a matter, having regard to this being a medicine wrapped up with all this on, which would be very inconvenient if that had to be done. Now, sir, the next thing I submit is that this Act does not apply to this article, because it is a patent medicine. My friend said a patent medicine only referred to a medicine which was the subject of some existing patent. I venture respectfully to entirely contest that proposition. A patent medicine within the meaning of this Act does not mean a medicine that at the time the inquiry takes place is the subject of an existing patent. Whether it is the subject of an existing patent, or whether it is the subject of a patent that has expired, and is made under a specification that was once a patent and protected, or whether it was one of these occult nostrums which are sold and known to the world as patent medicines, I venture to submit to you, and I will give you reasons for it directly, that a patent medicine within the meaning of section 17 means every medicine for the making and selling of which it is necessary there should be a Government licence and a stamp attached to it, and of course a licence to the seller.

The Magistrate: Do you say, Mr. Poland, that it is the Government imposing the stamp and licence on the seller that constitutes it a patent medicine?

Mr. Poland: Yes, sir. If you have this book before you, at page 53 you will see that the first statute, 42 Geo. III., c. 56, sec. 6, dealt with the licence to sell these articles which I call patent medicines or proprietary medicines. In this statute one of the provisions is that there must be a licence obtained for the purpose of selling these articles, and attached to this statute there is a schedule, in which there are a number of these articles referred to. Then there came the 52 Geo. III., c. 150, and next there is a schedule of articles which required a licence to sell and also the Government stamp. There is now a definition added to the end of the schedule, which, for the first time, deals with occult nostrums and things which are the subject of patents. If you look at that, you will see all the things mentioned by name, and then comes the general description, which you also find at page 53 of Mr. Alpe's book: "Pills, powders, lozenges, potions, cordials;" he goes through a large number of things—"to be used or applied, externally or internally as medicines or medicaments for the prevention, cure or relief of any disorder or complaint incident to or in any wise affecting the human body, made, prepared, uttered, vended or exposed to sale by any person or persons whatsoever wherein the person making, preparing, uttering, vending or exposing to sale the same hath or happen to have any occult secret or art for the making or preparing the same, or hath or happen to have any exclusive right or title to the making or preparing the same, or which have at any time heretofore been, now are, or shall hereafter be prepared, uttered, vended or exposed to sale under the authority of letters patent under the great seal, or which have at any time heretofore been, now are, or shall hereafter be by any public notice or advertisement, or by any printed papers or handbills, or by any written or printed papers or handbills, or by any label or words written or printed, affixed to or delivered with any packet, box, bottle, phial or other enclosure containing the same, held out or recommended to the public by the makers, vendors or proprietors thereof as nostrums or proprietary medicines or as specifics or as beneficial to the prevention, cure or relief of any distemper, malady, ailment, disorder or complaint, incident to or in any wise affecting the human body." Under that my client has got the licence which is called the stamp medicine licence. There is a statute afterwards under which the annual premium is reduced.

Mr. Gill: I think that Act provides that an Excise licence has to be taken out.

Mr. Poland: Here is the licence itself which gives power on the payment of 5*s.* annually to sell, and then on the back of it is the part taken from the statute which relates to what are termed proprietary medicines. Now, sir, comes the question: Dr. Dupré says these medicines are known as patent medicines. My friend Mr. Gill says no, although they come within the Act, so far as the licence is concerned and so far as the stamp is concerned, nevertheless they are not patent medicines unless they are actually the subject of an existing patent. I think I shall satisfy you beyond all question that that cannot be so, for this reason, that section 16 says that "nothing hereinbefore contained shall extend to or interfere with the business of any legally qualified apothecary or of any member of the Royal College of Veterinary Surgeons of Great Britain, nor with the making or dealing in patent medicines, nor with the business of wholesale dealers," and so on. Then comes section 1 of the Act. If this is not a patent medicine it cannot be sold by anybody, except a qualified chemist, because section 1 says: "From and after December 31, 1868, it shall be unlawful for any person to sell or keep open shop for retailing, dispensing or compounding poisons, or to assume or use the title chemist and druggist, or chemist or druggist, or pharmacist, or dispensing chemist or druggist in any part of Great Britain, unless such person shall be a pharmaceutical chemist or a chemist and druggist within the meaning of this Act and be registered under this Act, and conform to such regulations as to the keeping, dispensing, and selling of such poisons as may from time to time be prescribed by the Pharmaceutical Society with the consent of the Privy Council." Therefore, if a patent medicine is a poison within the meaning of this Act, then it cannot be sold except by a qualified chemist or druggist.

The Magistrate: You mean a proprietary medicine.

Mr. Poland: Or a patent medicine. The words in the exception are, "making and dealing in patent medicines." If any proprietary medicine or a patent medicine is a poison which comes within section 1, then section 16 was intended to show that all these things which are sold under the licence and under the stamp, and sealed up as being some secret preparation or the subject of a patent are all described by the general term "patent medicines." It is perfectly absurd that a thing which is to be sold under a licence, and with a Government stamp to it, and sealed up so that it cannot be opened with-

out breaking the stamp, which is known in common parlance as a "patent medicine," that a thing of that kind cannot be sold, although it is a poison, except by a pharmaceutical chemist. It seems to me obvious that in section 16 those words were put in not to apply merely to a thing that was the subject of an existing patent, but to that which was generally known at the time the Act passed as being a "patent medicine." It seems to me perfectly clear that it never was the intention of the legislature in section 1 to include a thing of this kind, which is generally known as a patent, whether a proprietary medicine or a patent medicine, actually by reason of there being an existing patent—that the object of section 16 was to take out of the Act, although a poison, all articles which are "patent medicines." I contend that a patent medicine is not a thing which is the subject of an existing patent, but that which is generally known and treated on the same footing as a medicine actually patented, viz., those articles which are described in the Act of Parliament, and in page 53 of Mr. Alpe's book, viz., these nostrums in the preparation of which there is something occult, all those which are described in that page 53. If I am right with regard to that it seems to me manifest that that was put in for that very purpose. Section 2 gives a definition of a poison. A poison within the meaning of this Act shall mean all articles which are in the schedule, parts 1 and 2, and in the same way when I come to section 16 that also takes out of the hereinbefore mentioned provisions, one of which is the provision defining poisons, patent medicines. Therefore I conclude that the Act of Parliament does not apply to articles the subject of existing patents, but that "patent medicine" means that which is generally known and understood as a patent medicine, in other words, those articles which are sold under a licence for which a stamp is required, which are described in the passages in the statute relating to this matter. If it is not so it is perfectly obvious that it will be requisite not only that the word "poison" and the name and address of the actual seller should be put upon the bottle, but the actual seller must be a person who is a qualified chemist. I say this is perfectly obvious when you come to consider the few medicines which are actually patented, and it was well known at the time of the passing of the Act that there were hundreds, not dozens, but a very much larger number of articles which are known as patent medicines. That is the whole of the case. I submit, therefore, taking it that you will find *primâ facie*—without calling evidence for the purpose of rebutting that which has been given so far by the witnesses on the part of the prosecution—that there were two ingredients which are two of those described in Part 2 of schedule 1, and that those two are poisons, that nevertheless, although they are poisons, being part of a proprietary medicine, which I say is a patent medicine, it is no offence under this Act of Parliament to omit to put on the bottle the word "poison," or to omit to put on the bottle the name and the address of the actual seller. Unless it were so it would lead to this ridiculous result, that chlorodyne could never be sold —your decision must go to that extent—by any person unless he were an actual chemist and druggist or pharmaceutical chemist within the meaning of section 1.

The Magistrate: What injury would that do?

Mr. Gill: I agree with every word my friend Mr. Poland says. I contend for all these propositions.

Mr. Poland: That every patent medicine should be sold by a qualified man?

The Magistrate: Every proprietary medicine.

Mr. Gill: If it contains poison.

Mr. Poland: I should have thought the very object of putting in these words was to show that the Act was not intended to apply to these. They are all made up, corked, sealed, and delivered across the counter. What is the necessity of the person who sells that thing, being a pharmaceutical chemist or a chemist and druggist within the meaning of the Act? They are sold, known by the Legislature to be sold, in numbers of shops, stores, by grocers, and general dealers. They are not things which are either compounded, or prepared, or dispensed, but they are things which are simply known by a name and having a reputation as a patent medicine, handed across the counter and exchanged for money. It is immaterial that the person who hands the thing across the counter which is exchanged for money should be a qualified chemist. That is the argument on the part of the defendant, and he absolutely disavows any intention to, in any way, break the salutary provisions of this Act of Parliament. He and all others up to this time have always considered that they were exempt from the provisions of this statute. They have done what they have done uninterruptedly, and certainly have up to this moment carried on business by selling this article, and until these proceedings he never questioned in any way that he was bound by the provisions of this statute. The case is of course to him and to other owners of proprietary medicines very important indeed, and probably whichever way you decide this case you will give the opportunity of having it reviewed by the High Court. Of course there is nothing secret; nothing initially wrong done. That you can well understand, and I am not of course entitled to go into the question of whether this is a useful medicine as it is stated in the paper before you. I prefer to keep myself strictly to the legal question, and I submit that under this Act of Parliament no offence has been committed by Mr. Davenport.

Mr. Lushington (the Magistrate): It seems to me that the whole question in this case is whether this article is a patent medicine or not. That is the simple issue. I understand that whichever way I decide the parties would desire to take the case up to a higher court, and I quite agree that it is very desirable that that should be done. It appears to me that Mr. Poland's argument is that the term "patent medicine" in the section is equivalent to proprietary medicine, and that there is no need whatever that a medicine should be legally the subject of a patent, that any letters patent should have been issued or any specification drawn up. I do not think I should confine the term "patent medicine" to such medicines as are actually protected by existing patents, but I should take the definition out of the statute 52 Geo. III., which Mr. Poland quoted, "which had at any time heretofore been, now are, or shall hereafter be prepared, uttered, vended, or exposed to sale under the authority of any letters patent under the great seal." I take it that is the real and full definition of a patent medicine. It is quite clear that in the schedule there is a distinction drawn between that and other nostrums, as they are called, although they are both subject to the necessity to take out a licence and stamp. I shall hold that it is undoubted that poison has been sold by Mr. Davenport, and that poison has been sold without the box or wrapper being distinctly labelled with the name of the article and the word "poison." I shall hold that the exception, in the 16th section, which says that "nothing hereinbefore contained shall extend to or interfere with the making or dealing in patent medicines" does not apply, and that the defendant is liable under the Act. What costs do you ask for, Mr. Gill?

Mr. Gill: The penalty is £5.

The Magistrate: Yes; the penalty is £5.

Mr. Gill: And five guineas costs.

The Magistrate: Yes; five guineas costs.

Mr. Poland: We will give formal written notice of appeal.

The Pharmaceutical Society v. W. H. Dumble.

In the County Court of Cornwall, holden at St. Columb on April 29, before his Honour Judge Granger, the Council of the Pharmaceutical Society of Great Britain sued William H. Dumble, assistant to the St. Columb Drug Company, Limited, Fore Street, St. Columb, for two penalties of £5 each for having sold poison (laudanum and oxalic acid) contrary to the provisions of the Pharmacy Act, 1868.

Mr. C. W. Langley Flux represented the Council.

Mr. Murray, of St. Columb, appeared for defendant.

On the case coming on, Mr. Flux, after drawing his Honour's attention to the preamble and general provisions and the sections of the Act, and after pointing out that the Annual Register (a copy of which his Honour had had handed to him) was by the Act made evidence, said the present proceedings were taken to recover two penalties of £5 each incurred by the defendant (he not being a duly qualified and registered person within the meaning of the Act) for having sold on two different occasions poisons contrary to section 15 of the Pharmacy Act, 1868. The first penalty was incurred by the defendant on February 26 last, when he sold a preparation of opium, to wit, laudanum, and the second penalty was incurred on the 1st March last, when he sold to the same purchaser two poisons, to wit, laudanum and oxalic acid. With his Honour's permission he would not deal further with the statute then but call his witnesses.

Frederick Samuel Tripp, examined by Mr. Flux, said he had called at the St. Columb Drug Company, Limited, on the 26th February, and had asked to have a preparation containing laudanum made up. He had not got the prescription with him in court. The defendant made it up and handed it to him in a bottle without any label on it. He told the defendant that he had children at home and wanted the bottle properly labelled. The defendant labelled it with a label indicating that the contents were poisonous. He took the bottle home and locked it up in an iron box. The bottle now empty —the contents having all been used for the purposes of analysis—was handed to witness; who, identifying it, said that he had himself put a mark upon it before locking it in the iron box. On March 14 he again called at the drug company's and again obtained a bottle of the same liniment, and in reply to a question from the defendant, said that it was for rheumatism. The bottle had no label on it. The empty bottle was handed to witness, who at once identified it, and continuing, said that he also asked the defendant for some oxalic acid, which the defendant sold to him, and which bore a label with the words "Oxalic Acid—Poison." Both these purchases he took home and locked up in the iron box with the previous purchase. Before doing so, he carefully put on each purchase his own mark for identification. (The packet containing the oxalic acid was handed to witness, who at once identified it.) He did nothing further with the purchases, until acting upon instructions he handed them to Mr. Moon. The errand-boy had told him that the person who sold him the things was Mr. Dumble.

Cross-examined by Mr. Murray: He had made the purchases upon the instructions of the Pharmaceutical Society. He had made the purchase of February 26 at 2.30, those of March 1 at 3.30. Neither bottle was sealed by the defendant. He had in no manner tampered with, or in any manner interfered with, the contents of the bottles. He had kept them locked up exactly as he had purchased them, until on March 24 he handed all the purchases to Mr. Moon, at Bodmin Road station; Mr. Moon being, he was informed, returning from Penzance to London. He had kept the purchases he made on March 1 in his pocket all the afternoon. When the purchases were made, he did not say that they were for the purposes of analysis. His instructions were to purchase and retain them untouched, until further instructed. This he had done.

His Honour: I have only one question to ask. Are you certain the defendant is the man who sold you those things?

Witness: Yes, your Honour, I can swear that it was the defendant, that man straight in front of me. I swear it positively.

Mr. Harry Moon, examined by Mr. Flux, said that on March 24 the last witness had handed to him, at Bodmin Road Station, a package containing the two bottles and the packet of oxalic acid which he now identified. On his arrival in London he opened the package and sealed the tops of the two bottles, and had retained the bottles and the packet of oxalic acid under lock and key until he handed them to Mr. Eastes for the purpose of analysis on April 26.

Cross-examined: He had in no way interfered with the contents of the bottles or packet, and had done nothing but seal up the bottles to prevent possible leakage.

Mr. Ernest J. Eastes, examined by Mr. Flux, said that he was an analyst and was assistant to Professor Attfield at the Pharmaceutical Society's House in Bloomsbury Square. The last witness (Mr. Moon) had handed to him on April 26 the two bottles and the packet with the label "oxalic acid, poison," for the purpose of analysis. He had made careful analyses of the contents of both bottles, being for that purpose obliged to use the whole of the contents of both bottles, and he found that both of them contained laudanum. He had also analysed the packet labelled "oxalic acid, poison," and found that the contents were, in fact, oxalic acid. He had retained the bottles and the packet, and had brought them with him, handing them direct to Mr. Flux when the purchaser was in the witness box.

Replying to Mr. Murray, Mr. Eastes said that laudanum was a preparation of opium.

Mr. Flux said that that was his case.

His Honour asked for the purchases to be handed up to him, and after carefully looking at the bottles he mentioned that though all three purchases were made at the same place one was not labelled at all, and the labels on the other two bore different names, one of which was of a Mr. Williams at Gateshead-on-Tyne.

Mr. Murray, in opening his case for the defendant, said that he would prove, and the defendant would swear, that he did not and could not have sold the oxalic acid, as there was none in the shop—a statement which the secretary to the Drug Company would corroborate. That the shop he would prove was closed on March 1 before the time named by the purchaser. His client and a Mr. Philip Hoblyn would swear that the shop was closed that day at 2.30 in consequence of its being the occasion of the annual ball-hurling. That the purchaser not having informed the defendant that the purchases were made for the purposes of analysis in accordance with the provisions of the Adulteration of Foods Act his client could not be found guilty. [His Honour here said that that Act had nothing to do with the present proceedings.] That the alleged purchases not having been sealed when sold the purchaser could have interfered with the contents, and he implied that the plaintiff's evidence on this point could not be relied on.

The defendant was then examined. He denied having ever seen the purchaser or having sold him anything at any time or at all. He had not made up for or sold to the purchaser any liniment. He could not possibly have sold any oxalic acid to the purchaser on March 1 as there was none in stock. He closed his shop on March 1 at 2.30 and re-opened at 7 in the evening. It was ball-hurling day, and it would have been dangerous not to put the shutters up and close completely for the time. He had himself put up the

shutters and a friend of his, Mr. Hoblyn, was in the shop at the time chatting with him. Mr. Hoblyn's premises adjoined the drug company's at the rear. Mr. Hoblyn would corroborate him. The Company's business had been sold on February 27 to a Mr. Williams, chemist, of Plymouth, and he (the defendant) had remained on for a short time as his assistant in charge until Mr. Williams obtained a qualified assistant. He had now left St. Columb and had opened a cigar and tobacco shop in Truro.

Mr. Flux did not cross-examine the defendant.

Replying to his Honour, the defendant said that he knew that it was unlawful for an unqualified person to sell poisons, but he had not done so.

Mr. Philip Hoblyn was then called both inside and outside of the court but did not answer.

Major Cardell, examined, said that he was the Secretary to the St. Columb Drug Company, Limited. That about the end of February, in consequence of the sale to Mr. Williams, of Plymouth, of the Company's business, he had taken stock of the contents of the shop and found when the drawer in which the oxalic acid was kept was pulled out that it was quite empty, so that he could and did swear that no oxalic acid could have been sold by the defendant on March 1.

Cross-examined by Mr. Flux: He could not swear on oath as to what day it was that he took stock, but believed it was February 27.

Mr. Flux: I should like to know whether you found any laudanum in the shop when you say you took stock.

Witness: I cannot say. I did not look.

Mr. Flux: A most useful and reliable stock-taking.

Mr. Murray summed up his case, laying stress on the evidence of his witnesses being more reliable than the plaintiff's evidence, commenting on the long time the purchases were kept, that the same had not been sealed, that the Adulteration of Food Act was not complied with, and that he had proved there could have been no sale as alleged of oxalic acid. He said that on this last point he himself knew as a Director of the Company that there was no oxalic acid. [His Honour: You cannot put that in as evidence, you are not a witness.] He could only urge upon his Honour that he had proved his case, and that the action should be dismissed. He was commencing to put forward matters within his own knowledge as Director of the Company when his Honour reminded him that he had to tell him just before that he was not a witness.

His Honour: I understand, Mr. Flux, that you put the Register for this year in as evidence.

Mr. Flux: Certainly, your Honour.

His Honour, without calling upon Mr. Flux to reply, gave judgment. He said that the Pharmacy Act was one of the most (if not the most) useful Acts passed for the safety of the public. The present case, which was a clear attempt to evade the statute, had been most clearly proved by the plaintiffs. The purchaser or (as he had been called) informer Tripp had given his evidence most clearly and honestly, and he did not doubt one word of it. There was nothing in the Act requiring that bottles containing poison must be sealed. The Adulteration of Foods Act in no way applied. He was satisfied that the defendant had sold all the articles and that they all were poisons. He gave judgment for the plaintiffs.

Mr. Flux applied for costs on the scale above £20.

Mr. Murray objected that his Honour had no power to do so.

His Honour: This is just one of those cases where I have that power, and I shall exercise it.

Mr. Murray: Do I understand your Honour that the judgment is against the Drug Company?

His Honour: My judgment is against the defendant. There are no other parties before me.

Judgment was entered accordingly for the plaintiffs, with costs.

The Pharmaceutical Society v. A. E. Gammidge.

At the Leicester County Court on Tuesday, May 3, before his Honour Deputy-Judge Russell, the Council of the Pharmaceutical Society of Great Britain, by Richard Bremridge, the Registrar of the said Society, by the authority of the said Council *v.* Albert Edward Gammidge, 104, Belgrave Gate, Leicester. Plaintiff claimed £5, penalty incurred by the defendant on March 11, in keeping open shop for the retailing, dispensing, or compounding of poison, to wit, a preparation of opium, contrary to the provisions of the Pharmacy Act, 1868, 31 and 32 Vic. cap. 121.

Mr. C. Langley Flux (Messrs. Flux, Son and Co., London) for the plaintiff, and Mr. Sprigge (Leicester) for the defendant.

Mr. Flux said: Proceedings in this case are brought by the Pharmaceutical Society under the Pharmacy Act of 1868, 31 and 32 Victoria, cap. 121. The preamble of the Act recites that it is expedient for the safety of the public that people who keep open shop for the retailing of poison shall be duly qualified and registered under the Act.

His Honour: And if they are not, what then?

Mr. Flux: If they are not they incur certain penalties which are set forth in the 15th and 17th sections of the Act.

His Honour: How do you come here—suing for a penalty?

Mr. Flux: Because the only way we can recover the penalty is under the statute.

The Deputy-Judge: The ordinary course of things is to go before the magistrates.

Mr. Flux: The proceedings for the recovery of penalties under section 15 are brought in accordance with the provisions of the statute of 1852. I have the sealed copy of the authority of the Council of the Society, appointing Richard Bremridge, whose name appears as plaintiff, as registrar appointed under the statute to recover.

Mr. Sprigge: We will admit it, to save time.

His Honour: What is the answer to the case?

Mr. Sprigge: I do not know who the plaintiff is suing. Mr. A. E. Gammidge does not keep this shop and it is not his shop in any way. That is one of the defences. There are any amount of defences, three or four of them.

Mr. Flux: By the particulars, your Honour will see that the defendant is sued for the amount of a penalty incurred on March 11, 1892, in keeping open shop for the retailing, dispensing, or compounding of poisons, to wit, a preparation of opium, contrary to the provisions of the Pharmacy Act of 1868, 31 and 32 Victoria, cap 121. I have got to prove that there was poison sold at the shop, I do not say by defendant; he need not be the actual seller. There is a case—24, Queen's Bench Division.

His Honour: I am in your favour on that point. If a person sells by another person's hand he is liable.

Mr. Flux: I will prove the sale of the poison.

Harry Moon, examined by Mr. Flux, said that he was in the employ of the Pharmaceutical Society. Acting on instructions he called at 104, Belgrave Gate, Leicester, on March 11. It was the shop of a chemist and druggist. The name over the shop was "Belgrave Gate Drug Stores." He did not see the defendant Gammidge in or about the shop. He handed in a prescription to the assistant behind the counter and asked him to make it up. It was the prescription produced.

His Honour: I suppose it is written in cabalistic signs. Perhaps you will explain it to us.

Witness said the prescription was for ½ oz. of tincture of opium and ½ oz. of soap liniment. The prescription was made up and handed to him. There was a seal on the top of the cork and on the seal was the name of "Gammidge, chemist." The bottle was

handed to the analyst to analyse after witness had marked it so that he could identify it. The bottle produced was the one supplied to him. There was more sealing wax on the neck of the bottle now which he had put on himself that it might not be tampered with and that no leakage might occur. He kept it in his possession until he handed it to the analyst on April 30.

Mr. Sprigge: You do not know Mr. Gammidge?—I do not.

This was probably your first visit to Leicester?—It was.

Should you know the gentleman who dispensed the prescription?—I cannot say.

Is it the gentleman sitting near me?—I do not recognize him.

Would you be prepared to swear that is not the one?—No.

Mr. Flux: It is not material. I am not proceeding for having sold, I am proceeding for having kept open shop. I will call the analyst.

Mr. Sprigge: If his object is only to prove that it contains opium, we admit that. We admit it is a poison.

E. J. Eastes said he was a qualified analyst, and acted with Professor Attfield at the Society's house in London. On April 30 Mr. Moon handed him the bottle produced for the purpose of analysis. The result of the analysis showed that it contained a preparation of opium.

His Honour: What do you say of opium, is it a poison?

Witness said it was a poison. He analysed it himself, and had done nothing to the seal on the cork.

Mr. Flux: Under section 13 of the statute the Register is evidence in a court of law that the person whose name does not appear is not qualified within the meaning of the statute.

Mr. Sprigge: We admit that Mr. Gammidge does not appear in the register.

Mr. Flux: I will call the defendant.

Mr. Sprigge: He is not here; I am expecting him every minute.

Mr. Flux: I understood Mr. Sprigge to say that his client was in court.

Robert Dyer, clerk to the St. Margaret's Vestry, Leicester, produced the rate-book, containing the entry of the rating with regard to the premises, 104, Belgrave Gate, and said that on March 9 the vestry ordered the name of Albert Edward Gammidge to be entered in the book for those premises.

Mr. Sprigge: Those premises, 104, Belgrave Gate, consist of a house and shop, do they not?—The only description we have in the rate-book is "house," but I know the premises well and know there is a shop.

You have not got anything at all about a shop in the book?—No, I have not; but in hundreds of similar cases we have not anthing about the shop.

You put it that way?—Yes.

Mr. Flux: That is my case.

Mr. Sprigge: I have been expecting defendant in every minute, but he has not come yet. In this Act of 1868, section 16, it says, "upon the decease of any qualified chemist or chemist and druggist, actually in business at the time of his death, it shall be lawful for any executor, administrator, or trustee of the estate of such pharmaceutical chemist or chemist and druggist to continue such business if and so long only as such business shall be *bonâ fide* conducted by a duly qualified assistant; and a duly qualified assistant within the meaning of this clause shall be a pharmaceutical chemist or a chemist and druggist registered by the registrar under the Pharmacy Act or this Act." The defence in the action is this. Some six years ago the present Mr. A. E. Gammidge's father was a qualified chemist and was registered. He died, carrying on this business to the time of his death, and since then and at the present time the executors, Mrs. Gammidge and Mr. Grimes, under the will of the late Mr. Gammidge, have conducted the business, which is carried on in the same place, by keeping a duly qualified assistant to manage it. On March 11 this prescription was made up and sold by the assistant, who was properly qualified. We have been guilty of no breach of the Act whatever.

Joseph Robinson said he was a qualified chemist and druggist and produced his certificate.

The clerk of the court also said that the witness' name was on the register.

Mr. Sprigge: Who manages this business at 104, Belgrave Gate?—I do.

What has Mr. A. E. Gammidge, the defendant, to do with the business; does he dispense?—No, sir.

Is it his shop?—I am engaged by Gammidge and Co.

The Judge: Who is that?

Witness: That is Mrs. Gammidge and the executors.

Mr. Sprigge: Do you manage this business for Mr. A. E. Gammidge alone?—I do not know who the other parties are, but I believe it is Mrs. Gammidge and the executors under Mr. Gammidge's will.

Can you say whether Mr. Gammidge, the defendant, has anything to do with it?—I cannot say.

The Judge: He comes into the shop?

Witness: Yes; he comes into the shop.

Mr. Sprigge: Does he have anything to do with the medical part of the business?—Very little; he only spends a few minutes in the shop at a time.

What is he?—He carries on a dentistry business.

Did you make up this prescription?—I did.

Mr. Flux: When were you first employed by Messrs. Gammidge and Co.?—I came on January 30 this year.

Had the shop at that time been recently opened?—I do not know how long it had been opened.

Is it not a fact that the shop was actually closed from about the end of October until the end of January?—I do not know, I was not in Leicester.

Is it not a fact that the shop was occupied for a long time by Mr. Broof?—I believe he did occupy it; but I do not know of my own knowledge, because I was not in Leicester before.

Mr. Sprigge: I submit that the plaintiff has not made out his case; but if your Honour has any doubt about it, I intended to call the defendant, who should have been here. I can now put forward the late Mr. Gammidge's will.

Mr. Flux: You cannot put it in without a witness.

Mr. Sprigge: I can prove that Mrs. Gammidge and Mr. Grimes, as the executors, have continued the business—as provided by section 16 of the Act—under Mr. Robinson, a qualified chemist. If your Honour is not satisfied, I must ask for an adjournment, to get the defendant here.

The Judge: I will adjourn it for a short time, and take it up when it is convenient.

The case was adjourned for a time, and later in the day Mr. Sprigge returned to the Court and said:

When I got to the office I found a letter from the defendant, in which he seemed to think the case would not be reached until five o'clock, and he would not be here until that time. I have been to 104, Belgrave Gate, but he is not at home, and his wife said she did not know where he was. I do not wish to keep the court waiting, and I will leave the case in your Honour's hands as it stands. What has been proved to your Honour is that the defendant is on the rate-book for this house and shop. He is stated as being the occupier of the house.

His Honour: The clerk says that means for all the premises.

Mr. Sprigge: I will admit he is on the rate book for the whole of the premises. My witness, a qualified

chemist, stated that the business is carried on by Gammidge and Co., and the explanation of Gammidge and Co. is that they are the executors under the will of the late Mr. Gammidge.

His Honour: There is no proof of it, it is what he believes.

Mr. Sprigge: No evidence has been given to the contrary, and I rely on section 16 of the Act, and under that section I say we are perfectly justified in selling poisons so long as we employ a qualified chemist.

The Judge: You recognize that there is no proof that you are acting as executors.

Mr. Sprigge: We must admit that.

The Judge: Supposing you had got over that difficulty, how did you make out that this gentleman (Robinson) is duly qualified under the meaning of the clause?

Mr. Sprigge: He produced his certificate and he is on the Register.

Mr. Flux: There is no dispute as to that.

Mr. Sprigge: On these facts I leave the case in your Honour's hands, and submit that we most certainly have committed no breach.

His Honour: It is only mere suggestion that defendant is an executor. There is no proof of it.

Mr. Sprigge: Except so far as the witness Robinson went. I have seen the will.

Mr. Flux: Your statement is not evidence.

His Honour: It seems to me there is a business of some interest and emolument carried on by him, as he is carrying on business as a dentist as well.

Mr. Sprigge: Defendant is a medical student at the present time, and will in time be a medical practitioner.

His Honour: There is no evidence that I can see that he is carrying on as an executor or administrator or trustee. He is not qualified himself. He does not come within this clause, which would enable him if he were an executor to be represented by a qualified assistant.

Mr. Sprigge: He does not carry on the business and his assistant said so. His assistant said he was employed by Gammidge and Co.

His Honour: He says he (defendant) goes into the shop occasionally.

Mr. Spriggs: He lives on the premises and sees to the dentistry business.

His Honour: He goes to the business and takes part in it.

Mr. Sprigge: Perhaps he does, and sells a toothbrush now and then.

The Judge: I cannot distinguish between toothbrushes and poisons. You can come within this section if you can only prove it, but what you have failed to do is to prove that he is executor and administrator of a deceased pharmaceutical chemist.

Mr. Sprigge: Which I could prove if defendant was here.

Mr. Flux: I am very sorry he is not here.

His Honour (to Mr. Sprigge): Then judgment must go against you. If you had been properly instructed perhaps you would have had a better defence.

Mr. Sprigge: This £5 is in the nature of a penalty. Under the circumstances and in the face of the fact proved that the business is carried on by a duly qualified chemist, who understands what poison is and what its effects would be, I urge you not to give judgment for £5, but for a nominal sum only,

His Honour: Oh, I cannot do that. The Society is carried on for a most laudable purpose, and no doubt they go in for great risks and sometimes fail to prove their case. They are working often in the dark, and it is on behalf of the public, and when they do succeed, as they have succeeded here, I think they are entitled o the full benefit of the penalty.

Mr. Flux: Under the section 15 you have no power to reduce the amount. It is £5 or nothing.

His Honour: I expected something of the kind.

Mr. Flux: I wish the defendant had been here so that we could have argued before your Honour the question of carrying on a business by executors. I should contend that it only means a *bonâ fide* carrying on for the purpose of winding up.

The Judge: It could never be the intention to carry it on for six years. However, we need go no further.

Mr. Flux: These prosecutions have to be taken up under statute, and the Society is put to a great expense by them. The ordinary costs on a judgment of £5 are very small, but your Honour has power under section 119 of the County Court Act to award extra costs.

His Honour: I do not think this case comes within that clause. The question of costs had better be left with the Registrar.

Judgment was therefore entered for plaintiff for the full amount claimed and costs.

Obituary.

Notice has been received of the death of the following:—

On the 23rd of April, J. E. Midgley, Chemist and Druggist, Liverpool. Aged 49 years.

On the 23rd of April, Charles McCulloch, Chemist and Druggist, New Cross. Aged 75 years.

On the 28th of April, J. A. Bell, Chemist and Druggist, Greenock. Aged 38 years. Mr. Bell was a member of the Greenock Town Council and held the office of Dean of Guild.

On the 2nd of May, Thomas Purdue, Chemist and Druggist, Witney. Aged 82 years. Mr. Purdue was one of the Founders of the Pharmaceutical Society.

BOOKS RECEIVED.

METHODS AND FORMULÆ USED IN THE PREPARATION OF ANIMAL AND VEGETABLE TISSUES for Microscopical Examination, including the staining of Bacteria. By P. W. SQUIRE, F.L.S. London: J. and A. Churchill. From the Author.

THE UNIVERSAL LANGUAGE WITHOUT STUDY. English edition. (London: Neal's Library, 48, Edgware Road.

REPORT OF THE CITY AND GUILDS OF LONDON INSTITUTE for the advancement of Technical Education, 1892. London: Gresham College. From the Secretary.

CEYLON ADMINISTRATION REPORTS, 1891. Royal Botanic Gardens. By Dr. H. TRIMEN, F.LS., Director. From the Director.

NOTICES OF MEETINGS.

Royal Institution.—May 10. Lecture: "Photography in the Colours of Nature," by Mr. F. E. Ives. May 12. Lecture: "The Chemistry of Gases," by Professor Dewar.

Society of Arts.—May 9. Cantor lecture: "Recent Bacteriological and Chemical Research in connection with the Fermentation Industries," by Professor Percy F. Frankland.

School of Pharmacy Students' Association.—Thursday, May 12. Papers: "Bismuth and its Salts," by R. W. Walkington, "The Spider," by Miss M. E. Buchanan, and "Note on the Tea Industry of Ceylon," by W. B. Hoile.

Erratum.—Page 901, column 2, line 14 from top, or Stockport read Southport.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Foster, Chubb, Flux, Brinson, Griffiths, Schneitzer, Hill, Mair, Thomas, Wright.

BOTANICAL NOMENCLATURE, WITH ESPECIAL REFERENCE TO 'PHARMACOGRAPHIA.'

BY G. CLARIDGE DRUCE, M.A., F.L.S.

(*Concluded from page* 791.)

At present our English list exhibits a pitiable example of a want of uniformity in this respect. Compare *Viola canina*, L., *Epilobium tetragonum*, L., with *Carex ovalis*, Good., *Carex pulla*, Good.

Another reviewer of Dr. Otto Kuntze has criticised in an appreciative manner the volumes under consideration, and done justice to the wonderful amount of work contained in them. I refer to N. L. Britton in the 'Bulletin of the Torrey Club,' February, 1892, who as a whole accepted the rules and conclusions of the author. One rule adopted by Kuntze is objected to, *i.e.*, when a name has for some reason become invalid for a species or genus, Kuntze allows the name to be used for another. Britton, on the contrary, holds that once a synonym, always a synonym. There is no question that it is always better to avoid using a synonym, that is to avoid re-establishing a name for a genus which has already sunk as a synonym of another, but it would be very rash to disallow all those at present in use because at one time or another they have been synonyms of other species or genera. This, again, would lead to great confusion, and is contrary to a good rule, viz., "nomen genericum unius generis, *nisi supervacaneum* in aliud transferri non debet," and to the practice of Linnæus himself, of which there are many examples.

But to clear, as an old botanical writer said, this Augean stable, is there no way—no *modus vivendi* by which the varied hostile hosts may be reconciled?

At present how opposing are the opinions!

Suppose a list of European plant names were drawn up respectively by the Kew botanists, by Nyman, by Drude, by Richter (whose recent premature death we must deplore) and Kuntze, how dissimilar would they be? so much so as to render their correlation a work of serious labour.

It must be remembered that, vast as are the changes proposed by Kuntze, and great and laborious as have been his researches, they are not absolutely exhaustive; for instance, he has omitted an older generic name for *Buda*, of Adanson, 1763; *i.e.*, *Corion*, Mitchell, 1748.* Doubtless others might be unearthed from small treatises and insignificant journals of botanical writers between 1735 and 1753, so that many generic names selected by Kuntze might in turn be overthrown. In order to avoid the vast revolution proposed by Dr. Otto Kuntze, and which seems inevitable if the date for citation of genera be thrown back as far as the 'Systema,' or even as the first edition of the 'Genera,' as suggested by Asa Gray, James Britten, and N. L. Britton, I would propose that a definite rule be drawn up, *i.e.*—

That the citation of both genera and species names should begin with the first edition of the 'Species Plantarum,' 1753, that being the earliest work where the binominal system of nomenclature was first consistently applied.

It is true no definition of the generic characters are here given. These may be sought for in anterior works, but the names and their spellings (except obvious misprints) should be cited as in the 'Species Plantarum.' If more recent writers revive or use a name of an earlier date which is not included or applied to any plant in that work, the name should be followed by that of the first Linnean writer who revives or uses it, with or without the original (*i.e.* pre-Linnean) author's name, which, if quoted, should be enclosed in inverted commas. By pre-Linnean author is meant a writer who used the name before the publication of the first edition of the 'Species Plantarum.'

If this rule be adopted, we shall reduce the changes proposed by Kuntze to a quarter of their original numbers. The remainder must be treated according to the merits of each case.

Perhaps it would be well to pass under review the reasons which have induced botanists to cite pre-Linnean writers as authors of genera. As we have seen, Linnæus followed this custom with regard to Tournefort, and he also cited Plumier, Vaillant, Dillenius, Michelius, etc. Asa Gray says "the practice of leading botanists has been essentially uniform in citing these writers as the authors of genera from Jussieu down to De Candolle, father and son. It seems perfectly clear therefore . . . . that such genera are expected to be cited as of their respective founders. And as hardly anyone doubts that Tournefortian genera suppressed by Linnæus, but restored by modern botanists (such as Fagopyrum), are to be cited 'Tourn.,' it follows that only in a restricted sense do genera begin with Linnæus in the year 1737.

"This case, indeed, is governed by the principle in citation so well insisted on by M. de Candolle, that no author is to be represented as saying the thing that he does not say. The alternative course is to write 'Linnæa, Linn,' which is certainly what Linnæus has not said. . . . . We have only to understand that genera adopted by Linnæus from Tournefort, etc., and so accredited, should continue to be thus cited; that the date 1737 (Linn., Gen. Ed.) is, indeed, the point of departure from which to reckon priority, yet that botanical genera began with Tournefort, so that Tournefortian genera which are accepted date from 1700. That is the limit fixed by Linnæus, and it definitely excludes the herbalists and the ancients whose writings may be consulted for historical elucidation, but not as authority for names." In a case when Linnæus, instead of choosing a name such as *Periclymenum* already given by Tournefort, invented a new one such as *Lonicera*, Asa Gray (with Agassiz) hold "that the names sanctioned by Linnæus are to be held as established above all others."

This, it will be observed, is not absolute priority, and, as I think, there are objections to going behind Linnæus for genera authorship. These objections are well put forward by Kuntze in his section 13, on 'Linnæus Systema Naturæ editio princeps,' 1735, as the starting-point of the nomenclature of genera, which I will transcribe. "The rules of nomenclature do not allow of our going beyond Linnæus in the adoption of genera. Some indeed go back to Tournefort's 'Institutes' of the year 1700, or its first French edition entitled 'Élémens de Botanique,' 1694, or its third amended edition by Jussieu in 1719, from which Linnæus

* In 'Act. Phys. Med. Ac. Nat. Cur.,' viii., app. 218 (1748).

borrowed so much ; but we must not yield to these claims, which have been repeated, though only here and there, in recent times, if we are to arrive at any unity of nomenclature. If we put back the starting-point, we shall introduce a different competition of names and an incalculable revolution in the nomenclature.

"Each of Tournefort's editions, if taken as the starting point of our nomenclature, will give different results. To choose the year 1700 would be only playing with the round number ; and besides this, Breyne's, Commelin's, Volkamer's, Trionfetti's, Petiver's, etc., works appeared also in that year. 1694 would be more a rational date to choose, but then there would be a collision with the publications of Ray, Plukenet and Rivinus. The year 1719, of the most perfect edition of Tournefort's work, would give us another different nomenclature. A sure base is most essential for the starting-point. As shall be shown presently, one or two years' difference in the point of beginning produces a considerable difference in the names of plants. Eminent botanists have attempted in the most recent times to go back far beyond Tournefort's time for plant names, but this produces infinite uncertainty . . . . . We have only to observe, for instance, the first genus in the natural system as usually adopted, *Clematis* . . . . . This one name would give rise to a series of discussions in order to discover to which genus the name *Clematis* or *Clematitis* really belongs, unless we secure some better point on which to base the starting point of our nomenclature. Linnæus may have sometimes proceeded most arbitrarily, but he has this among other merits, that he sifted the chaos of the nomenclature, which followed no rules, thoroughly and uniformly, as no one had done before and as no one has done since.

"The starting-point of our nomenclature must command assent, and to take Tournefort's publication would be quite arbitrary, for Tournefort partly based his work on earlier authors ; moreover, he did not go through the species. According to Adanson he gave a list of 10,146 without examination. Ray's list of 1704 contains 18,655 species, several thousand more were added before 1737, though Linnæus reduced the number by a third or fourth. In Tournefort's list the species which have no detailed descriptions are mixed up together with no separation of varieties and no systematic arrangement of any sort, and often enough species are intercalated which do not agree with the diagnosis and figures of the genus ; these figures were generally consulted by later authors only in doubtful cases, Tournefort's diagnosis being highly unsatisfactory. The 'Species Plantarum' of Linnæus does at least afford us some light in similar doubtful cases. Again, Tournefort has no sufficient store of botanical technical terms, so that his diagnoses can only be communicated by simultaneous reproduction of his figures, and this simply excludes the practical application of his diagnoses. . . . . His method and terminology are not elaborated; his system is tolerable. . . . . The best and most original point in his system is the sub-division of the classes, the diagnosed sections ; but the genera in these are arranged uncritically and without statement of their differences. . . . . Some think we must go back to Tournefort because he first introduced the idea of the genus into botany by means of his diagnoses, but there is no foundation for this opinion. As early as 1690, Rivinus, in his 'Introduction,' p. 32, not only gave a clavis of the classes (*genera summa*, Riv.), but also on p. 6A and 7A (*Folio tabelle*) of his 1st vol. of the 'Ordo Plantarum,' a regular clavis generum, and the same in the 2nd vol., 1691, p. 10, and in the 3rd vol., 1699, p. 11, Rivinus was far ahead of Tournefort, inasmuch as the latter had no clavis generum, and was utterly unable to give a clearly intelligible diagnosis in words ; his distinctions are matters of instinct. If Rivinus founded no such school as Tournefort . . . . . this was only the result of the excessively costly form in which the 'Ordo Plantarum' appeared which ruined Rivinus financially ; for this reason he was never able to complete it, and only a few rich people could afford to buy it, while Tournefort has the merit of having represented all the then known genera in diagnostic figures in an inexpensive form. Rivinus was also far ahead of Tournefort in the matter of nomenclature ; he reformed it in 1699, and admitted no more generic names of two words ; he had in 1699 not one generic name which would not be according to modern rules. He also had, for the most part, simple specific names, or at most names of two flora, not specific phrases like Tournefort . . . . . If Rivinus had completed his work and carried the reform of nomenclature as far back as the first volumes, we should have had to go back to Rivinus as the founder of genera and of consistent nomenclature. The last volume of his great work appeared after his death, the 'Icones plantarum flore irregulari hexapetalo' (Orchidaceæ) in 1760-1763, and the last 112 supplementary tables (which Pritzel omits to state) not before 1773-1776. We cannot therefore go back to Rivinus, because his work appeared at intervals, remained unfinished, and did not contain all the then known genera."

After pointing out and criticizing the reasons why Tournefort has been cited by many botanists, Kuntze says he has been cited by some without verification ; "even such skilful monographers as Buchanan and Pax . . . . . overlooked the fact that after all Tournefort figured *Luzula* only under the name *Juncus*, so that, strictly speaking, Tournefortian botanists ought to call *Luzula Juncus*, and find another name for our present *Juncus* ; and that *Auricula* has the precedence in Tournefort over *Primula* and *Androsace*.

"Tournefort was thrust to the front by De Candolle, when he introduced his system in opposition to the Linnæists, and the preference afterwards came to be a matter of course with many ; but De Candolle and his adherents should have thought first of the contemporaries of Linnæus, who for the most part were quite neglected, and they must still do so before making so great a jump backwards as some of them are for doing.

"On the other hand, the names of older authors, if Linnæus did not himself select them—and his selections when made were quite arbitrary and without reference to priority—were often adopted, being revived mostly after 1735 by authors who did not regard Linnæus or were unacquainted with his first works, and accepted either in former times or still at the present day, at least in the case of the genera which Linnæus had overlooked or confounded with others. But this is done in distinct opposition to the views of those who would go back

to Tournefort; for instead of making the latter works of Linnæus the foundation, as was done by former writers, and is still done by Bentham and Hooker, the beginning is made with Linnæus' first completed systematic work, the 'Systema Naturæ' of 1735.

"In this work Linnæus completed a selection from the oldest generic names and changed many, shortening the too lengthy names, rejecting the substantival double words as names of genera, such as *Dens-leonis*, *Cytiso-genistus*, etc., used by Tournefort, and doubled generic names combined with adjectives, such as *Caryophyllus-aromaticus*, etc., etc. [the two words are united by a hyphen that they may not be mistaken for a generic and specific name; they were used without the hyphen for the generic name], abandoning the use, not infrequent up to 1735, of the same name with different adjectives for different genera (as *Centaurium majus* and *C. minus*, Tourn., or genera, with other authors, with *Gramen* as the first half of the word, and abolishing generic names ending in *-oides* (100 more or less), *-astrum*, *-ella*, or with prefixes, as *Pseudo- Chamæ-*, etc., perhaps too rigidly, and most of the *nomina barbara*). He at the same time transferred the names sometimes to other genera, or in writing several previously independent genera, chose one of their names, often with a slight change. He also established a number of new names to genera for the first time in 1735; in short. he not only founded his system in the 'Systema' I., 1735, but his nomenclature also for his genera. This nomenclature has maintained and naturalized itself better than his artificial and three natural systems. It is obvious that we must go back to this first work, and it is merely to the difficulty in making use of it owing to the want of an index and the unhandy form. . . . . and to the great rarity of the work that we can ascribe the fact that it is not this work but the 'Genera Plantarum,' and later editions of the 'Systema' have become the standard. It is the case also that Linnæus' successors as a rule have not founded their nomenclature on Linnæus' first works, but have built upon the new editions of his works which were completed subsequently and in many cases altered. If we go back to his older works we must for consistency make use of his first system, and we find full information respecting the names there in the 'Codex Linneanus' of Richter and Petermann. The rules of nomenclature do not require us to reject Linnæus' 'Systema,' ed. I., and to do so would be justifiable only if it consisted of nothing; but *nomina nuda* (*nomina seminuda* therefore excepted) occur in it but sparingly. The names given in the key or synopsis are not without description as some think, for the placing them in the several classes and orders involves of itself a considerable portion of description. But Linnæus . . . . . also gave characters of the groups, and cited the earlier authors with the generic names, sometimes even with a statement of details in the case of well-known genera; but it need not be said that a citation of authors supplies the place of a diagnosis by referring the reader to previous descriptions or figures. He also added synonyms in 1735, so that there is seldom any doubt as to the plant intended. Linnæus marked every new genus in this work with a †, and there are but 66 such marks in the genera then published. Of these comparatively few new genera nearly half are supplied with synonyms, etc., so that they cannot be regarded as *nomina nuda*, and are in part, at least, only old genera with new names. The really new genera which remain are somewhere about forty, and there may perhaps be some doubt about three of them. . . . .

"There is, therefore, no legal or moral ground for putting aside Linnæus' first fundamental systematic work, the editio princeps, in 1735, of the 'Systema Naturæ.' . . . . I must, therefore, ... accept the year 1735 as the beginning of botanical nomenclature and not the year 1737. The matter would be less important in its consequence since few systematic works causing change of names appeared between these dates, if Linnæus himself had not licentiously and arbitrarily changed in the year 1737 some fifty of his own names adopted in 1735, though he afterwards restored a few of them. But this inconsistency, which was one of others that he was guilty of in later times, and which must be corrected according to international rules in the interest of unity of nomenclature. The 'Genera Plantarum,' including the Corollarium, contains 994 genera with detailed diagnoses, but besides the arbitrary clauses of names, it contains much that is a *reformatio in pejus*! For example, many genera which are still in vogue were adopted in 1735 but suppressed [merged in other genera?] or dropped, such as Arnica, Cedrus, Cinnamonum, Fœniculum, Larix, Sassafras, Taraxacum. The 'Systema' of 1735 was not produced all at once, Linnæus began his studies in 1727; in 1729–30, when he was deputy of Olif Rudbeck, he wrote his 'Hortus Uplandicus.' . . . . But these MSS. were never published;* in 1730 they contained seventy-four pages (Linnæus' writing was very fine and small). Besides these works the 'Flora Lapponica' appeared in 1732–35 and contained a sketch of his system, so that we have a right to ask why our nomenclature should not begin there?" Kuntze shows how this cannot be adopted, since the names in the 'Flora Lapponica' are *nomina nuda*. And no explanation is given as to what he meant by the names of the classes and orders, besides the use of an unreformed nomenclature. The 'Opusculum' of 1732 is introduced by an anonymous preface, the work most probably of Olaus Celsius, Professor of Theology, the patron and benefactor of the then needy student Linnæus. But, says Kuntze, "we must reject all these unripe and premature fruits which Linnæus offered as inedible, and must begin with the edition 1735, in which he not only explains the classes and orders, but first promulgated his reform of the nomenclature. His system of 1735 is evidently only an extract from his labours of the eight previous years finally and carefully corrected, and from other larger works already prepared in Sweden and published in rapid succession in Holland in 1736 and 1737. The mottoes of the young and then entitled Linnæus were *Tantus amor florum* and *Nulla dies sine linea*.

"With what zeal he had studied and criticized the literature of Botany before 1735 is shown by his work, which appeared almost at the same time with the 'Systema,' the 'Bibliotheca botanica,' which presents us in its 153 pages with the most

* Catalogue of Linnæus in the Linnean Soc., 1888, and Gistel's 'Life of Linnæus,' p. 65.

complete repertory of the kind that had appeared up to that time. There can be no doubt that Linnæus had previously worked well through the genera of 1735, in respect of their delimitation and nomenclature—his 'Fundamenta botanica' also appeared almost at the same time—and even separated some of them better than in the more elaborate revision of the 'Genera Plantarum,' which appeared one year later, and that of the species in the 'Hortus Cliffortianus,' in which they were treated in the old-fashioned way, not without much haste and unskilful alteration; for instance, in 1735 he supplied our *Lobelia* with three exact synonyms, under the name of Dortmanna, Rudb., and made it easy to recognize. In 1737, in the 'Genera Plantarum,' he confounds a very different genus, *Lobelia*, Plumier, with it, and puts that name first," etc. Kuntze continues by saying we must no more neglect this 1st edition of the 'Systema' "than his first edition of the 'Species Plantarum,' which is as scarce as the 'Systema,' and which was neglected in former times by most authors, who referenced it by the 2nd edition of 1762-3. In both cases Linnæus' later and arbitrary changes must be corrected, and this would have to be done if we based our work on any other of his publications, unless we chose to use as our foundation his last book, which suffered more corruption at the hands of his pupils who represented him in his old age; but even then we should have to change older Linnean names, now current, but which were not used in the 'Systema Vegetabiliana,' ed. xiii., which would be still worse.

"To obtain the firm basis which is indispensable and a fixed point of time for the beginning of our nomenclature, I have on principle excluded all botanical publications of other authors which appeared in 1735, and which bear that date on their title-page, from the competition, and have made it begin with the end of 1735. . . . . The year 1735 was rather rich in botanical publications. . . . . 1736 is very poor in botanical literature. The only noticeable productions are Siegesbeck's 'Primitiæ Flora Petropol,' with many new names, Moehring's 'Primæ Lineæ Horti,' with old names prescribed, and Zannichelli's 'Enumeratio rerum Nat.,' an unimportant work in a botanical sense. On the contrary, 1737 was again fruitful in new works; see besides Linnæus, Burmann, Ludwig, Blackstone, Blackwell, Miller, Wienmann."

NOTES ON EUCALYPTUS OILS.*

BY J. H. MAIDEN, F.L.S.

The Different Species of Eucalyptus Yielding Oils.

It may be convenient to classify the oils into three groups:—

1. Scented or Perfume Oils.
2. Mallee Oils.
3. Other Eucalyptus Oils.

Scented or Perfume Oils.

These oils bear a strong resemblance to each other in regard to odour. They have been suggested as soap-perfumes, but the chief difficulty in dealing with them arises from their volatility. Their perfume reminds one of citronella oil, although it is much more dainty than this well-known oil.

a. E. Baileyana.—A "stringy bark," of local distribution; being confined to Northern N. S. W. and Southern Queensland.

b. E. dealbata.—Confined to the drier portion of Queensland and New South Wales. Believed by some to possess the finest odour of all the Eucalypts.

c. E. maculata, var. ***citriodora.***

$= E.$ *citriodora.*

"The citron-scented Eucalypt." Found along the Queensland Coast districts. It is a variety of the well-known "Spotted Gum" of N.S.W., whose leaves possess no marked perfume. The *citriodora* variety is especially abundant near the town of Gladstone, and an enterprising pharmacist there has entered into the distillation of the oil largely. It is the best known of the scented eucalyptus oils.

d. E. Staigeriana.—The "lemon-scented ironbark" of the Palmer River (Queensland). The leaves possess an odour very like that of the scented verbena (*Lippia citriodora*). Leaves are obtainable from Maytown; the oil at present remains little more than a curiosity of the laboratory.

Mallee Oils.

The word "mallee" is of aboriginal origin, and is applied to those dwarf eucalypts found in arid country, which throw up a number of their stems from one stock. There is more or less of this "mallee scrub," or "mallee country," in the interior of all the colonies. The mallee grows to no great height, but it frequently forms impenetrable belts.

Of the eucalypts forming a mallee the following are the chief:—

Eucalyptus dumosa.
gracilis.
oleosa.
incrassata.
pyriformis.
uncinata.

Most of these mallee-eucalypts yield abundance of very good oil, which has the advantage of approximately constant composition, since the species of one kind are so gregarious—in fact, sadly too abundant, and sadly too gregarious to please squatters.

In the factory of Mr. Bosisto four mallees are drawn upon, viz.: *E. oleosa*, *E. gracilis*, *E. uncinata*, and *E. incrassata*, the average yield of oil being 1 per cent.

The mallee oils are particularly rich in *Eucalyptol.*

a. E. cneorifolia.—Found in Kangaroo Island, South Australia. The oil is of much promise, and has only quite recently been placed on the market. Besides the ordinary eucalyptus odour, it has a faint secondary odour which reminds one of dill or caraway.

b. E. dumosa.—Forms with *E. gracilis* and other species the "mallee country" of North-Western Victoria, Southern New South Wales, and South Australia. Specific gravity about ·912. Has a strong camphoraceous odour.

c. E. gracilis.—Yields a rather lower percentage of oil than any of the other mallees.

d. E. incrassata.—This species yields the highest percentage of oil of all the mallees.

e. E. oleosa.—Perhaps the best known of the mallees, but they all yield oil with a strong family likeness, and, as far as is known, with but little difference in composition and properties. This oil may be used with advantage in a sick room, as its vapour is comparatively free from irritating substances which cause cough.

f. E. uncinata.

Other Eucalyptus Oils.

It may be broadly stated that every eucalyptus contains oil, and the oil dots (though not so prominent as a rule as in the Rutaceæ) may be observed by holding a leaf up to the light, or the odour may be obtained by simply crushing it between the fingers. But few

* From the *Pharmaceutical Journal of Australasia*, March 15.

species fulfil the two requirements of abundance within a limited area and high oil yield.

a. Eucalyptus amygdalina, Labill.—"Brown or white peppermint tree" of Victoria. Found in South-eastern South Australia, throughout Tasmania and Victoria, and in the extreme south of New South Wales.

b. Eucalyptus globulus, Labill.—"Tasmanian or Victorian Blue Gum;" confined to those two colonies. It likes a touch of frost, and hence when planted in the warmer parts of New South Wales (Sydney for example) it does not flourish, but forms a straggling, sickly, short-lived tree, a prey to insect life.

Eucalyptus amygdalina and *Eucalyptus globulus* are so frequently mentioned together, in view of recent scientific discussions as to the composition of their oils, that it will be convenient to deal with them together.

It was for many years supposed that *Eucalyptus globulus* oil contained eucalyptol, while *Eucalyptus amygdalina* did not, but the recent classical researches of Professor Wallach, of the University at Bonn, have thrown fresh light on the subject. *Eucalyptus amygdalina* contains lævo-rotary phellandrene; *Eucalyptus globulus*, on the other hand, contains no phellandrene, but dextro-rotary pinene. The common constituent of both these oils is *Eucalyptol* or *Cineol*. Wallach himself had at first some difficulty in isolating this substance from the oil of *Eucalyptus amygdalina*, apparently owing to the presence of some disturbing impurity. The difficulty of separating eucalyptol from *E. amygdalina* naturally gave rise to the supposition that it did not occur in that species. The therapeutic effects of eucalyptus oil being considered to be largely dependent on the presence in it of eucalyptol, it is very satisfactory to learn that *E. amygdalina* (one of the most abundant yielders of eucalyptus oil) contains that substance.

If for no other reason than an endeavour to secure uniformity of oils it is desirable that, as far as possible, they be given their own species-name. These remarks apply with diminished force to mallee oils, which resemble one another in a remarkable manner, but are prompted by the knowledge that the words *Eucalyptus globulus* have, in times past, been used somewhat loosely. To use the words of a large user of eucalyptus oil, "the oil they always obtained was labelled *E. globulus*, and sometimes, by way of a change, *E. amygdalina*, for the two things seemed exactly the same." In a word, *Eucalyptus globulus* in very many instances should read "Eucalyptus." Oil labelled *E. globulus* should in fact be looked upon as only provisionally labelled, unless the accuracy of the labelling be guaranteed by a firm of repute and experience in this matter. No species of eucalyptus has been more persistently advertised (for planting, etc.) than *E. globulus*, and a number of people have at length got to imagine that we have no other species—at all events of any importance.

Comparatively little *E. globulus* oil is distilled in Australia, but as this species has been largely selected for planting in Algeria and California, a good deal of veritable *E. globulus* oil is produced by those two places.

The present is a suitable opportunity for a few remarks on blue gum. The best known blue gum is *Eucalyptus globulus*, common in Tasmania and Victoria, and on that account, distinctively known as "Tasmanian or Victorian Blue Gum." It may, in one or two isolated instances, be found over the New South Wales border; but, if so, it is one of the rarest of New South Wales plants. It was for many years supposed to be abundant in the south-east of New South Wales, but this was founded on a misapprehension; the blue gum of that district turned out to be a new species, Baron Müeller honouring me a few years ago by naming it *Eucalyptus Maideni*. The blue gum of the Sydney and coast districts is still another species, viz., *Eucalyptus Saligna*, not closely related to the other two, and yielding a reddish instead of a pale timber. I would like to see it generally known as "Sydney Blue Gum" by way of distinction.

These three do not by any means exhaust the blue gums of these colonies. The adjective blue refers to the bluish cast of the glaucous foliage, and occasionally bears reference to the tint of the smooth bark. In Southern New South Wales *Eucalyptus goniocalyx* is known as blue gum, though this species is better known as "spotted gum" in Victoria.

Eucalyptus tereticornis is more or less known as blue gum from the Shoalhaven district to Northern New South Wales and the neighbourhood of Brisbane. One occasionally hears *Eucalyptus hæmastoma* and *Eucalyptus viminalis* alluded to as blue gum. In South Australia *Eucalyptus leucoxylon* is frequently known as blue gum, while in the western colony *Eucalyptus rudis*, *Eucalyptus megacarpa*, and even occasionally the Karri, *E. diversifolia*, are all occasionally known as blue gum. So here we have what I may term three principal blue gums and eight secondary blue gums, and there may be others. The bare statement is an eloquent commentary on the difficulty of distinguishing many species of eucalyptus, and the oil-bearing eucalypts have not escaped the popular confusion.

c. E. goniocalyx.—This is the "spotted gum" of Victoria (not of N.S.W.); it is frequently known as "blue gum" in Southern N.S.W., to which it extends.

The oil possesses a rather penetrating odour considered to be disagreeable by many people.

d. E. hæmastoma.—"A white gum" of New South Wales and Queensland. Possesses a pleasant odour, described by Dr. Bancroft as intermediate between oil of geranium and peppermint.

Messrs. Schimmel and Co. liken its odour to that of cumin oil. It is an oil which is quite *per se*; it is on the borderland between the scented and ordinary eucalyptus oils. It is a common species.

e. E. mitrocorys.—The "sallow wood" of Northern N.S.W. Coast districts; frequently known as "turpentine" in Queensland. Allied to the perfume oils when properly made, but by some considered not to possess a very agreeable odour. I have no personal knowledge of this oil.

f. E. piperita.—The N.S.W. "peppermint," well known for the abundance of oil its leaves contain, and which attracts attention during the very first year of settlement in Australia. It reminds one of peppermint, as its name denotes; oil is made from it on a commercial scale in at least one district, and as it is abundant and the oil promises well, I believe the manufacture of this oil is destined to attain large dimensions.

g. E. Planchoniana.—Of limited occurrence, and found in Northern N.S.W. and Southern Queensland. The odour of this oil is described as peculiar, allied to citronella, but differing from it. It has been suggested as a soap perfume, and might perhaps be provisionally classed with the perfume oils.

h. E. populifolia.—"Bimbil box." The oil from this tree is interesting from the fact that it appears to resemble cajeput more than any other eucalyptus oil.

h. E. rudis.—"A blue gum" of Western Australia, and interesting as one of the few Western Australian species whose leaves yield oil in quantity.

k. E. salubris.—"The fluted or gimlet gum," so called in allusion to the appearance of the stem. The extraordinary abundance of oil in the leaves, approximately 4 per cent. in the fresh foliage, points this species out as the leading one in Western Australia for oil distillation (Müeller, "Forest Resources of W.A.").

E. viminalis.—"Manna gum."

E. corymbosa.—"Bloodwood."

E. leucoxylon.—Victoria and South Australian "white gum."

E. longifolia.—"Woollybut."
E. obliqua.—Tasmanian and Victorian "strongbark."
E. odorata.—"White box."
E. rostrata.—"Red gum." Have all been tested for oil yield, but none yield it in quantity, nor do their oils appear to possess any advantages over those of other species at present utilized.

The Active Principles of Eucalyptus Oils.—Speaking generally, the active principle of eucalyptus oil is *Eucalyptol*, which is so important, and so widely distributed, that the other constituents require but a passing notice.

The oil from *E. Staigeriana* contains a ketone ($C_{10}H_{16}O$?) to which it owes its pleasant lemon-like odour.

The oil of *E. maculata*, var. *citriodora*, consists, to the extent of about three-fourths, of citronellon, from which it receives its odour. Space will scarcely permit me to refer to other minor constituents of eucalyptus oils.

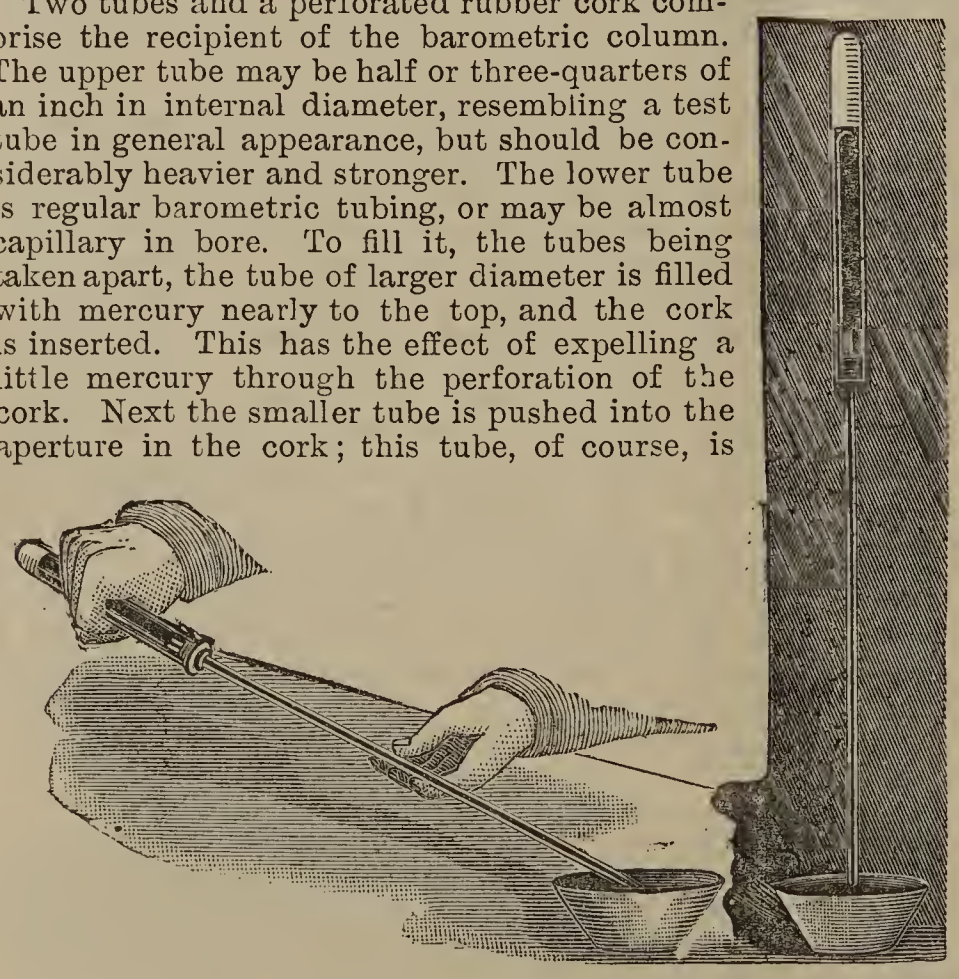
Eucalyptol (Cineol), $C_{10}H_{18}O$.—Specific gravity ·930; boiling point, 176°-177° C. Crystallizes at -1° C. Messrs. Schimmel and Co. report a mallee oil (*E. oleosa*)* to be so extraordinarily rich in eucalyptol, that in a freezing mixture it solidifies to a pasty mass. It is also contained in the oils of *E. globulus*, *E. amygdalina*, *E. Baileyana*, *E. microcorys*, and *E. dumosa*, and doubtless in many others only imperfectly investigated. It is also contained in cajeput oil, lavender oil, wormseed oil, and many others.

A LECTURE BAROMETER.

BY T. O'CONOR SLOANE, PH.D.

A simple form of barometer is illustrated for exhibiting the principle of the instrument in lectures or before audiences. The object is to have a large air chamber, so that it can be readily seen at a distance, yet to avoid the necessity of using very large amounts of mercury. It also is comparatively portable, as the tubes composing it are much shorter than the barometric column.

Two tubes and a perforated rubber cork comprise the recipient of the barometric column. The upper tube may be half or three-quarters of an inch in internal diameter, resembling a test tube in general appearance, but should be considerably heavier and stronger. The lower tube is regular barometric tubing, or may be almost capillary in bore. To fill it, the tubes being taken apart, the tube of larger diameter is filled with mercury nearly to the top, and the cork is inserted. This has the effect of expelling a little mercury through the perforation of the cork. Next the smaller tube is pushed into the aperture in the cork; this tube, of course, is open at both ends, and as it is pushed down the mercury rises in it. To avoid the resistance and pressure which the long column of mercury would produce were it vertical, it is well, in thrusting this tube into its final position, to hold the two, as shown in the cut, nearly horizontal with the lower end of the small tube over a recipient, which would naturally be the mercury cistern. When completely filled, the finger is placed over the end of the lower tube and the whole system is inverted in mercury, as in the manipulation of the ordinary barometer tube; the finger is removed and the mercury settles down to the proper height.



As regards their lengths, the upper tube may be 8 in. or 10 in. long, and the lower one about 24 in. Owing to the large volume of mercury employed, it settles down slowly to its position, the long almost capillary lower tube acting as a damper upon its motion exactly as in the ordinary sea barometer.

The advantages of this method of filling are that air can be so readily excluded. When a barometer is filled from the top, air is always carried in with the mercury, and to get rid of it some trouble is required. The bubbles may be fished out with a wire. By inverting the tube in mercury they may be made to coalesce into a large bubble; or the mercury may be boiled. In the present case, if any bubbles collect in the large tube, they may easily be drawn out with a glass rod or iron wire before inserting the cork. In the subsequent filling, as there is no agitation of the mercury, a perfect integral column is obtained.

As its disadvantage, the liability to leakage of the joint between the tubes should be mentioned. This is to be guarded against by using a very soft and perfectly fitting cork.—*Scientific American.*

THE SALE OF CHLORODYNE.

[In view of the discussions which have taken place in reference to the sale of proprietary preparations containing poisons it will be useful to place before our readers the opinions expressed on this subject in the medical journals and by the general press.]

"The numerous fatal accidents resulting from the sale, without any warning of their dangerous properties, of preparations containing opium or substances derived from opium, render the action of the Treasury in connection with 'Dr. Collis Browne's chlorodyne' peculiarly necessary. As a result of several coroners' inquests and of representations from various quarters this preparation has been officially tested, and a prosecution has been very properly instituted against the manufacturer rather than against any small retail shopkeeper, who might plead ignorance. That the case was regarded as one of considerable importance may be gathered from the array of eminent counsel employed. It was contended that chlorodyne was a proprietary medicine, and that the manufacturer had to take out an Excise licence and pay a stamp duty on every bottle. From a legal point of view a great deal appeared to depend upon whether the substance was a patent medicine or not. The prosecution maintained that the bottles should be labelled with the word 'Poison,' so that the public should know what they were actually buying when purchasing medicines containing a certain amount of poison, and children and adults with a tendency to commit suicide should be unable to obtain such dangerous drugs. For the defence it was urged that chlorodyne had been sold for over forty years, and that it was unwise to employ the word 'poison,' as

* This oil is now stated by Messrs. Schimmel to be distilled from *E. cneorifolia*. The error arose from the fact that this species was originally recorded as a sub-variety of *E. oleosa*.—[Ed. Ph. J.]

it would tell people what to take if they wanted to commit suicide, and indeed that it might be safer to keep it as a medicine, as everybody disliked medicine, and the young particularly shrank from taking that which they knew to be a medicine. This curious contention strikes at the root of the matter, and questions the wisdom of the provisions of the Sale of Poisons Act. As a matter of argument, it may be admitted that for the purposes of suicide the red label appears to offer certain facilities; but it is relatively so easy to procure poisons that surely the true purport of the label is to protect the public against accidents through ignorance. For a medicine, even a patent medicine, containing 15 per cent. of chloroform and 2 grains to the ounce of morphine, to be retailed without any warning, all over the country, by drapers, grocers and chandlers, is surely to invite accidents. The medicinal value of chlorodyne is not here in question—indeed, there is an official preparation much resembling it in the British Pharmacopœia; but then it is intended for use under medical advice and for sale by qualified chemists, and it is not dispensed freely for general, unskilled, haphazard employment in the treatment of coughs, colds, fever and the like, as though it were absolutely free from danger."—*Lancet.*

"At last our continued endeavours to expose the systematic infringement of the law relating to the sale of poisons has been attended with some measure of success, as will be seen from the report of the case heard before Mr. Lushington on April 30, and published in the *British Medical Journal* this week, at page 995. A prosecution has been instituted by the Treasury for the sale of a well-known secret remedy, without observance of the precautions as to labelling which are prescribed by the seventeenth section of the Pharmacy Act, 1868. For the first time legal proof has been produced in court of the presence, in that preparation, of an article which is a poison within the meaning of the Act, and as a natural consequence a magisterial decision has been obtained that the sale of this preparation without the precautionary label is a breach of the law, and an offence under the seventeenth section of the Pharmacy Act, for which a seller is liable to a penalty of £5 and costs. It is remarkable that, although the Pharmacy Act has been in force for more than twenty years, this is only the third instance in which the provisions of the Act intended for the protectron of the public have been put into operation in a similar manner. To a great extent this singular anomaly is due to the veil of secrecy under which preparations of the kind are sold, However, in the first of the three instances above mentioned that was not the case, and the preparation for the sale of which a public prosecution was instituted avowedly contained chloral—an article which had then been made a poison within the meaning of the Act. A conviction was obtained in that case, and, though notice of appeal was given, it was not followed up so as to bring to a judicial decision, in the higher courts, the question whether proprietary preparations containing poisons are exempt from the provisions of the Pharmacy Act.

"In a second instance of prosecution by the Treasury, a child had died from the effects of swallowing a large quantity of a cough linctus containing morphine, and the vendor of the preparation was charged with the offence of having sold it without the precautionary poison label, which would have been a warning against negligent use. In that case the defendant offered no defence. He admitted that he had not been aware of the requirements of the law, but had acted upon the supposition that secret remedies sold with the Government stamp were exempt from the provisions of the law in regard to the sale of poisons. This mischievous assumption is still very generally prevalent, and although it is now ten years since the prosecution referred to was instituted by the Treasury, that assumption has continued to be acted upon by the sellers of secret remedies containing poisons within the meaning of the Act. Meanwhile the evidence furnished by coroners' inquests has from time to time demonstrated the danger attending the irregular sale of such preparations, and the fact that it amounts to a direct stultification of the Act passed for the express purpose of protecting the public from the dangers of poison. It has, therefore, become an urgent necessity that the Government authorities should intervene and put a stop to this practice by strenuously enforcing the provisions of the 17th section of the Pharmacy Act.

"It is pretended, by the proprietors of secret remedies, that the Government stamp, under which their preparations are required to be sold, confers an immunity from the law relating to the sale of poisons, and that by the payment of the stamp duty they are at liberty to sell poisons without observing the precautions which Parliament has declared to be essential for the safety of the public. A more fallacious contention it would be impossible to imagine. But in addition to its untenable nature as an argument to justify the practice of the proprietors of secret remedies, it will be seen that since the Government derives pecuniary advantage from the stamp duty imposed upon secret remedies, it becomes especially a duty to prevent the Government stamp being used as a means of frustrating the object of an Act of Parliament. To permit the continuance of such a state of things would be both inconsistent and immoral, and we cannot doubt that as the real existence of the evil is now being proved, the Government will carry out the intention announced in the case which was heard at the Mansion House two years ago, and put the law in force systematically. Notice has been given in the chlorodyne case that the magisterial decision will be made the subject of an appeal in order to obtain a judicial settlement of the point of law, and it is probable that the proprietors of secret remedies, believing the sale of their articles would be damaged by the use of the poison label, will make a vigorous attempt to maintain the position that they are outside the law. We cannot, however, believe that they will succeed in that attempt, or that the safety of the public can be subordinated to the protection of private interests. Moreover, it is a mistake to assume that the sale of the preparations in question would be prejudiced by attaching to them the poison label in conformity with the Pharmacy Act. There is actually a case in which that has been done for several years without any consequent disadvantage to the proprietor of the article so far as its sale is concerned. On the contrary, it has been proved to be an advantage, for in a case where death was supposed to have been caused by an overdose of the preparation, the fact that the poison label had been attached to the bottle showed that, the sale of the article having been in conformity with the requirements of the law, the seller was free from any blame.

"The chlorodyne case of last Saturday is to be regarded as a test case, the final decision of which will affect all similar preparations. It is, therefore, important to note that the only defence put forward by Mr. Poland was based upon the assumption that chlorodyne is a patent medicine. The question at issue is, consequently, a very simple one. The magistrate declined to accept Mr. Poland's statement that any medicine sold under the Government stamp is a patent medicine, and he preferred to adopt the definition given in the Medicine Stamp Act that it is a medicine prepared, uttered, vended, or exposed for sale under the authority of letters patent under the Great Seal as contradistinguished from proprietary and secret preparations or nostrums that are equally

with patent medicines, liable to stamp duty. The popular error of confounding these different articles together under the term 'patent medicine,' cannot be sufficient reason for neglecting the specific definition and distinctions of the Act relating to these articles, and it is unlikely that a popular error would be upheld when it involves prejudice to the public interest. It may therefore be anticipated that the secret sale of poisons in the form of so-called 'patent medicines' will now be subjected to the control we have long contended that it requires.

"We cannot agree with Mr. Poland's contention that the consequent restriction of the sale of such articles to legally qualified chemists and druggists would be 'ridiculous.' On the contrary, we consider the achievement of that result to come within the especial object of the Pharmacy Act, and that it will be the duty of the Council of the Pharmaceutical Society to enforce that restriction vigorously. The opportunity for taking action in that way is now being provided by the removal of the veil of secrecy under which irregular sales of poison have hitherto been carried on, and it is to be expected that chemists and druggists throughout the country will loyally and actively support their representative executive in securing due observance of the law. If they fail to do so in a matter that will so obviously operate to their own advantage, they will forfeit all claim to be regarded by the public as entitled to higher consideration and confidence than ordinary traders, and be unworthy of the protection which the Pharmacy Act provides for them."—*British Medical Journal.*

"A case of no ordinary importance was heard before Mr. Lushington, at Bow Street Police Court, on Saturday last. After years of inaction the Treasury had decided to enforce the Sale of Poisons Act, 1867, in respect of the proprietary medicine known as chlorodyne, the manufacturer of which, Mr. Davenport, was summoned to answer a charge of having sold retail a mixture containing opium and chloroform, without indicating the poisonous nature of the contents on the wrapper of the bottle. The defence was that the preparation was a patent 'medicine,' and was thus excluded from the operation of the Act. The magistrate, however, held the charge to be proved, and inflicted a fine of £5 with costs. In future, therefore, every vendor of chlorodyne must affix a 'poison' label to the bottle under a penalty. This is indeed a step in the right direction, but it is very far from meeting the necessities of the case. The redrafting of the schedule annexed to the Act, and provision for the better enforcement of an amended law, are urgently called for in the public interest."—*The Medical Press.*

"It is to be hoped that the decision of Mr. Lushington at Bow Street on Saturday will not be lost sight of by the great army of quack medicine proprietors in this country, who trade and grow rich on the ailments—real, or supposed—of the public. Dr. Collis-Browne's Chlorodyne we have all known—by name, at least—for many years; but probably we did not all know that it consists largely of a preparation of opium and chloroform. For not labelling the mixture 'poison,' the manufacturer has been fined £5. Counsel, by the way, disclaimed any intentions of questioning the merits of the preparation, which may possess all the virtues claimed for it, but if we must take remedies for coughs and colds, it is well that we should understand clearly what we do take."—*Pall Mall Gazette.*

"It seems, at first sight, rather hard upon a patent medicine which has been sold for forty years as a harmless and useful preparation that it should be suddenly haled before a magistrate and compelled for the future to describe itself as a poison. Still, in the case of the medicine known as Dr. Collis-Browne's chlorodyne it must be confessed that the poison label is certainly a necessary precaution. The medicine is, of course, a very well-known remedy, and one would think that most people are aware that its ingredients include at least one sufficiently dangerous poison—opium. As a matter of fact, it does contain morphine, a preparation of opium, in sufficient quantities to make a large overdose really dangerous. There are at least three classes of the community who require protection in this case—children, ignorant and careless people, and intentional suicides. Mr. Poland, who defended chlorodyne from the indignity of a poison label, offered an ingenious defence in the case of children and suicides. Poison, he said, was less abhorrent to childhood than ordinary physic, and the bottle would gain in attraction by the label; whereas in the case of those who wished to put an end to their life the label simply served as an adviser of how to do it. Neither of those propositions, however, is worth discussing seriously. The great danger in the use of this form of medicine is the carelessness and ignorance of those who buy it. The patient, knowing nothing of the ingredients, buys it from some general dealer who may be equally ignorant. He is advised on the bottle to take ten drops—let us say; he takes fifty, because he fancies that he wants a strong dose. The medicine is advertised as being a remedy against pretty nearly all the ills which flesh is heir to. The ignorant buyer might easily imagine that a dose for a cold should be increased tenfold in the case of consumption. The label, 'Poison,' has at least one effect: it makes a man pause."—*Globe.*

THE FLÜCKIGER TESTIMONIAL.

Complete List of Subscribers to the British Fund.

Atkins, Samuel R.	£1	1	0
Attfield, Professor	2	2	0
Benger, F. Baden	1	1	0
Bentley, Professor	1	1	0
Bottle, Alexander	1	1	0
Bourdas, Isaiah	1	1	0
Bowen, J. W.	0	10	6
Bremridge, Richard	0	10	6
Bullock, J. Lloyd	1	1	0
Carteighe, M. (*President of the Pharm. Soc. of Great Britain*)	2	2	0
Davies, R. H.	0	10	6
Dunstan, Professor	1	1	0
Ewing, James L.	1	1	0
Gale, Samuel	1	1	0
Gerrard, A. W.	1	1	0
Gostling, T. P.	1	1	0
Green, Professor	1	1	0
Greenish, Henry G.	1	1	0
Greenish, Thomas	1	1	0
Greenish, T. Edward	1	1	0
Hanbury, Cornelius	2	2	0
Hanbury, F. J.	2	2	0
Hanbury, Thomas	100	0	0
Hampson, Robert	1	1	0
Hills, Walter	1	1	0
Holmes, E. M.	1	1	0
Kerr, Charles	1	1	0
Martindale, William	1	1	0
Naylor, W. A. H.	0	10	6
Nichol, Anthony	1	1	0
Paul, Dr. B. H.	1	1	0
Ransom, Francis	1	1	0
Reynolds, Richard	1	1	0
Squire, P. W.	1	1	0
Stanford, E. C. C. (*President of the Brit. Pharm. Conference*)	2	2	0
Umney, Charles	1	1	0
Woolley, George S.	1	1	0
Young, J. Robertson	1	1	0

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, MAY 14, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE END OF THE CHLORODYNE PROSECUTION.

WE understand that in the chlorodyne case reported in last week's Journal the decision of the magistrate will not be disputed, and that there will not be any appeal on the part of the defendant. This admission that chlorodyne is subject to the provisions of the seventeenth section of the Pharmacy Act as a preparation of morphine is a matter of importance to registered chemists and druggists, inasmuch as it will necessitate labelling, and we may therefore anticipate that the proprietors will follow up their acceptance of the recent decision by taking steps to comply with the requirements of the law in this respect. Until sufficient provision is made for doing that, it will be advisable to exercise some caution in the sale of chlorodyne which is not labelled with the word "poison" and the names of those articles contained in it, which are poisons within the meaning of the Pharmacy Act.

To affix a label with the name and address of the retailer will be a simple matter. But hitherto the seller of chlorodyne would probably not have been justified in putting a poison label even upon the wrapper of a packet, and he could not have put such a label upon the bottle itself, because of its being enclosed and sealed by the medicine stamp. Moreover, we doubt whether the general knowledge or presumption of the presence of a scheduled poison in the preparation sold under those conditions would have been a sufficient ground for such a proceeding upon the part of a retailer. As we have on previous occasions pointed out the responsibility of the retail sellers of such articles extends only to their supplying them as they are received from the manufacturers and their wholesale agents, and the onus of conforming with the requirements of the law rests solely upon the proprietors, who are the only persons supposed to be acquainted with the composition of the articles, and with the presence in them of scheduled poisons.

It may be inferred from the consideration already shown during the prosecution, for persons who were unwittingly selling chlorodyne in contravention of the law, that no undue advantage will be taken of the fact that its sale without a proper label has now been proved and admitted to be a punishable offence. But in any case it must be remembered that the reason for such consideration has now been replaced by the necessity of observing the "salutary provisions of the statute." Now that it has been shown that those provisions do not admit of an exception which would entirely destroy their salutary effect, and that a Government stamp does not give a licence to break the law, the consequences of the position so far established must be looked to. They cannot be better stated than in the words of the counsel for the defence, that if chlorodyne is not a patent medicine it cannot be sold by anyone except a legally qualified chemist. This proposition will also apply to all preparations, patent, proprietary, or secret, which resemble chlorodyne in containing scheduled poisons, and it is evident that the magistrate's decision at Bow Street must be taken as confirming it. The abandonment of the intention to appeal against that decision may be taken as an acknowledgment that such a limitation of the sale of these preparations is not only appropriate and requisite with regard to the public and to the class of persons who are qualified to deal in poisons, but that it is also the best means of maintaining whatever repute such preparations may be entitled to and of protecting the just interests of their proprietors.

THE COUNCIL MEETING.

AMONGST several matters of note dealt with at the closing meeting of the present Council, we must refer to the creation of a class of Corresponding Members as being the outcome of a particularly happy idea. It is of very great importance to the members of the Society that their organization should be in touch with specialists in the various branches of science upon which pharmacy is based, throughout the world. Most of the gentlemen whose names are included in the first list have already assisted to a great extent in improving the position of the Society, as a means for obtaining and disseminating information of a practical and valuable nature, and it may be fairly hoped that this complimentary acknowledgment of past services may be the precursor of further amenities in the future on the part of those elected.

An affair of equal importance, but having a direct bearing upon the domestic affairs of the Society only, is the recommendation of the Research Committee that the title *Research Fellow of the Pharmaceutical Society* should be conferred upon pharmaceutical chemists who are members of the Society, and have given satisfactory evidence of their capability in conducting original work in those departments of science chiefly connected with pharmacy. Of the necessity of some such incentive to research there is no shadow of doubt, and the title selected is probably as felicitous as could be adopted, seeing

that the Society is as yet debarred conferring anything in the nature of a university or college degree. It may be anticipated that by the action of the Council in adopting this recommendation a great impulse will be given to pharmacognostical investigations in this country.

A third matter of special interest, primarily affecting candidates presenting themselves for the Minor examination but in its incidence affecting the whole body of British pharmacists, is the adoption of a regulation drafted by the Boards of Examiners requiring such candidates to give satisfactory proof of their acquaintance with those provisions of the Pharmacy Act relating to the sale of poisons. It is a well-known fact that men in the drug business are, in many instances, painfully ignorant of the actual provisions of Acts of Parliament having some bearing upon their daily work. In many cases, indeed, much unnecessary inconvenience has been self-inflicted because of such ignorance. It behoves every pharmacist, therefore, who would properly realize his own position in the social economy to have a thorough understanding of all legislative proceedings in any way affecting his actions, and we trust that this enforcement of a knowledge of the special poison regulations imposed by the law may be followed by a general study of the various statutes which in any way control the conduct of the business of pharmacists.

THE ANNUAL DINNER.

It is necessary to remind those who intend being present at the Annual Dinner of the Members of the Pharmaceutical Society and their friends, which is to be held at the Freemasons' Tavern on Tuesday, that application for tickets should be made at once. This will be especially necessary in the case of those who may desire to have seats allotted for themselves and friends, besides being helpful to the Committee in their endeavours to arrange matters so as to give general satisfaction.

THE REDWOOD SCHOLARSHIP.

This Scholarship is now offered annually to pharmaceutical chemists who may desire to obtain advanced instruction with a view to conducting original investigations in chemistry and chemical pharmacology, and the first appointment under the new arrangements will be made this year. The scholar is provided, free of cost, with a working bench, apparatus, and materials, in the Research Laboratory of the Pharmaceutical Society, and will receive, in addition, the sum of twenty pounds. Particulars as to the conditions may be obtained of the Secretary of the Society, to whom all applications must be sent not later than July 25.

VOTING PAPERS.

To prevent misapprehension on the part of electors who may not have noticed the reference in last week's report of the Council meeting, it should be stated that, on the recommendation of the Library and House Committee, it was decided not to issue voting papers for the election of members of Council, there being only fourteen nominees for the fourteen vacancies.

FLÜCKIGER TESTIMONIAL.

The subscription list, initiated by the President of the Pharmaceutical Society, to enable those interested in British pharmacy to take part in the proposed international expression of esteem for Professor Flückiger on the occasion of his retirement from active service, is now closed, and we publish a complete list of the subscribers at page 948.

AUGUST WILHELM VON HOFMANN.

The death is announced of Professor Hofmann, of the Berlin University, at the ripe age of seventy-four. Trained in the Universities of Giessen and Bonn, he came to London to assist in the organization of chemical teaching then being initiated by the foundation of the Royal College of Chemistry. Since that time considerable progress has been made in the cultivation of chemical science in this country, but every British chemist will be aware of the good work done by Professor Hofmann in the position he occupied; and they, as well as all who are in any way interested in the practical applications of chemistry, must be sensible of the obligations they are under to him and to the founders of the College of Chemistry. At a later period Hofmann occupied the positions of Assayer to the Royal Mint and Examiner in Chemistry to the Department of Science and Art. In 1856 he was elected an Honorary Member of the Pharmaceutical Society and, in 1861, President of the Chemical Society. Returning to Bonn to fill the Chair of Chemistry at that university, he afterwards succeeded Mitscherlich in the University of Berlin. His 'Introduction to Modern Chemistry' is the work by which he is probably best known in this country, but he also, at various times, edited other important chemical works, including those of Fownes and Liebig.

BRITISH PHARMACEUTICAL CONFERENCE.

At a meeting of the local Executive Committee held at Edinburgh, on Wednesday, it was arranged that the headquarters of the British Pharmaceutical Conference at the annual meeting should be at the Waterloo Hotel. The meetings will be held at the Waterloo Rooms, Waterloo Place. There will be an afternoon excursion to Dalmeny and the Forth Bridge, another to Hawthornden and Roslin, whilst the whole day excursion is to be to Killin, at the head of Loch Tay.

BACTERIOLOGICAL LABORATORY.

A course of instruction in bacteriology—comprising lectures, demonstrations and practical work—commenced this week at King's College. The class is held on Monday evenings from 7 to 9, and the lectures will deal with the microscope, the classification and cultivation of bacteria, the specific micro-organisms of disease, and methods of work. The practical work will include actual study of types of bacteria, sections, cultures, plate cultivations, etc. A moderate inclusive fee is charged, and full particulars may be obtained of R. T. Hewlett, Esq., Bacteriological Laboratory, King's College.

Transactions of the Pharmaceutical Society.

DONATIONS TO THE LIBRARY AND MUSEUM.

At the meeting of the Library, Museum, School and House Committee, held on Wednesday, the 11th inst., the undermentioned donations were reported, and it was ordered that the thanks of the Society should be communicated to the respective donors:—

To the Library in London—

Journal of the Chemical Society, 1891.

Berichte der deutschen chemischen Gesellschaft, 1891. From Mr. WALTER HILLS.

Pharmaceutical Society of Ireland, Calendar, 1892. From the SOCIETY.

College of Preceptors, Calendar, 1892. From the COLLEGE.

Iasolino (G.), Rimedi naturali d'Ischia, 1588. From Mr. W. H. BRIDGMAN.

Guajardo F. (Amador), Botánica médica nacional, o sea plantas medicinales de Chile, 1892. From the AUTHOR.

Royal College of Veterinary Surgeons, Register of Veterinary Surgeons, 1892. From the COLLEGE.

Ephemeris of Materia Medica, etc., vol. 3, no. 6, 1892. From Dr. SQUIBB.

New South Wales, Report of Curator of Technological Museum for 1890. From the MUSEUM.

To the Library in Edinburgh—

Ephemeris of Materia Medica, etc., vol. 3, no. 6, 1892. From Dr. SQUIBB.

New South Wales, Report of Curator of Technological Museum for 1890. From the MUSEUM.

Withering, Arrangement of British Plants, 4th ed., 1801, 4 vols.

Smith, Compendium Floræ Britanicæ, 1816. From Mr. JAMES JACK.

To the Museum in London—

Three boxes of specimens illustrating Chinese Pharmacy. From Mr. ERNEST HART.

Specimen of "Pellote," a Mexican Tonic. From Mr. P. GOIFFON.

Specimen of Muna Muna. From Messrs. G. N. SOURATTY and Co.

Twenty-eight specimens of native drugs from Afghanistan. From Mr. H. A. SCHLESINGER.

Specimens of terpeneless oils of lemon and caraway, and of citrene and carvene. From Mr. H. HAENSEL.

To the Museum in Edinburgh—

Specimen of neutral tartrate of strychnine. From Messrs. DUNCAN, FLOCKHART and Co.

Cone of *Araucaria imbricata*. From Mr. J. JACK.

To the Herbarium—

Specimens of *Salix daphnoides*, *S. fragilis*, *S. Grahami*, *S. purpurea*, and *S. viridis*. From Mr. F. W. TOWNDROW, per Mr. L. L. STROUD, Malvern.

Specimens of *Erythroxylon Coca*. From Messrs. T. CHRISTY and Co.

Specimen of Styrax Benzoin. From the DIRECTOR, Botanical Gardens, Singapore.

Proceedings of Societies in London.

SOCIETY OF CHEMICAL INDUSTRY.

LONDON SECTION.

An ordinary meeting of the section was held at Burlington House, on May 2, Mr. T. Tyrer in the chair. Among the preliminary announcements was an account of what it was proposed to do at the forthcoming annual general meeting and an appeal for the formation of a guarantee fund.

Professor Ramsay then read a paper on the distillation of wood. He said that although he was set down as the joint author with Mr. J. C. Chorley, he would prefer to describe himself as Mr. Chorley's mouthpiece, most of the work of the paper being due to the latter investigator. In spite of the comparative antiquity of the process of wood distillation for manufacturing purposes, it did not appear to have been investigated with a view to determining the influence of conditions upon results. Mr. Fawcett, of Glasgow, had made some experiments which were recorded in the Society's Journal, and these threw a good deal of light on the yield obtained from different woods, but did not touch the question of the nature of the products and the causes of their variation. In reviewing the substances that were obtained by the distillation of wood, the authors stated that although acetic acid was the chief acid product, yet such bodies as formic acid, propionic acid, isopropionic acid, and butyric acid were also present. The neutral bodies, besides methyl alcohol, included such substances as acetone, methyl acetate, amyl acetate, aldehyde, methyl formate, methylethyl ketone, methylal, and furfural. The gases comprised carbon monoxide, carbon dioxide, march gas, oxygen and nitrogen, the last two being possibly merely due to the retained air. Olefines were also sometimes present, but, according to Fischer, no free hydrogen was formed. It was impracticable on a large scale to take the true temperature of the inside of a retort; a small apparatus had therefore been constructed for laboratory experiments by means of which both this could be done and the character of the product determined. It consisted essentially of a glass distilling flask, jacketted so that its temperature could be kept constant, condensing tubes for the liquid products, and a gas holder for those which were gaseous. The following are some of the authors' results:—

	High Temperature Distillation.		
	Oak. Per cent.	Beech. Per cent.	Alder. Per cent.
Weight of wood used (grms.) .	187	180	134
Charcoal . . .	24·55	26·66	25·37
Distillate . . .	58·69	59·33	59·70
Carbon dioxide .	9·58	9·29	9·70
Volume of gas in c c.. . . .	7000	7200	6000

The gases had the following composition:—

	Parts per cent.		
Carbon monoxide	70·77	73·14	73·47
Oxygen	—	1·02	1·52
Olefines	1·11	1·49	1·59
Marsh gas . . .	14·90	18·71	20·11
Nitrogen . . .	13·32	5·64	4·31

Experiments carried on at a low temperature generally showed figures similar to these, differing however, to some extent, along tolerably well-defined lines. Thus the amount of charcoal was higher and that of carbon dioxide lower. In the case of the gases the percentage of carbon monoxide was increased to about 90 per cent., the olefines, which were a product of the action of a high temperature on marsh gas, disappeared altogether, and the amount of marsh gas itself largely decreased. In a series of experiments made by Mr. Chorley, to determine the yield of methyl-alcohol, the numbers varied so widely that suspicion was cast on the method of estimating it, which consisted in obtaining it moderately free from other products by fractionation, oxidizing with bichromate and sulphuric acid, and estimating the carbon dioxide given off. With regard to the temperature at which these changes took place, it was noticed that a rise began at a certain

stage of the distillation, showing that an exothermic reaction occurred in the retort at that particular juncture.

Professor Ramsay stated that when this temperature had been reached, decomposition would proceed even after the fires had been drawn, and characterized the change as an explosive one. It was at this part of the process that acetic acid, methylal and furfural were chiefly evolved.

In the discussion which followed, Mr. Blount objected to the application of the term "explosion" or "explosive" to a change, merely because it was exothermic. It might prove a convenient method of classification, but was an undue straining of a term which, though difficult to define, was well understood.

Mr. Howard said that it was highly necessary to have a clear idea of what changes were truly explosive, in order to diminish manufacturing risks.

Mr. Foster had noticed the occurrence of a high temperature in distilling the wood of the coniferæ. He had also observed that although the fixed carbonaceous residue did not vary very much, the proportions of gas and tar showed considerable fluctuations.

Mr. Watson Smith, speaking upon the question as to whether the reaction was of the nature of an explosion, said that no severe rise of temperature was, according to his experience, observed on the large scale. More danger was to be apprehended from the spontaneous ignition of freshly burned charcoal.

Mr. A. G. Green objected to the method of estimating methyl alcohol which the authors had adopted. Assuming that it had been first obtained by neutralizing and fractionating the distillate, acetone would be the only probable impurity, and could be estimated as iodoform and the true value for the methyl alcohol obtained.

Mr. Biggs said that the wood distillation industry was a dying one in this country; charcoal was now a drug in the market. In earlier days the process had been undertaken for rather curious purposes; for example, it had been used for preparing Epsom salts, by dissolving the lime out of magnesium minerals by means of the pyroligneous acid obtained as one of the chief products. It was unfortunate that the Excise authorities did not allow the sale of pure methyl alcohol unless the full duty was paid on it, although a method had been worked out by which the purification of crude wood spirit could be effected.

Professor Ramsay, in reply, adhered to his use of the word "explosive," and considered it perfectly legitimate. He would be disposed to apply it to any exothermic change. He pointed out to Mr. Green that the scale of the experiments he had conducted was but small, and considerable difficulties would have been encountered in any endeavour to make a more accurate estimation than was actually done.

A note by Dr. Rideal on "Some Indian Gums of Known Origin," was down for reading; but on account of the length of the preceding paper and discussion, was unfortunately curtailed. Dr. Rideal pointed out that there many Indian gums that were too much ignored in England, largely from want of knowledge of their good properties. Ghatti gum, for instance, was scarcely known in this country, although used by pharmacists in India. Of the fifteen samples from known botanical species and gathered in determined localities which he had examined, many were quite unlike those from Arabia and Egypt. The author had determined the viscosity, adhesiveness and other properties of these gums, and their tabulated results would be given in the full paper. Gum acacia was often inferior to some of the others, and afforded an example of the evils that arose from careless and dirty methods of collection. Under proper supervision he thought that a valuable industry might arise in certain of these new gums.

CHEMISTS' ASSISTANTS' ASSOCIATION.

The annual general meeting of the above Association was held at 103, Great Russell Street, on May 5, when the following report was submitted by the Council and read by the Hon. Sec., Mr. J. C. Stead.

The Annual Report.

The Council has much pleasure in presenting this, the fifteenth annual report.

The Association numbers 190 members, of whom 101 have been enrolled during the session. There are forty-nine patrons, being an increase of five. At the same time the Council much regrets that the death of Mr. H. E. Attwood has deprived the Association of one of its esteemed patrons.

The average attendance has been larger than that of previous years, viz., thirty-seven; the smallest fifteen, the largest at ordinary meetings, fifty-eight on the occasion of the Inaugural Meeting, and fifty when Dr. Luff's paper was read.

Twenty-eight papers and notes have been read at the meetings of the Association, which both in number and excellence compare very favourably with those of former years. They have for the most part been published in full by the pharmaceutical press. In November last the discussion on "The Importation of Foreign Chemicals" was well attended, and on December 3 the "Impromptu Discussions," substituted at a very short notice for a paper unavoidably postponed, were a success.

The conversazione, held at the Portman Rooms on November 19 last, was very largely attended, and the annual dinner at the Holborn Restaurant, on March 3, presided over by S. R. Atkins, Esq., J.P., also attracted a large gathering.

The innovation this session of providing refreshments at all meetings has been fully appreciated, and the Association can be congratulated upon the economical manner in which the idea has been carried out, the cost having been but slightly in advance of that for refreshments for the musical and social evenings only of the preceding session.

The Council has again to lament its inability to award the silver medals of the Association and the money prizes accompanying them, as it considers that neither in the application for the research prize nor yet in the quality of the essays submitted does the work attain a standard sufficiently high to justify the bestowal of such substantial and honourable awards.

The marked increase in the balance indicates that the affairs of the Association are again upon a satisfactory basis, and this taken with the fact that the roll of members exceeds that of any former session, and the high figure at which the general attendance stands renders the submittal of this report an agreeable duty, and it is with a feeling of satisfaction that the Council congratulates the Association at the termination of a very useful and highly progressive session.

The President moved and the Vice-President (Mr. Frank A. Rogers) seconded the adoption of the report, which was agreed to unanimously.

The Treasurer (Mr. C. J. Strother) then read the balance sheet, which was eminently satisfactory and showed that the Association had quite recovered from the state of depression under which it laboured at the commencement of the Session. In spite of the increased expenditure consequent upon increase of work and members the finances of the Association are in a much better condition than at any former period of its existence.

The President proposed that this be adopted. The motion was seconded by Mr. T. A. Ellwood and unanimously agreed to by the meeting.

Election of the Council.

The scrutineers, Messrs. Riches and Pope, reported that eighty-four voting papers had been received, of which one was informal. The following is the result of the election:—Morris, W. A., 80; Stead, J. C., 78; Williams, W. L., 76; Ellwood, T. A., 76; Strother, C. J., 70; Walton, S. A., 68; Rogers, Frank A., 65; Robins, H. H., 63; Parry, E. J., 57; Seccombe, C. W., 50; Harrison, E. F., 47; Robinson, H. A., 47; Burnett, E. E., 45; Sage, C. E., 43. The above form the Council.

Morley, C., 42; Shepheard, W. J., 40; Hobbs, A. E., 40; Pearmain, T. H., 31; Care, H. B., 12.

A vote of thanks was proposed to Messrs. H. Garnett and C. E. Sage, the auditors of the balance sheet, and Messrs. Pope and Riches, the scrutineers, by the President, and seconded by Mr. H. H. Robins, and carried without dissent.

The President (Mr. W. Lloyd Williams) then read his—

Valedictory Address.

Gentlemen,—With the presentation of its balance-sheet the duties of your Council may be said to conclude, and concurrently with its presentation your President resigns his office.

But before retiring once more to the ranks of the "common councillor," I am privileged by precedent to have the last word, and I should be sadly remiss in courtesy and gratitude did I allow the occasion to pass without putting on record my deep appreciation of the magnificent fashion in which you have so consistently responded to the urgent appeal I made for support at the commencement of the session.

There was abundant justification for the forcible manner in which I considered it to be my duty to address you when opening the session, but it is a source of infinite satisfaction to me to know that my remedy should have had the effect of arresting the waning energy and of restoring once more to a healthy condition the flagging vigour of this Association.

Gentlemen, it is in no spirit of fulsome compliment that I congratulate you upon the labours of the past session. You have ample grounds for satisfaction in your augmented balance, in the substantial addition to your roll of members, and above all in the sustained interest and excellent attendancies manifest at your meetings. Nor has this happy consummation been bought by loss of dignity or derogatory conduct, for I have ever been conscious of Bacon's remark, "Not to use ceremonies at all is to teach others not to use them again," and whilst maintaining the dignity of the chair, I have endeavoured to make the most shy and reserved member realize that he is as much a part of our Association as is the most confident and self-possessed gentleman amongst us.

The efforts I have myself made to contribute to the success of the session would have been of little effect had I not been able to command the active co-operation of the whole of the Council, and especially are your thanks and mine due to the ever ready and cheerfully rendered assistance of our incomparable secretaries, Messrs. Stead and Morris.

The amount of work entailed in efficiently administering the affairs of this Association increases year by year, and it requires a personal experience of the post to correctly estimate the self-denial involved; and no words I could use would be too strong to express my sense of personal indebtedness.

Having once more been raised from the lethargic condition into which you had slipped, it should now be your aim to surpass all previous efforts, and if each member will recognize his own power and influence this task will prove no task at all, for "who does the utmost that he can can sometimes do more."

Your influence, if exerted in increasing the roll of members, will considerably augment the sphere of usefulness of the Association to the entire body pharmaceutic, and an opportunity for enjoying further social and educational advantages will result from a natural process of evolution. If any tincture of regret is to stain our recollection of the past session, it will lie in the fact that members are not quite sufficiently alive to the sense of personal effort. The Council was unable to award the Association prizes because the quality of the work submitted was not in accordance with the standard that we consider should be rigorously maintained; and there is a tendency to slur over the evenings set apart for the discussion of pharmaceutical subjects amongst our own members.

It is not to be expected that every member of the Association will contribute a paper to its meetings or compete for its prizes, but it is quite evident we need to be reminded that "a wise man will make more opportunities than he finds," and one of the things we have to learn is to find out what we cannot do—and having found it—to do it.

If you allow your course of conduct to be ruled on some such lines as these, "progress" will be writ large on every department of your work.

And now, gentlemen, I must lower this, the crowning stone of the edifice of our joint labours. Cemented with the mortar of good fellowship, the past session will long be remembered by ourselves at least; and if I have sometimes failed to reach the high-water mark of an ideal president, I am conscious that I have been generously treated by yourselves, whilst I have striven, perhaps not altogether without success, to worthily repay the confidence you were good enough to repose in me. With every wish for the success in life of each one of you, in my presidential capacity I bid you farewell.

At the conclusion of the President's address, a vote of thanks was proposed to him by Mr. T. A. Ellwood and seconded by Mr. E. J. Parry, for the able manner in which he had filled the presidential chair during his year of office.

The vote being carried with acclamation and suitably acknowledged by Mr. Williams, the proceedings terminated.

ROYAL INSTITUTION.

Micro-Organisms in their Relation to Chemical Change.

BY PROFESSOR PERCY F. FRANKLAND, PH.D., B.SC. F.R.S.

Almost exactly on this day twenty-two years ago the subject of micro-organisms was introduced to the audience of the Royal Institution in one of those charming discourses, which so many of us well know were always to be heard from Dr. Tyndall. The title of his discourse on that occasion was "Dust and Disease," and its contents should be studied by all interested in this departure of science, forming, as it does, a part of the classical literature of the subject in which it marks the commencement of a new epoch. It has probably rarely, if ever, happened before, that in so short a period as twenty-two years any science has undergone such a marvellous advance as that which has taken place in the case of bacteriology, the science which is devoted to the study of those low forms of life which we group together under the name of *micro-organisms*. This advance has been made through the ungrudging expenditure of self-denying labour by a great body of earnest workers of nearly every nationality. The subject is indeed one calculated to draw forth interest and enthusiasm, for the problems involved are not only of high scientific importance, but are also of incalculable moment to mankind, and

indeed to the entire living creation. The great impetus which this new science received at its outset was imparted by Pasteur, who has not only laid the foundations, but has also added, and is still adding, so much to the superstructure of its many mansions.

The side of bacteriology with which the general public is most commonly brought in contact is that which relates to disease, but of this I propose saying absolutely nothing to-night. It has been dealt with by others in this place, and notably by my friend Dr. Klein. There is a second side of bacteriology which has also a special interest for at least a portion of the public in consequence of the invaluable assistance which it has afforded to some sections of the industrial world. Indeed, chronologically, this industrial department of bacteriology was the first which claimed attention, for the growers of wine, the brewers of beer, and the manufacturers of fermented liquors of all kinds from the highest antiquity have been practical bacteriologists, of the same spontaneous order, it is true, as M. Jourdain was an unconscious author of prose. It was Pasteur also who first infused science into the operations of the wine-vat and the fermenting-tun, by his classical 'Etudes sur la Bière et sur le Vin.' It was he who first showed that the normal work of the brewery was accomplished by particular forms of micro-organisms, known as yeast, and that the frequent failures to produce beer or wine of the desired quality was occasioned by the presence of foreign forms of micro-organisms giving rise to acidity and other undesirable changes in these beverages. In these researches of Pasteur's on beer and wine, we are almost for the first time brought face to face with the precise nature of some of the chemical changes which micro-organisms bring about. The time-honoured vinous fermentation of sugar, the products of which had been valued and indulged in by man even from the days of Noah, is for the first time so accurately studied as to be definable almost with the precision of a chemical equation. Similar attention was also given by Pasteur to some of the other micro-organisms which deteriorate the quality of the beer, thus more especially to the bacterium which causes the *acetic* or vinegar fermentation, which is a process of *oxidation*, transforming alcohol into vinegar; to the bacillus inducing the *lactic* fermentation, which is a process of *decomposition*, in which sugar yields lactic acid; as well as to that which brings about the *butyric* fermentation, a process of *reduction* in which butyric acid is formed. These are the foundations and scaffolding on which subsequent investigators of the phenomena of fermentation have laboured. Thus making use of more refined methods than those which were at the disposal of Pasteur, Christian Hansen, of Copenhagen, has enormously extended our knowledge of the alcohol-producing organisms or yeasts; he has shown that there are a number of distinct forms, differing indeed but little amongst themselves in shape, but possessing very distinct properties, more especially in respect of the nature of certain minute quantities of secondary products to which they give rise, and which are highly important as giving particular characters to the beers produced. Hansen has shown how these various kinds of yeast may be grown or cultivated in a state of purity even on the industrial scale, and has in this manner revolutionized the practice of brewing on the Continent. For during the past few years these pure yeasts, each endowed with particular properties, have been grown with scrupulous care in laboratories equipped expressly for this purpose, and these pure growths are thence despatched to breweries in all parts of the world, particular yeasts being provided for the production of particular varieties of beer. In this manner scientific accuracy and the certainty of success are introduced into an industry in which before much was a matter of chance, and in which nearly everything was subordinated to tradition and blind empiricism.

The Bacteria connected with the Soil.

It is, however, with regard to the bacteria connected with other industries than those of alcoholic fermentation that our knowledge has particularly advanced during the last few years. Thus some of the most important phenomena in agriculture have recently received a most remarkable elucidation through the study of bacteria. Scientific agriculturists are generally agreed that one of the most important plant-foods in the soil is *nitric acid*, indeed they inform us that if a soil were utterly destitute of this material it would be incapable of growing the barest pretence of a crop *either of corn, or of roots, or of grass*, even if the soil were in other respects of the most superb texture, however favourably it might be situated, however well drained, tilled, and supplied with the purely mineral ingredients of plant-food, such as *potash*, *lime*, and *phosphoric acid*. Yet, notwithstanding the commanding importance of this substance nitric acid to vegetation, it is present in ordinary fertile soils in but little more than homœopathic doses.

These facts are gathered from those grand experiments which have during the past half century been going on at Rothamsted under the direction of Sir John Lawes and Dr. Gilbert, and which have rendered the Hertfordshire farm a luminous centre of the whole agricultural world. From these experiments it appears that sometimes there is in fertile soil under 1 part, and often under 10 parts, of nitrate of lime per million of soil. Now the cause of such minute quantities only of nitric acid being found in soils is due partly to this material being washed away by the rain and partly to its being so eagerly taken up by plants for the purposes of nutrition; for it has long been known that by suitable means the quantity can be enormously increased if no vegetation is maintained, and the ground properly protected from rain. The soil in fact, under ordinary circumstances, continuously generates this nitric acid from the various nitrogenous manures which are applied to it, and it is in the form of nitric acid that the nitrogen of manures principally gains access as nutriment to the plant.

It was in the year 1877 that two French chemists, Schloesing and Müntz, showed that this power of soils to convert the nitrogen of nitrogenous substances into nitric acid was due to low forms of life—to micro-organisms or bacteria. The proof which they furnished of this statement was of a very simple character, and consisted essentially in demonstrating that this production of nitric acid, or process of *nitrification*, as it is generally called, is promptly inhibited or brought to a standstill by all those materials which have the property of destroying micro-organisms, and which we call *antiseptics*, whilst similarly the process is stopped by heat and other influences, which are known to be fatal to life in general. These results of Schloesing and Müntz were confirmed and greatly extended in this country by Mr. Warington and Dr. Munro, but although the vital nature of the process was fully established, little practical advance was until recently made in the identification or isolation of the particular bacteria responsible for this remarkable and invaluable transformation. In 1886, however, a very important step was made by Dr. Munro, who showed that this process of nitrification could take place in solutions practically destitute of organic matter, or, in other words, that the vital activity of the bacteria of of nitrification could be maintained without nutriment of an organic nature. In 1885, I had myself already established the fact that some micro-organisms can actually undergo enormous multiplication in ordinary distilled water:—

*Multiplication of Micro-organisms in Distilled Water.**

Hours after Introduction of Micro-organisms.	Number of Micro-organisms found in 1 c.c. of Water.
0	1,073
6	6,028
24	7,262
48	48,100

In taking up the subject of nitrification in conjunction with my wife in the autumn of 1886, I determined to avail myself of this remarkable property of the nitrifying organisms to grow in the absence of organic matter, thinking that in this way it would be possible to achieve a separation of the nitrifying organisms from other forms which can only grow if organic food materials are supplied to them. Proceeding on these lines, we have carried on the process of nitrification over a period of upwards of four years without the nitrifying organisms being supplied with any organic food materials whatsoever—

Composition of Solution Employed for Nitrification.

Ammonium chloride	·5 grm.	In 1000 c.c. of distilled water.
Potassium phosphate	·1 „	
Magnesium sulphate	·02 „	
Calcium chloride	·01 „	
Calcium carbonate	5·0 „	

In a solution of this composition the process of nitrification was carried on over a period of upwards of four years. In carrying on this series of experiments it was soon evident that although a number of forms foreign to the nitrification process were being eliminated, there were still some remaining alongside of the nitrifying organisms, or, in other words, that a pure culture of the nitrifying organisms had not been obtained. From various considerations, however, we came to the conclusion that the nitrifying organisms probably differed from the other forms which were still present along with them, in being unable to grow on the common cultivating medium employed by bacteriologists, and known as gelatin-peptone. The separation from these foreign forms was ultimately effected by enormously diluting one of these nitrifying solutions, and then taking out small portions of this diluted material and introducing each of these portions into separate ammoniacal solutions. In some of these nitrification was established, in others not; whilst amongst those in which nitrification *was* established, some contained organisms which grew upon gelatin, whilst one refused to give any growth on the gelatin at all, although it was seen under the microscope to contain abundantly bacteria of the form shown in the diagram.

These results, which were published in March, 1890, were followed in about a month by a communication in the 'Annales de l'Institut Pasteur,' by W. Winogradsky, who had also separated a very similar, if not identical, nitrifying organism, and a few months later again a similar separation was made by Mr. Warington. But these discoveries had not completely unravelled the problem of nitrification, for the organisms separated in these three independent investigations possessed only the property of *converting ammonia into nitrous and not into nitric acid.* The nitrous acid is an intermediate body, which curiously is rarely found excepting in very minute quantities in soil. The changes will be more clearly understood by reference to the chemical equations:—

$$(1)\quad \underset{\text{Ammonia.}}{NH_3} + \underset{\text{Oxygen.}}{3O} = \underset{\text{Water.}}{H_2O} + \underset{\text{Nitrous Acid.}}{NHO_2}$$

$$(2)\quad \underset{\text{Nitrous acid.}}{NHO_2} + O = \underset{\text{Nitric acid.}}{NHO_3}$$

The organisms separated by Winogradsky, by Warington, and by myself, possessed only the property of effecting the first of these changes, they were absolutely destitute of the power of bringing about the second. Now the curious thing is that the first of these changes is by far the most difficult to accomplish by *purely chemical means*, whilst the second can be brought about with the greatest facility. In order to bring about the first change, we have to employ one of the most powerful oxidizing agents known to chemists, viz., ozone. We thus see that the power of oxidation possessed by our nitrifying organism is altogether unique, and does not find its parallel amongst purely chemical agents of oxidation. *But how then is the nitric acid found in the soil produced, when these organisms yield only nitrous acid?*

At the time when I found that the organism which I had separated produced nitrous acid exclusively, I pointed out that it was doubtless explicable on one of two hypotheses: (1) that nitrous and nitric acids are produced by totally distinct organisms; or (2) that the same organism produces the one or the other, according to the conditions under which it is growing. More recent researches of Winogradsky have shown that the first of these two alternative hypotheses is the correct one, for by making cultivations of soil in a solution containing nitrous acids and no ammonia, Winogradsky has succeeded in isolating a micro-organism which possesses the power of converting nitrous acid into nitric acid, but has no power of attacking ammonia. This second organism or *nitric ferment*, as we may call it, resembles in its activity the purely chemical oxidizing agent—*potassium permanganate*—which has no action on ammonia, but readily converts nitrous into nitric acid. The process of nitrification in the soil now becomes intelligible in its entirety. It is the work of two independent organisms, the first of which converts ammonia into nitrous acid, whilst the second transforms into nitric acid the nitrous acid produced by the first.

There is a point in connection with the distribution of nitric acid in nature which is exceedingly remarkable, and which forces itself upon the attention of every student of the process of nitrification. Although nitric acid is generally so scantily present in the soil, there is one notable exception to this rule, for in the rainless districts of Chili and Peru there are found immense deposits of nitrate of soda, or Chili saltpetre, as it is called, which would appear to represent the result of a gigantic nitrification process in some previous period of the earth's history. The vast quantities of this material which occur in these regions of South America can be gathered from the fact that its exportation has for years been going on at the rate indicated by the following figures:—During the first six months of 1890 there were brought to the United Kingdom 90,000 tons, and to the European Continent 480,000 tons. From the presence of such altogether enormous quantities, one is almost tempted to hazard the suggestion that in this particular region of the earth, under some special circumstances of which we know nothing, the nitrifying organisms must have been endowed then and there with very much greater powers than they possess to-day, and it is particularly noteworthy that in a recent examination of soils from nearly all parts of the earth, one coming from Quito, and therefore not far distant from these nitrate fields, was found to possess the power of nitrification in a degree far beyond that exhibited by any other soil hitherto experimented with. Is it not possible, perhaps, that we have in these vigorous nitrifying organisms of the soil of Quito, the not altogether unworthy descendants of that Cyclopean race of nitrifying bacteria, which must have built up the nitrate wealth of Chili and Peru, and thus countless ages ago founded the fortunes of our nitrate kings of to-day?

But these nitrifying organisms have also assisted in teaching us a highly important lesson in connection with the maintenance of life. The facts which I have

* Proc. Roy. Soc., 1885.

already referred to concerning the multiplication of micro-organisms in distilled water, and the continuation of the nitrification process over a period of four years in purely mineral solutions, are strong presumptive evidence in favour of these bacteria being able to gain a livelihood in the entire absence of organic foodstuffs. I refrained, however, from promulgating such a revolutionary doctrine until I should have had an opportunity of repeating these experiments with materials in which the absence of even the merest traces of organic matter had been assured, for, as chemists well know, even distilled water may contain traces of organic matter. Such a rigid proof as I had contemplated has, however, in the meantime been attempted by M. Winogradsky, also in connection with his experiments on nitrification, and he has indeed found that the nitrifying organisms flourish, multiply, and actually build up living protoplasm in a solution from which organic matter has been most rigorously excluded. Now this living protoplasm in the experiments in question must have been elaborated by these bacteria from carbonic acid as the source of the protoplasmic carbon, and from ammonia and nitrous or nitric acids as the source of the protoplasmic nitrogen. If these experiments are correct, and they were undoubtedly performed with great skill and much caution, they are subversive of one of the fundamental principles of vegetable physiology, which denies to all living structures, save those of green plants alone, the power of building up protoplasm from such simple materials.

I had occasion to mention in connection with these nitrifying organisms that they refuse to grow on the ordinary solid cultivating media employed by bacteriologists, a fact which presents a great obstacle to their isolation in a state of purity, for it is just by means of these solid culture media that micro-organisms are most easily obtained in the pure state. This difficulty has, however, been overcome in a most ingenious manner, originally devised by Prof. Kühne, in which the solid medium is wholly composed of mineral ingredients, the jelly-like consistency being obtained by means of silica.

Fixation of Free Nitrogen by Plants.

But whilst the study of the bacteria giving rise to nitrification has thus led to the subversion of what was regarded as a firmly established principle of vegetable physiology (*viz., the incapacity of any but green plants to utilize carbonic acid in the elaboration of protoplasm*), the same science has received another shock of perhaps equal if not greater violence through researches which have been carried on with other micro-organisms flourishing in the soil. For nearly a century past agricultural chemists and vegetable physiologists have been debating as to whether the free nitrogen of our atmosphere can be assimilated or utilized as food by plants. This question was answered in the negative by Boussingault about fifty years since; the problem was again attacked by Lawes, Gilbert and Pugh about thirty years ago, and *their* answer was also in the negative. In the course, however, of their continuous experiments on crops, Lawes and Gilbert have frequently pointed out that whilst the nitrogen in most crops can be accounted for by the combined nitrogen supplied to the land in the form of manures and in rain water, yet in particular *leguminous* crops, such as peas, beans, vetches and the like, there is an excess of nitrogen which cannot be accounted for as being derived from these obvious sources. The origin of this excess of nitrogen in these particular crops they admitted could not be explained by any of the orthodox canons of the vegetable physiology of the time. The whole question of the fixation of atmospheric nitrogen by plants was again raised in 1876 by a very radical philosopher, in the person of M. Berthelot, whilst the most conclusive experiments were made on this subject by two German investigators, Prof. Hellriegel and Dr. Wilfarth, who have not only shown that this excess of nitrogen in leguminous crops is obtained from the atmosphere, but also that this assimilation of free nitrogen is dependent upon the presence of certain bacteria flourishing in and around the roots of these plants, for when these same plants are cultivated in sterile soil, the fixation of atmospheric nitrogen does not take place. Moreover, the presence of these microbes in the soil occasions the formation of peculiar swellings or tuberosities on the roots of these plants; and these tuberosities, which are not formed in sterile soil, are found to be remarkably rich in nitrogen, and swarming with bacteria.

Extremely important and instructive in this respect are the experiments of Professor Nobbe, who has not only confirmed the results mentioned, but has endeavoured to investigate the particular bacteria which bring about these important changes, and he has indeed succeeded in showing that in many cases each particular leguminous plant is provided with its particular micro-organism, which leads to its fixation of free nitrogen. Thus he found that if pure cultivations of the bacteria, obtained from a pea tubercle, were applied to a pea plant, there was a more abundant fixation of atmospheric nitrogen by this pea plant than if it was supplied with pure cultures of the microbes from the tubercles of a lupin or a robinia; whilst similarly the robinia was more beneficially affected by the application of pure cultures from robinia-tubercles than by those from either pea-tubercles or lupin-tubercles. This subject of the source of nitrogen in leguminous plants has again been taken up by Sir John Lawes and Dr. Gilbert at Rothamsted, and their recent results fully confirm the observations of these foreign investigators that it is partially derived from the free atmospheric nitrogen through the agency of bacteria in the soil. To micro-organisms again, then, we must ascribe the accomplishment of this highly important chemical change going on in the soil, although it has not hitherto been so fully illuminated as the process of nitrification.

Selective Action of Micro-organisms.

Any of the ordinary plants and animals with which we are familiar may be regarded as analytical machines; and we ourselves, without any knowledge of chemistry, are constantly performing analytical tests. Thus, we can all distinguish between sugar and salt by the taste, between ammonia and vinegar by the smell; whilst by a more elaborate investigation we distinguish, for instance, between the milk supplied from two different dairies, by ascertaining on which we, or our children, thrive best. In fact, such analytical or selective operations are amongst the first vital phenomena exhibited by an organism on coming into this world. It is, however, particularly surprising to find this analytic or distinguishing capacity developed in an extraordinarily high degree amongst micro-organisms. From the power which we have seen that some possess of flourishing on the extremely thin diet to be found in distilled water, we should be rather disposed to think that caprice would be the very last failing with which they would be chargeable. As a matter of fact, however, the perfectly unfathomable and inscrutable caprice of these minute creatures is among the first things with which the student of bacteriological phenomena becomes impressed. Let me call your attention to a striking example of this, which I have recently investigated.

I have here two substances, which have the greatest similarity:—

	Mannite.	Dulcite.
Occurrence.	Numerous plant-juices.	Ditto, but less frequently.
Taste.	Sweet	Ditto, but less so.
Melts.	166° C.	188° C.
Crystalline form.	Large rhombic prisms.	Large monoclinic prisms

Not only, however, do these two substances possess such a strong external resemblance to each other, but in their chemical behaviour also they are so closely allied that one formula has to do duty for both of them, for so slight is the difference in the manner in which their component atoms are arranged, that chemists have not yet been able with certainty to ascertain in what that difference consists. Under these circumstances it would have been anticipated that bacteria would be quite indifferent as to which of these two substances was presented to them, and that they would regard either both or neither as acceptable. But such is by no means the case; some micro-organisms, like ordinary yeast, have *no action upon either*, whilst *others will attack mannite, leaving dulcite untouched, others again being less discriminating, attack both*; representatives of a fourth possible class *which would act upon dulcite but not upon mannite* are as yet undiscovered. The *Bacillus ethacetieus*, I have recently shown, has the property of breaking down the mannite molecule into alcohol, acetic acid, carbonic anhydride and hydrogen, but leaves the dulcite molecule untouched. More recently I have, in conjunction with my late assistant, Mr. Frew, succeeded in obtaining a micro-organism (*B. cthacctosuccinicus*) which decomposes both mannite and dulcite into alcohol, acetic, and succinic acids, carbonic anhydride, and hydrogen.

Optically Active Substances.

But these are by no means the ultimate limits to which the selective or discriminating powers of micro-organisms can be pushed, for although mannite and dulcite are extremely similar substances, they are not chemically identical. We are acquainted, however, with substances which, though chemically identical, are different in respect of certain physical properties, and are hence known as *physical isomers*. It is in explanation of this physical isomerism that one of the most beautiful of chemical theories was propounded by Lebel and Van't Hoff in 1874, and which remains unsupplanted to the present day. This theory depends upon taking into consideration the dissymetry of the molecule which is occasioned by the presence in it of a carbon-atom which is combined with four different atoms or groups of atoms, and is most easily intelligible from an inspection of these two models. This molecular dissymmetry is specially exhibited in the crystalline form of such substances, and in their action upon polarized light. The molecule arranged according to the one pattern has the property of turning the plane of polarization in one direction, whilst the molecule arranged according to the other pattern has invariably the property of turning the plane through precisely the same angle in the opposite direction. The molecular dissymmetry ceases when two such molecules combine together, the resulting molecule having no action on polarised light at all. The interest of these phenomena in connection with micro-organisms lies in the fact that they are sometimes possessed of the power of discriminating between these physical isomers. Although this remarkable property was demonstrated years ago by Pasteur in respect of the tartaric acids, it has only comparatively rarely been taken advantage of. Recently, however, chemical science has been enriched in several instances by successfully directing the energies of micro-organisms in such work of discrimination.

During the past few years no chemical researches have commanded more interest, both on account of their theoretic importance and the fertility of resource exhibited in their execution, than those of Emil Fischer's, which have led to the artificial preparation in the laboratory of several of the various forms of sugar occurring in nature, as well as of other sugars not hitherto discovered amongst the products of the animal or vegetable kingdoms. The natural sugars are all of them bodies with dissymmetric molecules, powerfully affecting the beam of polarised light, but when prepared artificially they are without action on polarised light, because in the artificial product the left-handed and right-handed molecules are present in equal numbers, the molecules of the one neutralising the molecules of the other, and thus giving rise to a mixture which does not affect the polarized beam either way. By the action of micro-organisms, however, on such an inactive mixture, the one set of molecules is searched out by the microbes and decomposed, leaving the other set of molecules untouched, and the latter now exhibit their specific action on polarised light, an active sugar being thus obtained.

The most suitable micro-organisms to let loose, so to speak, on such an inactive mixture of sugar-molecules, are those of brewers' yeast, which decompose the sugar molecules with formation of alcohol and carbonic anhydride. Their action on these inactive artificial sugars of Fischer's is particularly noteworthy. One of the principal artificial sugars prepared by Fischer is called *fructose*, it is inactive; but consists of an equal number of molecules of oppositely active sugars called *lævulose*. One set of these lævulose-molecules turns the plane of polarisation to the right, and we may call them *right-handed lævulose*, whilst the other set of *lævulose-molecules* turns the plane of polarisation to the left, and we may call them *left-handed lævulose*. The left-handed lævulose occurs in nature, whilst the right-handed lævulose, as far as we know, does not. Now, on putting brewers' yeast into a solution of the fructose, the yeast-organisms attack the left-handed lævulose molecules and convert them into alcohol and carbonic anhydride, whilst the right-handed lævulose is left undisturbed. The yeast organisms thus attack that particular form of lævulose of which their ancestors can have had experience in the past, whilst they leave untouched the right-handed lævulose molecules, which being a new creation of the laboratory, they have no hereditary instinct or capacity to deal with. This selective power is possessed also by other forms of micro-organisms besides the yeasts, which are indeed only suitable for the separatory decomposition of sugars, and by means of bacterial forms a much greater variety of substances can be attacked in this manner. Thus I have recently found that glyceric acid can be decomposed by the *B. ethaceticus*, to which I have already referred this evening. This glyceric acid is thus represented by chemists:—

$$C_3H_6O_4 \quad \text{or} \quad \begin{array}{l} (CH_2OH) \\ | \\ (H)—C\ OH) \\ | \\ (COOH) \end{array}$$

and this should, according to Le Bel and Van't Hoff's theory, be capable of existing in two physically isomeric forms, as easily shown by our models. The ordinary glyceric acid known to chemists is, however, quite inactive to polarised light, and must consist, therefore, of a combination in equal molecules of a right-handed and left-handed glyceric acid. Now when the *B. ethaceticus* is put into a suitable solution of the calcium salt of this glyceric acid, it multiplies abundantly and completely consumes the right-handed molecules of the salt, but leaves the left-handed molecules entirely intact, a powerfully active glyceric acid being thns obtained.

A number of derivatives of this new active glyceric acid have recently been prepared in my laboratory:—

Derivatives of Active Glyceric Acid.

Formula.	Specific rotation. $[a]_D$
$(C_3H_5O_3)_2Ba + 2H_2O$	− 9°
$(C_3H_5O_3)_2Sr + 3H_2O$	− 10°
$(C_3H_5O_3)_2Ca + 2H_2O$	− 12°

Formula.	Specific rotation. $[\alpha]$
$(C_3H_5O_3)_2Cd + 1\frac{1}{2}H_2O$	−14°
$(C_3H_5O_3)_2Zn + H_2O$	−22°
$(C_3H_5O_3)_2Mg + H_2O$	−18·5°
$C_3H_5O_3Na$	−16°
$C_3H_5O_3Am$	−20°
$C_3H_5O_3K$	−15°
$C_3H_5O_3Li$	−20·5°
$C_3H_5O_3Me$	− 4·8°
$C_3H_5O_3Et$	− 9·2°
$C_3H_5O_3Pr$ (*n*)	−13·0°

Here again then chemistry has been enriched by a number of new compounds, which we owe entirely to the unaccountable caprice of this micro-organism.

Individuality of Micro-organisms.

Although micro-organisms are thus becoming more and more indispensable reagents in the chemical laboratory, essential as they are for the production of many bodies, it is always necessary to bear in mind that by virtue of their vitality their nature is infinitely more complex than that of any inanimate chemicals which we are accustomed to employ. In a chemically pure substance we believe that one molecule is just like another, and hence we expect perfect uniformity of behaviour in the molecules of such a pure substance under prescribed conditions. In a pure cultivation of a particular species of a micro-organism, however, we must not expect such rigid uniformity of behaviour from each of the individual organisms making up such a cultivation, for there may be and frequently are great differences amongst them, in fact each member of such a pure culture is endowed with a more or less marked individuality of its own, and these possible variations have to be taken into consideration by those who wish to turn their energies to account. In fact, experimenting with micro-organisms partakes rather of the nature of legislating for a community than of directing the inanimate energies of chemical molecules. Thus frequently the past history of a group of micro-organisms has to be taken into account in dealing with them, for their tendencies may have become greatly modified by the experiences of their ancestors. Of this I will give you an instance which has recently come under my observation:—Here is a bacillus, which has the property of fermenting calcium citrate; I have found that it can go on exerting this power for years. On submitting this fermenting liquid to plate-cultivation, we obtain the appearances which you see here. If one of these colonies be transferred to a sterile solution of calcium citrate, it invariably fails to set up a fermentation of the latter, the bacillus having thus by mere passage through the gelatin-medium lost its power to produce this effect. If, however, we take another similar colony and put it into a solution of broth containing calcium citrate, fermentation takes place; on now inoculating from this to a weaker solution of broth containing calcium citrate, this also is put into fermentation, and by proceeding in this manner we may ultimately set up fermentation in a calcium citrate solution which absolutely refused to be fermented when the bacilli were taken directly from the gelatin-plate.

Phenomena of this kind clearly indicate that there may be around us numerous forms of micro-organisms of the potentiality of which we are still quite ignorant, thus if we were only acquainted with the bacilli I have just referred to from gelatin cultures we should be quite unaware of their power to excite this fermentation of calcium citrate, which we have only been enabled to bring about by pursuing the complicated system of cultivation I have indicated. It is surely exceedingly probable, therefore, that many of the micro-organisms with which we are already acquainted may be possessed of numerous important properties which are lying dormant until brought into activity by suitable cultivation. This power of modifying the characters of bacteria by cultivation is, I venture to think, of the highest importance in connection with the problems of evolution, for in these lowly forms of life in which, under favourable circumstances, generation succeeds generation in a period of as little as twenty minutes, it should be possible through the agency of selection to effect metamorphoses, both of morphology and physiology, which would take ages in the case of more highly organized beings to bring about. We hear much about the possibility of altering the human race through training from the enthusiastic apostles of education, but even the most sanguine cannot promise that any striking changes will be effected within several generations, so that such predictions cannot be tested until long after these reformers have passed away. In the case of micro-organisms, however, we can study the effect of educational systems consequentially pursued through thousands of generations within even that short span of life which is allotted to us here.

Provincial Transactions.

EDINBURGH CHEMISTS' ASSISTANTS' AND APPRENTICES' ASSOCIATION.

The Committee has arranged the following botanical excursions for the ensuing summer season:—

Date.	Place.	Meet at	Time.	Return.
May 25	Colinton Dell	Waverley Stat. (Suburban)	5.45 a.m.	8.5 a.m.
June 15	Duddingston Loch	Duddingston Church	8.45 p.m.	By road.
,, 29	Colinton Dell	Caledonian Stat.	8.30 p.m.	,,
July 13	Inveresk	Waverley Stat.	8.15 p.m.	10·45 p.m.
,, 27	Craigcrook	Caledonian Stat.	5.45 a.m.	7.51a.m.

Mr. S. G. Crowden has kindly offered a copy of the British Pharmacopœia, 1885, and 'Additions' to the apprentice member who writes the best report on the above excursions.

LIVERPOOL PHARMACEUTICAL STUDENTS' SOCIETY.

The closing meeting of this Society, which took the form of a smoking concert, was held in the Eagle Restaurant, Castle Street, on Thursday, April 28. In the absence of the President, who was unable to attend owing to indisposition, Mr. T. H. Wardleworth occupied the chair. Apologies were received from Mr. Edgerley Taylor and Mr. W. Wellings.

Mr. Cattley opened the programme with a pianoforte solo, "Qui Vive." Songs were rendered by Messrs. Beckett, Burn, Field, J. Jones, Mitchell, Oxford, Shacklady and Frank D. Williams; Mr. J. R. Johnson gave an amusing reading entitled "Etiquette." Messrs. Wardleworth, Johnson, Shacklady and F. Walker afterwards spoke regarding the work of the past session, which has been the most successful since the Society's formation, and urged upon the members to utilize the coming summer in making notes for consideration during the session 1892–93.

During the evening Mr. Edgerley Taylor's prize for the best paper on "Field Botany as a Help to the Minor," was awarded to Mr. Mitchell.

A most enjoyable evening was brought to a close by the singing of "Auld Lang Syne."

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

RECREATION SECTION.—SEASON 1892.

At a general meeting of the members of the Association, held Wednesday, April 29, it was decided to continue the above section during the coming season, under the following heads:—

(1) Cricket, Hon. Sec., W. Asten, Coventry Road.

(2) Tennis, Hon. Sec., J. T. Cattell, Gt. Lister Street.

(3) Cycling, Hon. Sec., W. C. Scott, 316, Wheeler Street, Lozells.

It was arranged that each section should be worked separately, and to this end a secretary was appointed to conduct each department as above named; the whole to be under the supervision of a General Secretary and Treasurer. The subscriptions for the whole, or any section, is 2*s.* 6*d.*, on receipt of which each member will be supplied with the fixture cards. The season was commenced on Wednesday, May 11. Full particulars of fixtures, etc., will be noted on card of membership, to be obtained of any of the Secretaries on application. It is hoped that all members of the Association will join and co-operate for the success of the season. Members should state to which section they wish particularly to attach themselves. Further information may be obtained of Mr. Sol. Taylor, 52, Moor Street, who is appointed Hon. General Sec. and Treasurer.

Parliamentary and Law Proceedings.

THE PHARMACEUTICAL SOCIETY v. STANLEY PROCTOR.

In the County Court of Derbyshire, holden at Glossop on May 7, 1892, before his Honour, Judge Ellison, the Council of the Pharmaceutical Society of Great Britain sued Stanley Proctor, residing at 7, High Street, Glossop, for the recovery of £10, the amount of two penalties incurred by the defendant under the Pharmacy Act, 1868, namely, one penalty of £5 for having sold poison, to wit, a preparation of opium called laudanum, on March 21, 1892, and a further penalty of £5 for having sold a similar poison on March 28, 1892, contrary to the provisions of the Pharmacy Act, 1868 (31 and 32 Vic., c. 121).

Mr. C. W. Langley Flux represented the Council.

Mr. J. W. Tweedale, solicitor, Glossop, appeared for the defendant.

Mr. Flux, after reminding his Honour of the provisions of the statute, said that these proceedings were taken against the defendant under section 15 of the Pharmacy Act, 1868, and that the sales, the subject of the proceedings, had been made by the defendant at 27, Station Road, Hadfield, which was a branch shop belonging to the defendant's father, who was a duly qualified person within the meaning of the Act, having his principal place of business and residing at 7, High Street, Glossop. He said he should prove the sales and that they consisted of laudanum, a preparation of opium.

His Honour: That, I assume, is one of the poisons the Act refers to.

Mr. Flux: Yes, your Honour, it appears in the schedule as "opium and all preparations of opium." The fact that the defendant's name does not appear in the Register is, by the Act, evidence that he is not a duly qualified person within the meaning of the Act, and that being so he is liable for the penalties sued for, and further he (Mr. Flux) would rely upon the decision in the case of the Pharmaceutical Society of Great Britain *v.* Wheeldon, reported in 'Law Reports,' 24 Q. B. D., p. 683, *et seq.*

His Honour: I should like to see that case.

Mr. Flux handed up his copy of the report.

His Honour, after perusing the case, said "of course on that point I am bound by that decision."

Henry Bradford, examined by Mr. Flux, said that acting upon the instructions of the Pharmaceutical Society he called at 27, Station Road, Hadfield, on March 21, and asked for twopennyworth of laudanum, which was sold to him by the defendant. He made a similar call and purchase on March 28. (Mr. Tweedale objected that witness was referring to a paper. Replying to his Honour witness said that they were notes made by him at the time of his purchases for the purposes of his evidence.) Witness continuing said that on both occasions he was served by the same person. He would identify that person, and he identified the defendant (pointing to him) as that person. (The bottles containing the laudanum were handed to the witness, who identified them and, replying to his Honour, said that he had sealed them and put his initials and the date on each purchase for the purpose of identification.)

Mr. Flux pointed out to his Honour that both bottles had been opened and part of the contents used by the analyst for the purposes of his analysis. The analyst would prove this.

Witness continuing said that he had kept them bottled up until he had handed them to a gentleman from the Society, as instructed. He did not know the name of the gentleman, but pointed him out in the Court (Mr. Moon).

His Honour asked whether it was the analyst.

Mr. Flux explained that Mr. Moon was a representative of the Society, and had in turn handed them to the analyst, who was also in Court.

Cross-examined by Mr. Tweedale as to why he had called on the 21st and 28th of March, witness replied that it was in accordance with his instructions.

Mr. Tweedale pressed witness as to the name of the person who gave him the special instructions to call on those days.

Mr. Flux interposed and reminded his Honour that the witness had already sworn that he acted upon the instructions of the Pharmaceutical Society, and that he objected to the question. Mr. Flux also said that the Council in these cases received certain information upon which they acted, and that their informant's name could not be brought out on cross-examination.

His Honour ruled that the question could not be put to the witness, as it could have nothing to do with defendant's case, and if answered might cause injury to the informant.

Mr. Tweedale, putting his question in a different manner, again endeavoured to obtain the name from the witness.

Mr. Flux again objected and his Honour again upheld the objection.

Mr. Harry Moon deposed to having received the purchases direct from the last witness, and that he had only parted with them by handing them to the analyst for the purposes of analysis, and had in no manner interfered with the bottles or contents.

Mr. Tweedale said that he could not contest the case further, and could only ask his Honour under the circumstances of his client being so young and only an apprentice to reduce the penalties.

Mr. Flux, referring to the statute, pointed out to his Honour that he had no power to reduce the penalties.

His Honour agreed, and gave judgment for the Society for the full amount claimed and costs.

THE PHARMACEUTICAL SOCIETY *v.* CHARLES BOOTH.

On the same day and at the same court, the Pharmaceutical Society of Great Britain sued Charles Booth, of 27, Station Road, Hadfield, for the recovery of £10, the amount of two penalties incurred by the

defendant under the Pharmacy Act, 1868; namely one penalty of £5 for having sold poison, to wit, a preparation of opium, called laudanum, on March 16, 1892, and a further penalty of £5 for having sold a similar poison on April 5, 1892, contrary to the provisions of the Pharmacy Act, 1868 (31 and 32 Vict., c. 121).

Mr. C. W. Langley Flux represented the Council, Mr. J. W. Tweedale appeared for the defendant.

In this case the defendant was the unregistered manager of the branch shop of Mr. Proctor, at Hadfield, mentioned in the above case.

In consequence of the evidence given in that case, defendant—through his solicitor—consented to judgment for the amount claimed.

His Honour accordingly gave judgment for the amount of the penalties claimed and costs.

What Constitutes a Still?

At the Sunderland Police Court a case was heard on Friday, May 6, which was brought by the Inland Revenue Department against the Sunderland Gas Company. Mr. Alpe represented the prosecutors, and stated that on February 19 the defendant company had a still at their works used in connection with their sulphate of ammonia plant at Hendon, for which a licence had not been obtained. Had the Company applied they would have been granted a certificate for this. The apparatus in question, though it was used for the transforming of gas liquor into sulphate of ammonia, could be used for the distillation of alcohol liquor.

Evidence was then called to prove that the apparatus was a still, but in cross-examination it was acknowledged that, whereas a still generally produced a liquid, the ultimate result of the use of the present plant was the production of a salt, also that there was no worm connected with the apparatus.

Mr. Evans, for the defence, said he appeared that day nominally as representing the Sunderland Gas Company, but really he was there in the interests of the Association of Sulphate of Ammonia Manufacturers of Great Britain. They considered that the present effort of the Inland Revenue was an attempt to force upon them an unjust and unconstitutional tax, for the Act had been in existence for over thirty years, and yet it was only recently that the authorities had begun to prosecute. The Association he represented was determined to resist the attempts, for the present so-called stills which it was desired to tax had not the least resemblance to stills used in the distillation of alcohol, etc. They differed in most material respects from these, and were never intended to be used for any other purpose than that of the Gas Company. It was a ridiculous position for the prosecution to take up. If they carried it to its legitimate conclusion they would in fact be saying that the common domestic kettle was a still. Having described the apparatus in question, and the different uses for which it was utilised, the learned counsel said it would be seen that the process was a purely chemical and not a physical one.

The Bench then retired, and on their return, after ascertaining that the still in question, used in its present condition, could not be made to distil alcohol, and that alcohol could not profitably be produced with this apparatus, said they had decided to dismiss the case.

An application for costs by Mr. Evans was refused.

We understand that the decision will be appealed against.

BOOK RECEIVED.

The Bacteriological World. Part V. (Battle Creek, Michigan: Modern Medicine Publishing Company).

Obituary.

Notice has been received of the death of the following:—

On the 28th of April, Charles Dawney, Chemist and Druggist, Bristol. (Aged 45 years).

On the 5th of May, W. W. Jones, Pharmaceutical Chemist, Bristol. (Aged 61 years).

On the 6th of May, Robert Hughes, Chemist and Druggist, Llangefin. (Aged 68 years).

On the 7th of May, J. W. Marshall, Chemist and Druggist, Rotherhithe. (Aged 71 years).

On the 10th of May, A. C. Finney, Chemist and Druggist, Brigg. (Aged 38 years).

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith. Matter intended for publication should be written on one side of the paper only.*

Proprietary Medicines Containing Poison.

Sir,—I should like to call the attention of chemists and druggists generally to the very pertinent advice of the *British Medical Journal* given in its number of May 7, an extract from which I append. W. Harvey.

Div. Sec., N.E. Bethnal Green.

*** The extract sent is the concluding paragraph of a leading article on "The Irregular Sale of Poisons," which we reproduce at page 947. [Ed. Ph. J.].

Sir,—Is it not incumbent on the Pharmaceutical Society to publicly advertise the fact that certain so-called patent medicines sold at stores, oil shops, etc., must only be sold by chemists, according to law, and to threaten prosecutions? "Voyez?"

"Terpeneless" Oil of Lemon.

Sir,—In your report of the evening meeting of the Pharmaceutical Society of Great Britain it is stated that the best brand of terpeneless concentrated oil of lemon is made in the Isle of Elba. Please note that this should read Pirna-on-the-Elbe, where the terpeneless oil of lemon has been prepared by the inventor, Mr. Heinrich Haensel, for over ten years. Wm. Poppelreuter.

Manchester.

NOTICES OF MEETINGS.

Society of Arts.—May 16.—*Third Cantor Lecture*: "Recent Bacteriological and Chemical Research," by Professor Percy F. Frankland. May 18. *Lecture*: "Colour Blindness," by Captain W. de W. Abney.

Royal Institution.—May 19. *Second Lecture*: "Photography in the Colours of Nature," by Mr. F. E. Ives. May 19. *Fourth Lecture*: "The Chemistry of Gases," by Professor Dewar. May 20. *Lecture*: "Electro-Metallurgy," by Mr. J. W. Swan.

Midland Counties Chemists' Association.—May 26.—Annual Meeting and Supper.

Dambose.—A description of the diploma of the Pharmaceutical Society will be found in the first volume of the Journal, at p. 264.

T. Rheeder.—We have received no report of the matter you refer to.

W. Baxter.—So far as we understand your query, the exemption of pharmaceutical chemists from jury service does not appear to apply in the case you mention.

Geo. R. Durrant.—Your specimens have been placed in Mr. Holmes' hands for comparison, and we hope to publish the results in a few weeks.

Communications, Letters, etc., have been received from Messrs. Cripps, Banerjee, Alcock, Hill and Taylor.

EARLY BOTANY AND MATERIA MEDICA IN ENGLAND.

V. THE EARLY FLORAS.

To Dr. William How, "a noted herbalist" and alumnus of St. John's College, Oxford, is due the first general description of the indigenous plants of England in the nature of a Flora. He may have been fired to the execution of this task by the local catalogues of Gerard and Johnson, and the elder Bobart, and by the example of foreign botanists. Local catalogues had been published at Altorf by Ludwig Jungermann in 1615, at Ingolstadt by Albert Menzel, in 1618, at Giessen by Jungermann in 1623, at Dantzig by Nicolaus Velhafen in 1643, while Pulteney claims for Simon Pauli the first use of the title "Flora" in his catalogue of the plants of Denmark, published in 1648.

In 1596, Gerard published a list of the plants grown in his physic garden in Holborn, which from its rarity and careless printing is surmised to have been primarily intended for distribution among his personal friends. Only one copy of this is in existence; it formerly belonged to Hans Sloane, and is preserved, as is also a manuscript copy, in the British Museum. The title runs, "Catalogus Arborum Fruticum ac Plantarum, tam indigenarum quam exoticarum in hortis Johannis Gerardi, civis ac chirurgi Londinensis nascentium." Then follow the Royal arms in a garter and the imprint, "Londini ex officina Roberti Robinson, 1596." The dedication is to Gerard's patron Burleigh, and to the 1033 species of the catalogue is annexed the attestation, "Herbas, stirpes, frutices, suffrutices, et arbusculas, hoc catalogo recensitas, quam plurimas ac fere omnes me vidisse Londini in horto Johanni Gerardi, chirurgi et botanici peroptimi (non enim omnes eodem sed variis temporibus anni pullulascunt, enascuntur et florent). Attestor Matthias de l'Obel, ipsis calendis Junii, 1596." The second edition, a small folio, much better printed and bearing the date 1599, may still occasionally be met with, and the student will find both editions of the catalogue of Gerard's garden preserved line for line, and letter for letter, in the modern edition of Mr. Daydon Jackson, to which reference has been made in the article on Gerard's 'Herbal.' Mr. Jackson, in his capacity as Editor, has added notes to the 'Herbal,' references, the modern names of the plants catalogued, and a short life of his author. Between the publication of the editions of 1596 and 1599 Gerard had published the 'Herbal,' which de l'Obel considered in a large measure a plundering of his 'Adversaria,' and the indignant foreigner is said to have endorsed his former attestation, "Haec esse falsissima attestator Matthias de l'Obel." The dedication is to Sir Walter Raleigh, and the printers' device consists of two cornucopiæ, combined with the symbols of Mercury in front of a landscape. The first local catalogues published in England were the "Iter in Agrum Cantianum, 1629, et Ericetum Hamstedianum, 1632," of Thos. Johnson, the Editor who preserved Gerard's fame.

In 1834, Dr. Johnson, with other members of the Apothecaries' Company, undertook a botanical tour, through Oxford to Bath and Bristol, and back by Southampton, the Isle of Wight and Guildford, with the avowed purpose of investigating rare plants. The record of their journey bears the title, 'Mercurius Botanicus; sive Plantarum gratia suscepti Itineris, anno 1634, Descriptio; cum earum nominibus Latinis et Anglicis." Though the number catalogued in this little octavo of seventy-eight pages is only about six hundred (excluding varieties), it must be remembered that this was a more imposing total, when the Cryptogamia were almost wholly disregarded. Though the tour only occupied twelve days, it resulted in the discovery of several plants not hitherto known as occurring in England, and led in 164 to the publication o Johnson's 'Pars altera sive Plantarum gratia sus cepti Itineris in Cambriam seu Walliam descriptio.- Among the new species thus added to the English' Flora were, *Rhodiola rosea*, *Serratula alpina* and *Papaver cambricum*.

In 1648, Jacob Bobart, the elder, who had been appointed by the Earl of Danby supervisor of the physic garden presented by him to the University of Oxford in 1632, issued a list of the plants then cultivated under the title of 'Catalogus Plantarum Horti medici Oxoniensis Latino-Anglicus et Anglico-Latinus: alphabetico ordine.' The plants, which are barely enumerated, without either synonyms or references to botanical text-books, comprise about six hundred English species, for though in the preface the garden is said to have contained sixteen hundred species, exotics and varieties of the indigenous plants are included in this number. An enlarged edition of this work was published in 1658, by the joint assistance of Dr. Stephens, Mr. William Browne and the two Bobarts, father and son. The authors, in adopting the specific appellations given by Gerard and Parkinson to each plant, quote the pages of their works, following the example of the 'Hortus Eystettensis;' but the plants marked as new in the catalogue are chiefly varieties, and many dubious and ill-ascertained plants are included in it.

With the 'Phytologia' of Dr. William How we reach the separation of indigenous from exotic botany. This little octavo of 133 pages is the first general list or description of English plants only, and though he does not style it a Flora, that term occurs in his preface. Published anonymously, the work bears the modest title, 'Phytologia Britannica natales exhibens indigenarum Stirpium sponte emergentium.' Dr. How was helped in its compilation by Mr. Stonehouse, Dr. Bowles, Mr. Goodyer, Mr. Heaton, and other friends, whose aid he scrupulously acknowledges. Though the list comprises only 1220 plants, as the Cryptogamia are practically excluded, the catalogue is for the time a copious one. The arrangement is alphabetical, in the order of the Latin names, which are followed by one or two synonyms, as well from continental as the standard English writers, the place of growth, and minute descriptions of the particular spots where the rarities are to be found. Several plants enumerated in the 'Phytologia' are not, however, indigenous, and there is a good deal of looseness of nomenclature, as in "*Gramen caninum supinum longissimum nondum descriptum.* The injury of the grass some nine miles from Salisbury by Mr. Tuckers, at Maddington, wherewith they fat hogges and which is four-and-twenty foot long, which may happily be a kinde of *Gramen caninum supinum*, though Gerard English it ill Upright Dogge's Grass;" and, again, "*Gramen caninum supi*

num alterum, another sea dogge's-grass." The 'Phytologia' abounds in naïve observations, as where Dr. Bowles remarks, with reference to the spider orchis, *Orchis arachnitis*, "A brave plant, and flowers betimes. I was much taken, having never seen it before; it grows upon an old stone-pit ground which is now green, hard by Walcot, a mile from Barneck, as fine a place for variety of rare plants as ever I beheld."

The earliest botanical publication of Ray, written in conjunction with John Nid, was a duodecimo of about 300 pages, 'Catalogus Plantarum circa Cantabrigium nascentium Cantab, 1660.' It contains the names of 626 plants growing wild in the neighbourhood of Cambridge, arranged in the alphabetical order of their Latin names and followed by the synonyms of Gerard, Parkinson, and the two Bauhines. Besides many observations on the uses of the plants in medicine and commerce, on the structure of the flower and on varieties, we are given an index of English names, an index of the special localities of the rarer plants, a copious etymology of the names, and a glossary of botanical terms. An 'Appendix to the Cambridge Catalogue,' containing the names of forty-two additional plants and enumerations, was issued in 1663, and in 1685 sixty more, chiefly communicated by Mr. Dent, of Cambridge, appeared in another appendix.

In 1638, Mr. Ray, following the example of Johnson, undertook a tour through the midland counties of England and the north of Wales in search of plants, and in 1661 he travelled with some friends through Durham and Northumberland to Edinburgh and Glasgow, returning through Cumberland and Westmoreland with a like aim. Tours embracing the midlands, the north and centre of Wales, Worcestershire, Somerset, Devon, Dorset, Wiltshire and Hampshire, and a tour in Yorkshire and Westmoreland, were also undertaken by him between 1666 and 1669 with the view of ascertaining the *loci natales* of all the indigenous plants more accurately than had yet been done, and in the hope, fortunately realized, of discovering new ones.

The knowledge thus gained was utilized in the 'Catalogus Plantarum Angliæ et insularum adjacentium tum indigenas tum in agris passim cultas complectens,' the basis of all later English Floras. Published in 1670, it is modelled largely on the Cambridge catalogue. Though it comprises only 1050 plants, several of them are new, and the discrimination of species is far in advance of preceding English writers, Ray having adopted, with little change, the notions of Jung as to what constitutes a specific distinction and what characters are valueless as such. The stations of the plants are very minutely described; thus the dwarf carline thistle, we are told, grows on the plain near Cambridge, "where the pest-houses stand." A second edition of the catalogue, published in 1677, which was also arranged alphabetically, contains the names of forty to sixty additional species, several of which are new discoveries.

In 1688, was published as a supplement to the catalogue, 'Fasciculus Stirpium Britannicarum post editum Plantarum Angliæ Catalogum observatarum.' Of this work Pulteney remarks, "By this little volume a considerable accession was made to English botany; several very rare mountainous or Alpine plants from Wales, some scarce ones from Cornwall, sea plants, new fungi, mosses and grasses made their first appearance in this little catalogue."

Ray's 'Synopsis,' the pocket companion of every English botanist for more than a century, appeared in 1690, under the title, 'Synopsis methodica Stirpium Britannicarum, in qua tum notae generum characteristicæ traduntur, tum species singulæ breviter describuntur: 250 plus minus novæ species, partim suis locis inferantur, partim in appendice seorsim exhibentur; cum indice et virium epitome." In the preface Ray acknowledges the help of Bobart, Sloane, Doody, an investigator of the cryptogams; Plukenet, Sherard, Tancred, Robinson, and other botanists of the time. Lists of plants from Plukenet, Bobart and Sherard, including a flora of Jersey, a list of *musci* from Mr. Doody, emendations and additions by Dr. Robinson, and a catalogue of thirty-four species common both to England and Jamaica, communicated by Dr. Sloane, are thrown into an appendix, while Ray's observations on the qualities and uses of the plants described are relegated to an index. A second edition, containing considerable additions to the Cryptogamia, appeared in 1696.

With the 'Provincial Catalogues of Plants' printed at the end of each county in the edition of Camden's 'Britannia,' published by Gibson in 1695, Ray's contributions to the British flora ceased. But his interest in the distribution of plants was not confined to the indigenous plants of England. His 'Observations topographical, moral and physiological, made in a journey through part of the Low countries—Germany, Italy and France,' London, 1673, contains an alphabetical list of plants mentioned in the body of the book entitled 'Catalogus Stirpium in exteris regionibus, a nobis observatarum, quae vel omnino vel parce admodum in Anglia sponte proveniunt,' and Haller credits him with having made large accessions to the flora of Switzerland. The addenda to the second volume of Ray's 'General History of Plants' comprise several interesting catalogues, among which may be enumerated the new Italian, Swiss and Milanese plants of Zanoni's history, the catalogue of Breynius, Banister's 'Catalogue of the Plants of Virginia,' and a list of Mexican plants from Hernandez. In 1694 Ray added to the 'Catalogus Stirpium in exteris regionibus observatarum,' such large augmentations from de l'Ecluse, the Bauhines and other authors, as to render it a fairly complete list of all the European plants not indigenous to England. He also altered the title to 'Stirpium Europæarum extra Britannias nascentium Sylloge.' The appendix to the third volume of the 'History of Plants,' which appeared in 1704, also contains some interesting catalogues of foreign plants, including the floras of New Holland, Greenland, China, Madras and Africa.

The 'Pinax Rerum Naturalium Britannicarum' of Dr. Merret, which appeared in 1667, was undertaken at the instance of a bookseller, to supply the deficiencies of How's 'Phytologia;' but though it is in many respects an interesting production, it cannot be said to have accomplished this object. Many of Merret's new species are only varieties, and his list contains a number of exotics and species yet unidentified. There is in this 'Pinax' a list of the plants as they flower in each month and the duration of their flowering.

Dr. Plukenet, superintendent of the garden at Hampton Court, amassed a herbarium of 8000 plants and had correspondents all over the world. His 'Phytographia ; sive, Stirpium illustriorum et minus cognitorum Icones,' 1691-1696, his 'Almagestum Botanicum,' 1696, his 'Almagesti Botanici Mantissa,' 1700, and his 'Amaltheum Botanicum,' 1705, form a valuable magazine of botanical stores, many of the English species being therein figured for the first time, while the synonyms are carefully considered. The figures, about 2740 in number, are, however, very unequally executed and some are unascertainable, while the new plants are described only by the specific definitions, which in the absence of true generic characters were insufficient.

James Petiver, F.R.S. and apothecary to the Charterhouse, has the credit of being one of the first successful investigators of the Cryptogamia. Besides several short catalogues and single tables of rare plants, his 'Gazophylacium,' 1702, his 'Pterigraphia Americana : Icones continens plusquam CCCC Filicum variorum Specierum,' 1712, and his 'Graminum, Muscorum, Fungorum Submarinorum et Britannicorum Concordia,' 1716, are of interest. The Jamaica catalogue of Sloane appeared in 1696. Besides the accuracy of its figures and descriptions it is noteworthy for the care shown in the discrimination of species.

Among the minor constructors of floras it may suffice to mention here Lawson's 'Catalogue of the Rare Plants of the North of England,' Bradley's 'Historia Plantarum Succulentarum,' which appeared in 1716, and Threlkeld's 'Synopsis Stirpium Hibernicarum, a short treatise of native plants, especially such as grow spontaneously in the vicinity of Dublin, with their Latin, English, and Irish names. The first Essay of the Kind in the Kingdom of Ireland. Dublin, 1727.' In the 'Catalogue of Plants growing in the neighbourhood of Giessen,' published by Dillenius in 1719, we have a flora of the plants of Hesse, which excited the enthusiastic admiration of Dr. Sherard and led to the establishment of Dillenius as Professor of Botany at Oxford. In this work are recorded 140 new species of musci and ninety new species of fungi. These tribes are divided into separate genera, and Bryum, Hypnum, Mnium, Sphagnum, Lichenoides, and Lichenastrum are for the first time employed as generical terms. The plants in this catalogue are arranged in the order of their flowering throughout the year, their habitat being subjoined, with critical observations on many of the species. This work was followed, in 1732, by the 'Hortus Elthamensis seu Plantarum rariorum quas in Horto suo Elthami in Cantio coluit Vir ornatissimus et praestantissimus Jacobus Sherard, M.D. Delineationes et Descriptiones quarum Historia vel plane non vel imperfecte a Rei herbariæ Scriptoribus tradita fuit. Auctore Johanne Dillenio, M.D.' The figures, drawn and etched by the Professor, are mostly of exotics of recent introduction, and several new genera are there established. A few of the rarer English and Welsh plants are also included and arranged alphabetically. Of this work Linnæus is reported to have said "Est opus botanicum quo absolutius mundum non vidit." In 1741 appeared the work on which the fame of Dillenius chiefly rests. It bears the title, 'Historia Muscorum, in qua circiter sexcentæ Species veteres et novæ, ad sua Genera relatæ, describuntur, et Iconibus genuinis illustrantur ; cum Appendice et Indice Synonymorum. Opera Jo. Jac. Dillenii, M.D., in Universitate Oxoniensi Botanicis Professoris Sherardini.' The plan of this work is as follows. For each genus he gives the etymology of the name used and his reasons for adopting it ; then the definition of the genus, followed by the subordinate distinctions for the arrangement of the species. Under each species is found a new specific character, the description of the species and its several varieties, with reference to the plates drawn and engraved by the author, the habitat, the synonym of every author at length in chronological order, and a number of critical observations and comments on the uses of particular kinds. "The first systematic writer on the Mosses" died in 1747, without executing, as he had long planned, a companion volume on the Fungi.

THE ANNUAL DINNER.

The annual dinner of the members and friends of the Pharmaceutical Society of Great Britain was held on Tuesday evening at the Freemasons' Tavern, the chair being occupied by the President, Mr. Michael Carteighe. He was supported by Sir G. Buchanan, Sir W. Trueman Wood, Professors Armstrong, Thorpe, Stewart, Foster, Drs. Bell, Black, Cottle, Langdon Down, Dowse, Farquharson, M.P., Hubbard, Wynn Westcott, Mr. Ernest Hart, and the officers of the Society, and the company numbered about two hundred.

The health of "The Queen" having been proposed, and received in the usual loyal manner,

The PRESIDENT proposed "The Houses of Parliament," remarking on the laborious duties which members of the House of Commons had to undertake, and congratulating the country on the fact that there were men who were willing to sacrifice their time and even their professional career for the sake of performing their duties to the community. Amongst these none was more worthy of recognition in that assembly than Dr. Farquharson, whose name he begged to associate with the toast.

Dr. FARQUHARSON, in response, alluded to the many times he had had the pleasure of enjoying the hospitality so liberally prescribed and dispensed by the Pharmaceutical Society, and expressed great apprehension lest the changes, consequent upon the general election which everyone was expecting, but of which no one knew the day at present—might prevent his enjoying such a privilege in the future. The peers, fortunately for themselves, were spared any such anxiety; they had no need to take part in public meetings on their own behalf, and were forbidden by constitutional law to take part in any such meetings at the time of a general election. In many other countries members of Parliament enjoyed advantages and privileges which were unknown in England ; here they had only the reward of their own consciences, supposing that the exigencies of political life had permitted them to retain such a commodity ; they could only cheer their declining years with the thoughts of what good they had helped

to accomplish, or what evil they had helped to prevent. The present Parliament was becoming rapidly moribund, and, of course, he, as one of its members, was in the same condition, and he could only thank them for the kind reception they had given to an aged man "whose trembling limbs had brought him to their door," a reception which he had received on many previous occasions and such as he highly appreciated.

Mr. ALEXANDER BOTTLE (Vice-President) next proposed "The Medical Profession," a toast which was always received with enthusiasm in any company of Englishmen, especially of pharmacists. A pharmacist always desired to serve as an *aide de camp* to a general practitioner, and, as promotion, to be conveyancer to a leading counsel in medicine. The medical profession was eminently progressive, and the practice of medicine to-day was very different to what it was as he remembered it fifty years ago. With the aid of the microscope, the stethoscope, the clinical thermometer, and other instruments, the medical man of the present day was able to discriminate between a trifling ailment and a malignant disease; but they had recently read of the introduction into medical practice of an old instrument, with which he was familiar in the days of his boyhood: the whip had recently been tried as a radical remedy for hysteria, but he could not commend that as being progressive medicine. He should rather term it aggressive, and would prefer going back to the early days of pharmacy and being anointed with the oil of scorpions, than being submitted to the whip of modern practice. There was evidently a great fascination about the medical profession, for it very seldom happened that anyone who devoted himself to it ever gave it up. He could only attribute that to a deep-rooted desire on the part of medical men to alleviate human suffering. They were always ready to face danger, disease and contagion in the service of humanity. They laid the foundation in the sick room of friendships which lasted throughout life, and were never known to abuse the confidence which was reposed in them. He would couple with the toast the name of Dr. Black, President of the Obstetrical Society.

Dr. BLACK, in responding, said he had been hoping that a telegram would arrive calling him away before he was called upon to make a speech, in place of other gentlemen who ought to have been there to undertake the duty, the President of the College of Physicians and the President of the College of Surgeons. The Pharmaceutical Society had no better friends than the medical profession, and, on the other hand, the medical profession had no friends so good as the members of the Pharmaceutical Society; in fact, they were becoming almost too friendly, and rendering the work of the physician so easy that there was a danger of prescription writing becoming a lost art.

The PRESIDENT next proposed "The Learned Societies." He said there was no learned Society from the Royal Society downwards which had not been benefited and improved by the individual character of a very small number of the unit members of the body. Just as pharmacists claimed that every individual who did good work brought credit to the corporate body, so he claimed that one good and great man in a generation associated with any learned Society or with half-a-dozen, as sometimes happened, was able to give a distinct impetus to science, and sometimes in more than one direction. There were present a number of distinguished members of the Royal, the Linnean, the Chemical, and other Societies as guests, and he would ask them to reflect for a moment on what would happen in any one of those Societies if a small minority of men, sometimes to be counted on the fingers of one hand, and at all times to be counted on the fingers of two hands, who propelled the Societies to which they belonged, were to disappear. It was sometimes said that they were too powerful and that they ought not to exercise the influence they did, but that was a great mistake. The formation of a society was brought about by the desire of a number of men interested in one pursuit to be pushed along, and to receive the benefit of the power and influence of a small number of enthusiastic units in that body. The Royal Society had been pushed along and made to do an enormous amount of good work, by the gentleman whose name he would couple with this toast. It had often been said that societies were of no use, that their *raison d'être* was simply to give a few men an opportunity of developing their particular fads, but as far as he could learn, he had come to the conclusion that fads represented progress, and that those who attacked fads represented the slow side of the Society. It was necessary to the life of all societies that those who were endowed with energy and zeal should be encouraged to apply those qualities. It had been so with the Royal, with the Linnean, the Chemical and other Societies, and he was very glad that they had present that evening a gentleman who was a distinguished representative of the type—Professor Michael Foster, the Secretary of the Royal Society, whose name he would associate with the toast.

Professor MICHAEL FOSTER, in responding said: Gentlemen, it has doubtless happened to all of us that we have heard phrases, and used phrases, and thought we knew the meaning of them; and then all of a sudden, on a particular hearing of them, we have felt that we have understood them for the first time. I listened to the most extravagant praise of your President, and while I listened to your kind response, I was reminded of a phrase familiar to me from my boyhood, which was expounded to me as a child, which I have expounded to my children, and which I thought I understood, but which I have understood for the first time to-night: "Thou anointest my head with oil"—not of scorpions. But lest I should be too much puffed up by so much praise, I bethought myself of the obverse—for everything has an obverse—every pharmaceutical agent, and what is not a pharmaceutical agent, has its antidote; and I remembered an incident which happened some few years ago, of which I will tell you. It was at a meeting of the British Association, of which I was then an officer, in a provincial city; next to me on the platform sat the mayor—"our mayor." You know "our mayor," the man who has risen by dint of his own energy and shrewdness; the man to whom, apparently, that meeting was a first introduction to science. It was a meeting at which there were certain formalities; the retiring President gave way to the President-elect, and in doing so explained what a wonderful man the President-elect was: how astonishing it was that he should not have been chosen before him! Then the President-elect got up and said what an admirable person his predecessor was: that he was just worthy to loosen his shoe latchet, and nothing more. Then there were some other officers to be elected, and there was the same strophe and antistrophe as before. I saw the mayor was getting very fidgetty, he pulled his waistcoat and screwed up his mouth, and then turned to me and said: "Well, you

men of science do know how to spill the butter-boat." Now, as to the learned societies I have an antidote for that, for I have a friend, a well-meaning but tedious friend, who sometimes gets me into that intellectual man's pillory, the corner of a smoking room at the club. It is a pillory, because although you are not pelted with eggs you are with ideas, which like the eggs have gone wrong before they have taken shape. He sometimes gets me into that pillory, and has a great discourse on a theme, which he introduces by a phrase which I think he must have caught from some popular preacher, he calls it "the great sins of great societies." I am not going to inflict on you the catalogue, but I will just mention to you a part of his discourse. He says it is most interesting to trace the history of the corruption of a great society, it begins because a few earnest men wish to push forward a subject. "They recognize at first that the Society is only the means for advancing the subject, and that lasts for some little time. Then the Society gets bigger and bigger, and after a while the usual idolatry comes in. They think they can only worship the subject through the Society, and after a while they worship the Society instead of the subject, and they think the subject was founded in order to support the Society." Then he says, "They will hear of no new thing, and they write an inscription over their portals 'Noli me tangere.'" If unawares an angel comes in in the shape of a young Fellow who wishes to stir their dry bones and bring about what he is pleased to call a reform at once they appeal to the past and choke him with wise saws, and they smother him with ancient instances. I said to him, "I understand that you know, of course, I mean it is possible that what you say is true with a certain Society with which I am specially connected, but is it true of all Societies?" "Well," he said, "No, I do not think it is; there is a Society, I think it may be called a great Society; yes, I think it my be called a great Society, because I observe at their annual banquets they always have M.P.'s, even if it is not on a Wednesday." "Now," he said, "this Society retains all the energy and vitality of a youth. It spends its energy in developing its subject. It has spent much of its energy in educating the profession which it represents, and it has educated that profession in a wise way. It has brought on the profession the pressure of examinations and the necessary pressure, but it has used that pressure in such a way as not to destroy its individuality while developing the class. That Society has out of its not too ample funds provided itself with ample lodging. It has made itself felt in the country." "Oh," I said, "I know the Society you mean, you mean the Pharmaceutical Society." "Yes," he said, "I do." "Well," I said, "how is it that that Society has not yet fallen into these great sins; how is it that it has been so successful?" "Well," he said, "there are a variety of causes. In the first place they all believe in their profession, and if they have any hard-won earnings, they are willing to give them for the success of the Society. Then they have had the happiness, which as a Society becomes older becomes rarer and rarer, to be governed by a Council which has had in view the interests of the Society, not its own individual interest, and not the interests of any faddists, moreover it has worked together, and has spent a great deal in a long pull, a strong pull, and a pull altogether; and then for many years past it has had a President who had not to be dressed for his post, who had not to be cut down here and pared down and padded there, but fitted the thing directly he was put into it, a President who knows the value of knowledge, and knows the value of money, and knows the value of one as much as the other, a President who understands politics, and who snares politicians with their own net—a politician"—and then we were interrupted by the conversation of a third friend, a friend of a different stamp from each of us, who was ready to take liberties with the English language which I dare not take. "Oh," he said, "this President of the Pharmaceutical Society, what I don't like about him is his name." "Oh," I said, "Michael is a very good name." He said, "Yes, that is not what I mean. Michael is very good; it is a very useful, strange, out-of-the-way kind of name, it serves to make you known. People remember that when they do not remember Thomas; it is the other name I object to." He says: "You know a cart is a passive receptacle which has to be pushed or pulled, there is no energy in a cart." "Now," he said, "there is nothing carty about the President of the Society; he is a pure 'oss, and can pull like ——, and yet" he says, "he has a wonderful soft mouth, a child can drive him, only you have to drive him the right way, and the right way is any way that leads to the good of the Pharmaceutical Society." But, gentlemen, let me thank you in the name of my scientific brethren here for the kind way in which you have received the toast of the great and successful societies, and especially for the kind way in which you have received the mention of my name. In return allow me to propose the health of the great learned Society, the Pharmaceutical Society, and to couple with that the name of Michael Carteighe, your President, ten times Thane of Bloomsbury.

The PRESIDENT said he would not detain them long in replying to the toast so eloquently proposed. But he only wished some of his predecessors were present in the chair to hear what Professor Michael Foster had said, but as that could not be he knew he should consult their wishes best by acknowledging, as he did most heartily on the part of the Society, the honour which had been done to it, and to him. It was, however, only right to say that in all the work which the Society from its foundation fifty-one years ago inaugurated the sympathy of men of science had been freely rendered. They had had to convince from time to time members of other learned professions of what was intended to be done, and had to consider how far they might be regarded as trenching on the interests of certain professions very closely allied to their own, but with regard to men of science there was no *arriere pensé* of that kind. He ventured to think that the estimate which Professor Foster had given, although he had used language which was perhaps unduly complimentary, was not far from the truth, considering that the Society was founded for the advancement of certain practical sciences. To-morrow morning he had to face what Dr. Farquharson would call his constituents, but he did not call them so, because they were his friends; they trusted—and had learned that it was policy to trust—in the President whom they themselves were instrumental in selecting, and they had acquired that professional instinct which was exhibited in loyalty to their chief. Lastly he might say, in the words of the preacher, "What have we to do with science?" Some of their brethren were accustomed to say that, but the answer was very plain, if they had not elementary science they could not get a living. The pharmacist of to-day who was ignorant of the elementary science on which his craft depended was lost. It was sometimes forgotten that if the Pharmaceutical Society did not exist now and had not existed for fifty years, their condition would have been very much worse than it now was. They might be badly off now, but they would be very much worse off if they had not existed as a corporate body, and had not had those individual units to whom he had referred, such as Jacob Bell, George Webb Sandford and Thomas Hyde Hills.

The PRESIDENT next proposed the toast of "The Visitors." He said he must first refer to those musical visitors who had done so much to add to the pleasures of the evening, viz., Mr. George May, Mr. Henry B. Bateman, Captain James Watson and Mr. Alfred Smythson, who had so kindly aided Mr. Davies in providing the musical portion of the programme. Coming to the visitors in the ordinary sense, there was the usual difficulty of knowing how to approach it without omitting names which ought to be mentioned. There were present visitors representing every branch of the scientific world and every branch of the medical world, besides several gentlemen who had come as individual visitors. Amongst the official guests was a distinguished man, who himself succeeded a distinguished man in a department of the Government with which the Pharmaceutical Society had much to do. When the Act of 1868 was passed, there was a difference of opinion as to how far the Medical Council had been perfectly in unison with the Society's views on certain matters, but, at any rate, since Sir John Simon left the Medical Department of the Privy Council and since his successor was transferred to the Local Government Board they had had the happiness of being associated with a gentleman who had, with regard to all matters pharmaceutical, given them the utmost consideration. It had been necessary for him within the last few months to announce his intention of resigning the position he held. He was a distinguished man of science, who had been instrumental in making a number of other men do work for the benefit of the Society, and no form of scientific work could be more useful than that which permitted a Government official to lay his hands on the proper men to do certain work, and practically to insist on their doing it. He alluded to Sir George Buchanan, to whom he might be allowed to convey, on behalf of the pharmaceutical body, their congratulation on the fact that his merits had been recognized by the dignity which had been conferred upon him. It was satisfactory that work which could not be recognized in salary was at least recognized in another way. He was sorry to see that Mr. Ernest Hart had left, and, therefore, he could not couple his name with the toast, but he would ask leave to mention the name of another gentleman, although he was a member of their own craft, one who had come from Edinburgh to be his personal guest, Mr. John Laidlaw Ewing, the Chairman of the North British Branch.

Sir GEORGE BUCHANAN, in responding, said the help he had given to the Pharmaceutical Society was but small when he was trying modestly to fill Sir John Simon's shoes, but he did the best he could, although he had always felt that he was not doing any particular service because he could not tread in the good old Greek shoes of pharmacy. He could not profess that he was doing hippocratical or galenical functions, but was obliged to appeal to Moses and such other respectable gentlemen who were better exponents of sanitary medicine.

Mr. J. LAIDLAW EWING also responded, and said he could assure the President that all the members in Scotland tried to do their duty to the Society to the best of their ability, and it was especially satisfactory to know that the younger members were taking a most earnest and growing interest in the progress of the Society. This was the first time he had had the pleasure of being present on such an occasion, and he might be excused for expressing his gratification at finding so many Scotchmen occupying a prominent position in the procee ngs

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, MAY 21, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

GEORGE WEBB SANDFORD.

THE intelligence which it is our business to convey of the death of another of the prominent leaders of pharmacy, who have in the past been intimately associated with the work of the Pharmaceutical Society, will undoubtedly be received with a profound feeling of regret. Though it is now many years since Mr. SANDFORD ceased to take an active part in the practice or politics of pharmacy, the services he rendered while his abilities and personal influence were exercised in the endeavour to reform and improve the position of the body by promoting the principles upon which the Society was founded, were of such a nature as to have earned for him a claim to the respect and gratitude of every individual connected with the business. It is mainly as the central figure of that contest, between the purely trade element of pharmacy and the more professional tendencies represented by the Pharmaceutical Society, which resulted in the passing of the Pharmacy Act, 1868, that GEORGE WEBB SANDFORD will be remembered. While valuing the Society as comprising all that was best in the ranks of the craft, and recognizing the necessity of educational qualification, his large sympathy with the entire body led him to regard the Society as having been established only as a means to an end, and to the conviction that the wider the grasp of the Society, the nearer it would be to the attainment of that end. His aim was the consolidation of the trade rather than the maintenance of a select association and, at this length of time, it seems strange that his chief opponent should have been the trade itself. Time has since shown that the compromise then made was not conducive to the interests of the trade. Among the better class of pharmacists it has been thought that the Act of 1868 has been productive of a retrograde tendency. The respect shown for vested interests has certainly proved injurious. The partial adoption of the Society's original principle of individual qualification opened the way to a practice that was subversive of the Act, and together with the recognition of the right of medical men to keep open shop it has led to serious abuses.

The limitation of recognized pharmaceutical functions to the sale and dispensing of poisons within the meaning of the Act has also been found to be a grave defect. But notwithstanding these shortcomings of the Act for which chemists and druggists are indebted to the late Mr. SANDFORD, recent experiences have shown that its utility as a means of securing public safety and of protecting the true interests of the trade is proving to be greater than has been thought. Judicial and magisterial decisions have within the last few years been influenced by a greater regard for the spirit of the Act, and almost simultaneously with the death of Mr. SANDFORD, at the ripe age of eighty, a construction has been put upon the Act which bids fair to do away with an anomaly which has been unfair to legally qualified chemists, and has also been for many years past condemned by the medical profession as mischievous to the public. It may therefore be anticipated that in the immediate future the Pharmacy Act, 1868, will be more respected and more efficient than it has hitherto been, and that the trade at large will find cause for thankfulness to its chief promoter and for respecting the memory of GEORGE WEBB SANDFORD.

The funeral took place at Cromer on Thursday, and the Society was represented by the PRESIDENT, VICE-PRESIDENT, Messrs. GOSTLING, GREENISH, and HILLS as members of the Council, and by the Secretary, Mr. BREMRIDGE.

THE SOCIETY'S ANNIVERSARY.

THE space occupied by the report of the proceedings at the annual meeting of the Society and the report of the annual dinner does not admit of any editorial reference to the subjects dealt with in the presidential address and in the discussion which took place. We may, however, congratulate our readers on the general air of tranquillity which characterized the meeting, and the evident disposition shown to regard the work of the Society's executive body as having been carried out with a due sense of the responsibilities resting upon its members, not only in relation to the public, but also in relation to the entire community, of which they are the recognized official representatives. Attention may also be directed to the remarks of the PRESIDENT upon the subject of proprietary medicines containing poison within the meaning of the Pharmacy Act, and urging the necessity of conformity with the provisions of the Act in their sale. This subject will undoubtedly soon command prominent attention in various ways, and as it is possible that the Council will be called upon to take action for enforcing the provisions of the Act as they are now interpreted, it is most important that all members of the trade should render every assistance in their power in supporting whatever steps may become necessary for that purpose.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, May 18, 1892.

Present—

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Messrs. Allen, Atkins, Cross, Gostling, Greenish, Hills, Leigh, Martindale, Newsholme, Richardson, Schacht, Southall and Warren.

Several persons were restored to their former status in the Society.

The Council settled the course of business at the annual meeting and then dissolved.

FIFTY-FIRST ANNUAL MEETING.

The chair was taken at 12 o'clock by the PRESIDENT.

The SECRETARY read the notice convening the meeting.

The report was agreed to be taken as read.

The PRESIDENT: I beg to move—

"That the annual report and statement of accounts now submitted be received and adopted."

In making my observations to-day, I must apologize if some of my remarks may savour of undue repetition; because it is not my fault if you insist so many of you on keeping me in this chair, as you have for so many years past. I feel like a preacher, who has to preach every Sunday; and it is very difficult, especially when one has to talk about the poison laws and the detail work of the Society, to avoid a good deal of repetition. I propose to-day to deal somewhat shortly with what may be called the affairs of the Society, unless, of course, any of you gentlemen require information, because I do not want to shirk anything in this report that is open to criticism, whether on finances or on any other subject. But in view of our present position with regard to legal affairs, and especially with regard to the poison law, I think it will perhaps be advantageous to all of us—I mean to my colleagues on the Council and myself, as well as to you, if I call your attention to what has taken place during the last twelve months and to certain decisions on the poison law of very considerable importance. I will first, then, just deal shortly with those matters in the report which affect the Society in its voluntary capacity and its general working. First, with regard to finance, you will see that the Council has spent a good deal of money. It has had a very handsome income, and because it found it was having an unusually good income—from various reasons which I will not go into, but probably owing to the fact that a number of candidates were rushing in to the Board of Examiners before certain new regulations came into force—the Council thought it desirable to make certain alterations—consequent on our removal into our new premises—which in ordinary cases, as in the case of a railway or a joint stock company, would be carried to capital account. Practically I may say that we see no reason why the annual expenses of the Society with its increased burden should not easily be met by its annual revenue without regard to any particular speculation. The fact that we have to carry on certain legal work from time to time makes it extremely difficult to calculate with any degree of nicety what our normal income is likely to be for any particular year, but I think I may speak for my colleagues and myself when I say that we have no fear for the future in that respect, and that we are quite prepared to justify all that we have done, financially or otherwise. Then with regard to

the examinations you will observe that there are several paragraphs which deal with this subject, and we have thought it desirable to make certain changes which I reported to you last year. These changes have been approved by the Government Visitor and practically have just begun to be put into operation. Now, I have only one word to say about this. I am happy to say that you are not likely to come before me as an Examiner, though I should be glad of the opportunity of examining some of you who have been troublesome if you gave me the chance. But this matter is not, perhaps, very interesting to you except in this way—and I think it is my duty to point it out as it is mentioned in the report—that it is a great mistake for any one of us engaged in the business of pharmacy to allow our assistants or apprentices, or both, to present themselves for examination without the necessary training. It is a cruelty. One of the most difficult parts of my presidential career has been to have to deal with cases of this sort. Masters have said men ought to pass. They keep a man a certain time in the business and then send him up to London or to Edinburgh. They throw him, as it were, before the Board of Examiners, and the poor lad is ploughed. The defect in many cases is not solely that of the individual but it is literally due to the fact that our own members of the trade at large do not realize that unless a man has had a proper training he is not likely to pass any examination, still less an examination that the Government of the day thinks proper for a chemist and druggist. I know there are candidates who are extremely good men who have failed though they have been well trained. I have said so before. Such failures arise from extreme nervousness—a man losing his head and becoming, in fact, temporarily incapable of showing the Board what he is made of. I am sorry to say there is no remedy for that difficulty but that form of rough usage and treatment which enables a man not only to know, but to be able from time to time to show what he knows in an oral examination. It is to meet, in fact, this state of nervousness that the division of the examination which now takes place has been devised, and so far as the Board has yet had any experience, it works satisfactorily. In fact, I may say the most satisfactory part of the examination at the present moment is the practical work preceding the meeting of the Board. The men are less excited and have plenty of time. The candidates may be roughly divided into two classes—not three, as is generally the case—those who are good enough to pass, and those who are simply nowhere. There is absolutely no difficulty at all. I am sorry to say that amongst the men who have presented themselves this year under the new regulations, there are a good many of those who are nowhere. You must remember that in this case nervousness does not come into play. A man is allowed three hours to work in his own way in a properly appointed laboratory or dispensary. He has to make certain preparations, and is left as much as possible to himself. The result is that the Board is satisfied that that brings out the good men and eliminates the weak men. However sorry we may feel individually for those who fail, it must be remembered that the Board has statutory duties to perform and that it must fulfil them strictly as defined by the schedule. In the case of the Major examination certain modifications may be made with regard to knowledge; but it is obvious as to the practical portions of the business which are now tested in the examinations—practical dispensing and practical chemistry—that as there is no requirement of a curriculum, and the only test is that of an examination, we must clearly insist that the man who comes up and professes to be a practical man, shall be able to perform with his hands under reasonable conditions certain operations both chemical and pharmaceutical. The next point that I wish to refer to with regard to the Society is the fact that we have present to-day a gentleman who represents the North British Branch in the widest and highest sense. I mean my friend Mr. Ewing, the Chairman of that Branch, whom we cordially welcome. We are, as you know, the Pharmaceutical Society of Great Britain, and we wish to remain so, and to do our work well both in North and South Britain. The work of the Society that has to be done in Scotland requires careful treatment, and I am quite sure that when I tell you that in the Chairman we have an admirable administrator, a man of good sterling common sense and wide views, it is the best augury that our work in the North will go on satisfactorily. On your part I beg to thank him for taking the trouble to come all the way from Edinburgh to be present at this annual meeting. The other general business in connection with this Society that I wish to refer to is the subject of the Bye-laws. We have, as you know, in the Bye-laws, which are now approved by the Privy Council, undone many things and modified many others. We have as a Council, and you have as a Society, done all that it is possible to do, without fresh Parliamentary powers, to remove some grievances which undoubtedly did exist with regard to joining the Society and remaining in it. But I think I am justified in saying that if any member of the trade now tells us there is some difficulty prevents him joining us, that difficulty will rest with the individual and not with the Bye-laws under which we work. Every person is distinctly invited in this report—and I invite him now—to join us in whatever capacity he can. If he has gone away from us, if he has been offended with the President because the Board of Examiners has plucked his son, let him come back. If any other little umbrage has been taken, I hope it will be forgotten, and that any member who has scruples of that kind will distinctly remember that our strength depends upon having as many in our ranks as possible. But though I believe that thoroughly, I think the time has gone by when we can go any further. I will not—nor will anyone who succeeds me—go further than to say we invite and beg you to come in; but if you cannot see for yourselves that it is an advantage, it is hopeless for us to invite you. We have, I think, during the last few years shown our readiness and desire to do all we can to make this Society the great bulwark of the trade; we have no exclusive feelings in the matter. We are as democratic every one of us individually as the body itself is. The Society is the most democratic Society I ever read or heard of. Every individual in it has power which is denied him in most organizations. Yet, in face of that, many say if the Pharmaceutical Society would do something for us we would join it. I can only reply, come into the Pharmaceutical Society and give the President your personal power and influence and then the Society will do something for you. I purposely leave those clauses referring to prosecutions and poison law to the end of my observations and pass on now to the remaining detail of the Report — the subject of the Benevolent Fund and the annuitants. I hope the members will appreciate what it is proposed to do, and, in fact, what the Council has decided to do next October; that is, to increase the amount given to the annuitants. I know that some of my friends throughout the country are a little bit nervous about this proceeding, but perhaps I can allay that feeling if I may be permitted to make a statement, and if, moreover, gentlemen will be good enough not to press me for too much detail. There are statements that a President can very well make with advantage, and there are detailed explanations which it is not always politic to give. I take it we are anxious to do

with the Benevolent Fund, every one of us, those on the Council and those off it, the greatest good to the greatest number. When, therefore, we proposed lately that as from next October the amount of the annuity should be increased, it seems to have been assumed that we were going to curtail the number, or limit the advantages, or in some way reduce the number of the beneficiaries of the Fund. I have only one answer to this observation, and that I made at the Council Board. I have sufficient faith in the liberality of the members and associates and their friends and the trade to believe that with this increased amount we shall not only be able to have the same number of annuitants, but I believe to increase it; and moreover we shall never send away a deserving applicant for casual aid without his case being duly considered. Do not ask me for any further details, though with full knowledge of all the facts I state this officially. Therefore do not feel uneasy and imagine that we are going to do anything very dreadful. One reference there is in the report to which I must call your attention, because it involves a departure to some extent in principle from the ordinary way in which the Benevolent Fund is administered. Under the will of the late Mr. Hills a sum of £1000 has been bequeathed to the Benevolent Fund under certain conditions. It is not bequeathed to the Fund to be dealt with in the ordinary way, but it is tied up with special conditions, namely, that besides the fact which is always of course involved—that the gift shall be invested—the proceeds are to be applied to the election into schools or asylums of the orphan children of members or associates of the Society who have subscribed to the Fund for not less than three years. You see there is a very important principle involved. It is a suggestion for a separate Fund for dealing with children, and in the next place there is a suggestion that the benefits of that Fund, whether it remains as Mr. Hills left it, or whether any others choose to add to it, are to be applied to the election into schools of the orphan children of members and associates of the Society who have subscribed; in other words that the children of those who are to benefit from this gift must be the children of those who have been members or associates of the Society, and have subscribed. I do not for a single instant wish to say one word more than this, that while I believe that the Benevolent Fund proper of this Society ought to be augmented, and while I believe it is the wisest and most charitable and honourable course for us to do as we have always done—be catholic in our administration of the Fund, without raising any question, when a man is in distress, or in the case of an application by his wife or children after his death, of how much he has contributed—still, I say it is possible that some members may choose, as they do amongst masons, to have a sort of Assurance Fund under distinct and separate conditions. That is a question which is now under consideration. It has been considered a short time by the present Council, and it will be the duty of the new Council to consider the details that relate to it. But I wish to impress on the meeting the fact that whatever is decided shall be the new departure, whether it is a separate voluntary fund or whether it is not, in any case I rely on you who are in this room, and on those who may do me the honour to read what I say, that you will not leave my successor in this chair next year to say that when we voted the increased amount to annuitants we were not supported by our brethren. With reference to the part of this report which deals with penalties I call your attention especially to the clause which refers to the sale of weed killers by unregistered persons. You will observe that we have had a good deal of legal business to do, and I hope that that business has been done satisfactorily, I mean of course in the sense of protection to the public, for that is the only line of action open to the Council. In the Council chamber, gentlemen, we do not know anything about privileges for a trade, we are the trustees for a statute, for the administration of an Act which is for the public safety, and it is our duty to look at every case from that point of view, and to take proceedings accordingly. While it is our duty to do this it is also our duty to remember that it may be necessary to proceed even against our own members as well as against grocers and hucksters. It may possibly be rendered imperative by proceedings which may occur from time to time, accidental deaths and otherwise, that we should do many things which may savour of persecution in a way, but, nevertheless, they may have to be done. When I say that, I am alluding particularly to the fact that while we have had considerable experience and trouble, because the trouble involved is not measured by the few lines referring to it in this Report, we have succeeded in making the manufacturers of one of the most dangerous poisons ever known—that is to say, an alkaline solution of arsenic of most deadly potency—recognize that it could only be sold under the conditions imposed by the Pharmacy Act, and they are at this moment making arrangements for the sale in different parts of the country through registered persons. I have nothing to say whether this is an advantage to the trade or whether it is not. That does not concern me. What I say is, that if the responsibility of the sale of weed killer is now, and it is by the recent decision, vested in one class of persons, viz., registered chemists and druggists, then registered chemists and druggists must take care that they comply with the law, that they obey the 17th section, that they keep their poison book properly entered, that they do not try to go round the Act; in fact, I ask them, as I have often said before in this room, to take care of the public safety in every conceivable way. When you tell me you cannot afford to do it, I say that is your fault; the public will always pay for its own safety. If you do not charge for it, that is your fault; but you must comply with the Act. I am induced to make these observations because of some recent experiences of my own in a little foraging expedition amongst the craft not long ago. I found the poison books in some pharmacies were not as carefully kept as I should have liked. Though I have always maintained, and every predecessor of mine in this chair has maintained, that in the sale of poisons the greatest safety is to be found in the intelligence and qualifications of the vendor, still, while there is a law, gentleman, a law that we assisted to pass, we registered chemists and druggists should be the last persons in the world not to comply with every letter of it. Therefore, if you would support the Pharmaceutical Society in what are commonly called in the trade active measures to protect the public, you must take care that you as individuals do what is your part and conform to the law in every particular. Following that, I may perhaps allude to a prosecution which has been recently instituted for the sale of another form of poison, a form of poison probably more widely distributed than any of the preparations of poison that an average pharmacist or chemist and druggist is in the habit of selling. I mean sealed preparations—popularly called patent medicines—containing poisons or preparations of poisons. Now many of you are old enough to remember the years 1866, 1867 and 1868, and those who are not will probably know that this term "patent medicine" has been a common term for many years, and has probably been regarded by most people as describing what are called proprietary or secret remedies. Odd as the phrase is, it is a singular thing that a popular name like "patent medicine" should be

held, as it often is by the trade and many others, to apply to a class of remedies which are not patent, but the reverse. Now it may be said, in view of certain proceedings which were taken at Bow Street not many weeks ago, how do the members of the Council justify the fact that for all these years they have not taken any proceedings with regard to the sale or distribution of these so-called "patent" or proprietary medicines? They may be asked whether they do not know—and I am sorry to say I do know, as I have taken pains to investigate—what the amount of poison is that is distributed by all sorts and conditions of men throughout the country? I am not referring to a particular thing now, but to a number of them in the form of anodynes, opiate tinctures, and things under fanciful names which are simply disguises for the preparations of opium. These are often distributed by pharmaceutical chemists themselves to hucksters all over the country. I am perfectly aware that the amount of poison distributed broadcast throughout the country in that way is not only enormous, but that it has enormously increased since the passing of the 1868 Act. That is the important point. While on the one hand the Legislature thought that it was going to restrict the sale of these potent things, and while the chemist and druggist has to regulate his sale of statutory poisons and his business is in fact restricted—while he is required to do that, someone round the corner will mix laudanum with water, 2 or 3 parts, and call it an anodyne tincture or an opiate preparation and put a stamp on it, and claim that it is outside the Act. We have certainly thought for many years that such preparations of poisons were not within the purview of the Act, and that is my answer if you ask me, as representing the Council, why it has not many years ago taken proceedings for bringing this matter before a court of law. You know, however, that during the last ten years especially coroners and others have been writing letters, and juries have returned verdicts, and if you look to the Registrar General's Report you will find that cases of accidental and wilful poisoning have occurred to a very large extent with certain so-called patent medicines. Therefore, it is perfectly natural that from the public point of view they should appeal to us as they have in many cases. We have had letter upon letter from the Privy Council announcing the verdicts of juries; we have received letters couched in very strong language from coroners and others with regard to the law. We have invariably dealt with them in the same way. We have felt ourselves in a difficulty. We have not felt that we had power to interfere. Accordingly that being the case, the matter not long ago became a sort of test case before a magistrate. The Government undertook the prosecution, and you know what was the result. It is possible, of course, the defendant in that case may appeal, one never knows absolutely, but at present it is assumed that there will be no appeal, and for the purpose of my observations I will, if you please, assume that. For the present, therefore, the law has been laid down by a police magistrate of this city that any preparation of a poison which is covered by a patent medicine stamp is not thereby exempt from any of the conditions imposed by the Pharmacy Act, 1868. I think I have made that plain. I hope I have; it is not easy by any means. It is not only within one section, but it is within all the sections. It may be said that this is a hardship, that it may be inconvenient, and so on. Possibly. No doubt every one of us is in the habit of selling, probably on a modest scale, certain proprietary medicines containing poison. If so, I charge you that it is your duty and mine to see that you conform to the law. I charge you to see that it shall not be possible to point to any Member of this Society or to any registered chemist and druggist brought before a magistrate after the recent decision and say that he has broken the law which was made for the safety of the public; the law which, as the public say, gives him a monopoly in the sale of poisons. This, of course, is one aspect of the question. The other is how far the sale of such preparations will be affected. Now, gentlemen, if we for a moment clear away the atmosphere in which we live, which is to some extent that of poison, if we consider ourselves for a moment intelligent members of the public, who do not even realise what the word "poison" means, and if we can get rid of that familiarity with poison which in our own case sometimes breeds a little contempt, I do not think we can wonder that the public feel alarmed. Nor do I think that when a preparation is distributed broadcast which contains a potent poison, it can be considered unreasonable on the part of the public to demand that a caution should be put before them when they take such a preparation. In view of that, we must sink our personal interests. We have to remember what the history of legislation with regard to pharmacy was from the very earliest days, and that even just a few years before the passing of the 1868 Act the reason why any legislation took place at all was because the Medical Council of the year, about 1863 I think it was, had decided that it was desirable that those who dispensed prescriptions and dealt in dangerous poisons should be educated and registered. The Medical Council proposed to go to Parliament and obtain powers for examining the future chemists and druggists. But it went still further. The recommendation of the Committee of the Medical Council positively said that it was of the utmost importance that what were called quack medicines containing poisons should be dealt with in future legislation. Now, I want to point out to you that for many years there has been a feeling that the sale of any remedy containing poison without a cautionary label is a wrong thing, and that it ought to be stopped if it is lawful by legislative enactment. The Lord President of the Council himself (Lord Carlingford) five years ago actually proposed to deal with this question. We are supposed to be a Society possibly of shopkeepers, and it may be supposed possible that our Council thinks more of the personal interest of individual people than of the safety of the public. I hold that it is libellous for that proposition to be made, but I know it is sometimes assumed. Therefore it is not to be wondered at but is very natural, that the Government itself should take up this question, and get a court to decide once for all whether it is law or not. That decision having been made, until it is upset by a higher court on appeal, it will be the duty of every manufacturer of such preparations, whether he be simply a seller of a few bottles a year, or whether he be a large manufacturer and distributor wholesale, to conform to Section 17, and to protect his brethren with regard to the labelling, and it will be the duty in all cases of the retailer to see that he puts his name and address on the package or bottle, as the case may be, of such preparations. Now you will naturally ask me how are you to know, subject to this decision, whether a bottle wrapped up in elegant paper contains a poison or not. I do not think you need ask, for it will very soon be found out. I am not sure that it is not already known. I am not sure that the Treasury has not a complete list of the number of things that are being distributed broadcast which come within this Act. Of course I am bound to say that if an innocent person sold a packed remedy untouched in the way he received it from a manufacturer, and if by chance it was such a preparation, I do not think any magistrate

would convict him. But when once it becomes known, and it will speedily become known, I should hope the manufacturers themselves will save us the trouble of having to go through the process of investigation by informing their customers, and then clearly our duty is plain. We cannot allow registered persons, who are practically under our charge, to go on for a very long time in ignorance, and if manufacturers of remedies of this kind do not protect their distributors by proper labelling and by a proper statement it will clearly be the duty of some body, either the Government or the Council of this Society, to do it for them, and it will also follow, gentlemen, as a matter of course, that these preparations must be sold by registered persons. It will be our duty to see that that is done, and when our attention is called to sales of this kind we shall, I hope, as we have always done, carry out the Act in the same spirit that a judge would do it. We shall not be persecutors, we shall not be in a hurry, and we shall not proceed, as some persons are constantly wishing us to do, to appoint inspectors, and go round and see what is in every store of the country, and whether it comes within the Act. We shall wisely, judiciously, and firmly carry out the provisions of the Pharmacy Act of 1868. Whether they be considered good or bad that is our duty, and that is the duty which every Council must perform. The moment, in fact, that it is weak and vacillating that moment will its power be taken away from it and transferred to somebody else, because the foundation of all legislation on this subject came from the Medical Council. The Medical Council at present deals with dentists, as you know. They have from time to time shown a distinct willingness to take chemists and druggists under their protection also. But the chemists and druggists of those days objected to it. The Medical Council fully trusted in the Council of the Pharmaceutical Society, in fact, after considering the particular report I have referred to, as to the necessity of legislation, the Medical Council did in 1864 send a letter to the Secretary of State, suggesting that on the whole it would probably be better that the Pharmaceutical Society should undertake this legislation; that it had done its work well, that it was a body to be trusted, and that the class of pharmaceutical chemists who existed at that time were men of considerable education and were to be trusted. Let me hope, gentlemen, that no Medical Council in the future (and that no minister) will ever say that the Council of the Pharmaceutical Society (now after these years) is likely to neglect its duty. But in judging of the acts of the Council I ask you to bear in mind that its duty is to protect the public from danger; that it is not its duty to be vindictive, not its duty to be like inspectors of the Inland Revenue department, whose visits most of you enjoy so much. No; if it were part of our duty to do that, I would not sit a moment upon it. It is our duty to see generally that the law is obeyed, not to take notice of anonymous or other statements in the newspapers as to this or that man breaking the law. If anyone is breaking the law, and it is known to any of you here, there is only one course open to him. The proper course and the only proper course is to buy poison and send the poison with a statement to the Registrar of the Society. With that evidence before it the Council will move, but it will never listen to the statements in a journal, whatever it may be, that may be made with regard to any person. I am sure this view will commend itself to you as being the only proper thing for a body which is carrying out a law of very considerable difficulty. I must apologize for occupying so much of your time with this subject. I know I have administered what may be called a sermon, but I do ask you to believe me when I tell you, from information I have, that it is important that all of you—every person on the Register—should digest what I have said, not only with regard to proprietary medicines containing poisons, but also as to those potent preparations I previously referred to, weed killers. Because if it can once be shown that the particular class specially educated to distribute these things is careless in the distribution, what case have we? We may or may not believe in the utility of certain precautions; personally we may think it is a mistake to have any form of legislation, or any hard and fast line laid down with regard to what shall be done with a poison. We did think so thirty years ago; I think so now. I think that the educated man will take better care of the public than any law which can be devised by the House of Commons or the House of Lords. But we cannot legislate for ourselves. We cannot see the danger that appears to non-pharmaceutical and non-chemical minds; we cannot see as they do the danger involved in the use of these potent poisons. Therefore, having been compelled by the trade, by the United Society of Chemists and Druggists, as it was called of twenty-five or twenty-six years ago, to go in for a Poison Bill, surely we are the last persons in the world who should claim to be relieved from any difficulty which may arise from the interpretation of its clauses. You know that this Society went to Parliament in the first place for a Bill which had nothing to do with poison. I am mentioning this for the benefit of the younger men. It has been so often said it is not true that I am obliged to repeat it, and I find it is necessary in these days to repeat things very clearly and to rub them in well. This Society held the theory that if you had an educated body of men you would need no statute to tell you how to deal with dangerous drugs or poisons, and it went to Parliament to ask for powers of education and examination (on particular lines) of those persons who dispensed medicines and potent things, and it did not go in for labelling or anything of the kind. On the other hand, the Society I have referred to, representing what was then called "the trade" as distinguished from Bloomsbury Square, said it did not want anything of that sort. The trade did not want to be interfered with; it did not want any education; all it wanted was a restriction placed on the sale of certain poisons. And I am bound to say the trade succeeded in making the Select Committee of the House of Commons think there was a great deal of danger in that respect, and so it wound up its report, after a comparatively short number of sittings, with these words, or something to this effect: That legislation was necessary with regard to the sale of poisons. Consequently it followed that the Council of this Society, having consulted with the United Society with reference to its Bill and ours, had to go to Parliament with a Bill—eventually carried with many modifications and alterations placed in it by Members of Parliament and by the Government—and to ask Parliament, in fact, to tie the Society's individual powers, if one may say so, by special clauses. It has done that; and I am not here to say that it was not the wisest thing to do. I believe it was. But we have done that ourselves, and as we have done it we must stand by our Act, and be loyal to it in every sense. Not disloyal to it where it appears to us to be a little interference with our own personal convenience, but loyal to it all round; if we are so I think the public will gain, and I do not think anyone of us will suffer very materially. I have now to refer to the death of certain officers. Mr. Passmore, whom we all regret was, as mentioned in this paragraph, a most zealous officer. I have also to call your attention to the fact that our dear old friend Redwood, that wonderful old man, is now gathered to his rest. I have so recently had to refer to him at the Council table that I do not think I should be considered wanting in respect for his memory if I do not say here much about

him. He was a well-built, hard working, straightforward, and hard hitting man, a very characteristic man; a man who was respected all through his life in very many ways. He was for many years of his life a pharmaceutical chemist, and I believe I should regard him as the typical giant of pharmacy. He knew the difficulties involved in everything connected with pharmacy, but with all this was very firm and decided. Those of you who have heard him, as no doubt all of you have, discussing in this room what seemed to be a comparatively small pharmaceutical process will never forget the clearness and brilliance with which he could describe that process. In fact, Redwood was a perfect genius with regard to pharmacy proper, regarding pharmacy as being a combination of physics, mechanics, and chemistry. His lectures and expositions on any matter involving physical processes, whether applied to pharmacy or not, were as good as any of us have ever listened to. It was a great honour to us that he should have been able to live with us, to help us in our work, to be our officer and editor, and to die as our emeritus professor. Then we have lost a very old officer by the death of Mr. John Barnard. To many of you he was unknown in the flesh, but I may say that he did a large part of the work that Jacob Bell did for us. I mean to say that he was his right-hand man, almost his private secretary, and in every bit of work that Jacob Bell did for many years Barnard had a hand. Although he always kept himself in the background, being very retiring, nevertheless he was known to those of us who were behind the scenes to have done very much for the progress of the Society. I now turn to Mr. Hills, and, as it happens, I have not had an opportunity of referring to his death personally before. I would remind those of you who knew him in his best days of the extraordinary power he possessed of getting men, not pharmacists, to cooperate with pharmacists for the common good. Hills was not a man of science; but he had the faculty in a marvellous degree of getting men of considerable eminence to come to this house and examine it, and go into details with regard to pharmaceutical matters with him, whether of law or otherwise, and then take them all home with him to dine, a result which in this world is known to be often of extreme value. The last words that I heard of Hills were spoken by Mr. Brady, when he said that though he had travelled all over the world he had never met with a more unselfish man. I have a further announcement to make to you, but I must ask you to be good enough to discuss the report first and let me make that later on.

The VICE-PRESIDENT seconded the adoption of the report, saying he would reserve the privilege of making any observations for the present.

The PRESIDENT explained that in consequence of an attack of illness, which he hoped would not prove serious, the Treasurer, Mr. Hampson, was unable to be present. They would all agree in the hope that he would soon be able to renew his active share in the Society's business.

Mr. LONG: Mr. President, this is not a very large meeting and there does not seem to be much interest in pharmacy or pharmacists. In the report I see you mention the number of failures at the examinations, especially in the Preliminary and the Minor, and when we advertise for assistants I am afraid we find in many instances that it is quite true. I do not wish to be a universal pessimist, there are some men now as bright as ever entered pharmacy, but I do not think the standard is being maintained. There has been a universal consensus of opinion in favour of increasing the stringency of the Preliminary, and I think it is absolutely necessary. It is no use to inveigle young men with no brains into our business, because they must prove an utter failure, and a misery to themselves and ll connected with them during their existence in it. That was shown by the proceedings of the Chemists' Assistants' Association, where it was recently suggested that papers should be taken as read because there were so few of them able to understand them. I am afraid we find also that if there is a difficult prescription or preparation to make, they are on their beam ends. Of course the whole cry is *cui bono*, what is the good of coming to such a rotten trade; there is no remuneration for you when you come into it. That is not the fault of the trade, it is the fault of the men that are in it. The old historic houses no longer take apprentices; the houses no longer take apprentices, the houses where they could be taught pharmacy. They are only distributors of patent medicines and they know very little about the trade. We know very well that an examination is not an absolute test of a man's ability. He may be nervous, or a dozen things which will let the bumptious man through, whilst the meshes may be too fine to let the good fellow through at the same time. We find the same thing with regard to the *Pharmaceutical Journal*. As one of the district secretaries I go round, and if I mention the Journal, they say, "Oh, I never read it; it is not adapted to the wants of the trade at all; there is a much better paper than that—the *Chemist and Druggist*." I say to that, it only shows that education has not been carried up to the point it ought to be; if you cannot understand the *Pharmaceutical Journal* and take an interest in it, you are not a proper man to be entrusted with pharmacy. Of course, as the journal of a scientific society, it cannot be conducted on the lines of *Tit Bits*. We give our members the Journal; it is our own property, and each member gets a copy. Another society in another place that has not any journal of its own first of all took ours, and now they have selected another. It surprises me when people are giving their profits away at the rate they are doing in most businesses that they do not reform and get a little more profit. If they like to take in any other journal, they can do it; but it is a question whether we might not add a few volumes of fiction to our Library so that the members might have the works of other eminent authors to read if they do not like pharmacy. At the present time unfortunately young men are inveigled into the business and are not taught anything at all, and when they come to you you have to show them what they have to do. In other things people are not allowed to teach unless they have a qualification for teaching, and any chemist taking apprentices at least ought to pass the Major and to have some special qualification to teach, and when they do take them they ought to teach. There is a good deal of claptrap talked about the men in the country, and how difficult it would be for them if there is a curriculum, but if a man has his business at his fingers' ends he has a great deal more opportunity of teaching his apprentices in the country than in London. He can teach him chemistry anywhere, and he has also the opportunity of showing him the plants as they grow in the places where they are found. Then having got a good foundation in chemistry, botany, and materia medica, he could come up and study at any school he likes. I am rather sorry that we have not any contest for the Council. It shows perhaps that our enemies having flung away the scabbard have now thrown away the sword, and that we must be getting into a very happy condition. Of course you know Mr. President the esteem I have for you, but you know the common opinion of those who do not agree with us is that you are a Council of idiots, and that you have no more interest in pharmacy than the man in the moon. It is supposed that as you have the gas, water, and electric light laid on to your houses, so you have the money laid on too. They do not consider

the amount of time and trouble that each member of the Council, especially the President, gives to our interests. We have had a trade interest election, we have had a vivisection election; we have had all sorts of elections, but still we remain the same, and I do not think there is much to find fault with really. At the same time with all these differences of opinion I have been looking for that saviour who was to bring us peace, happiness, and prosperity, but he has not come forward. Pharmacy is sinking lower and lower every day. The number of gentlemen who cut their own throats and try to cut their neighbour's is increasing daily. I am very pleased to say that almost all the chemists in North Kensington belong to the Society and subscribe to the funds, and the mention of it does not irritate them now in the way it used to. At the same time our poor Pharmacy Act is knocked into a cocked hat. There is scarcely a vestige of the intention remaining. It was simply a man that kept open shop; there was nothing else spoken of in the Act of Parliament. At the time when the Act was passed there were very few qualified assistants, although that was ten, sixteen, or eighteen years after the Society was founded. We were very happy then before the fringe of society was admitted, and we got on very well and were looked up to, but sometimes the fringe draggles in the mud, and then the public are apt to tar us all with the same stick. It is always being harped upon what has the Society done for us? It has done everything. If it were not for the Society where would the trade be now? The reason Government does not like us is weare of no use to them unless we can sell a lot of patent medicines. When I first began business I used to pay £2 for a patent medicine licence, £2 a year for selling methylated spirits, 11*s*. 7½*d*. to be allowed to sell pepper, and 10*s*. a year for the use of a still. Now, the question arises with me whether it would not be much better if we, like solicitors and auctioneers, paid a licence to the Government, and then it would protect us. I would suggest that nobody, either single or combined, should be allowed to act as a chemist unless he was on the register. There has been a great deal of discussion as to the state of the trade, but my panacea is this: let every chemist join the Society, and let him keep up his prices. Of course, we should have to have some modification in some cases. We do not live in the old times, and the old prices will not go down, but if chemists had a uniform price for everything they would have a much better chance than they have now when we are constantly being asked how much do you charge for this? and we know that what one man charges 4*d*. an ounce for another sells at 3*d*., and another 2*d*., and that creates distrust in the minds of the public when we want to obtain public support. Again, why should we make such slaves of ourselves; let us adopt earlier closing. But people are all keeping open against each other in order to try and secure the last halfpenny that is floating about. We ought to have early closing at certain definite hours, and after that time we ought to charge more for our goods.

Mr. GILES: As no one appears to be desirous of discussing the business part of the report, I should like, as one of the oldest unofficial members of the Society, to echo from this part of the room the sentiments you have so fitly and nicely expressed with reference to those whom we have respected and lost. We have lost them, it is true, ripe in years, but to those who, like myself, can look back to early days of association with them, there is something of very great solemnity in the fact of so many being taken from us as there are at this time. I am sure that in referring to some of them individually, I shall fulfil the wishes, if they could have been expressed in anticipation, of all those of whom I shall now name the first if I follow your example in giving the first place to that really very great pharmacist Redwood. He filled a place in this Society at times certainly when no other man could have filled it, and in a manner which, I think, at no time any other man would have filled. He was, as you have said, a typical pharmacist. He was a man who had devoted himself very much to the cultivation of science, and certainly the time has been when we did not realize what he was to this Society. He was its figure-head and body. He really built the Society for very many years. It is true that the honour has always been given, and fitly given, and I am not going to say anything in the sense of detracting from that honour, to Jacob Bell, for the formation of the Society. I do not know—perhaps nobody knows—how much Redwood may have co-operated with him in that work, but I expect he very largely assisted him. But from the time that the Society was established Redwood became the real representative of the Society, and held up its credit in the eyes of the world. There have been times when eminent pharmacists have somewhat cavilled at Professor Redwood's attitude in some respects. They seem to think that he should have been more of a drudge, in certain special ways, than he was. But I beg to say, and I think we shall all recognize it now, that if Redwood had been a mere teacher in the school he would not have fulfilled the large duties that he did discharge in reference to this Society. Those times are passed, and we may now look to the professors taking special departments. The management of the Society has been consolidated and is altogether put on a different footing, but in having lost Professor Redwood, after a life which has been carried up to the very last days, I think you may say, in the active performance of his duties, we have lost one of several men to whom this Society owes the greatest esteem and a deep debt of gratitude. I will now say just a few words on a very dear friend of my own, whom I have known also many years, Mr. Thomas Hills. Everybody has recognized Mr. Hills' great liberality in the way of giving, but that does not at all represent his character. Mr. Hills was generous in a much larger and wider sense than that. You have referred to the fact that he was not a brilliant man of science. He was quite aware of that, and he never aimed at what he was not, but he wonderfully well fulfilled that which he was. During the many years I have known him I have never heard him express a grudging opinion of any other man's success or any other man's distinction. He has always shown that passive generosity of cordially admiring the success of others. You have referred to his capacity for drawing about him eminent men. A very large circle of acquaintances he had, and he was naturally and properly proud of his social successes, but he never turned his back on the smallest pharmacist. He was as large-minded there as he was in every other aspect, and there was this to remark about him that these men, so much, as he would be disposed to say, his superiors in rank, station, and other accidental circumstances, not only enjoyed his friendship but they loved him sincerely. He was a man who really had very great gifts, but they were not of a very brilliant character. There was no man whose calm, quiet, steady judgment I respected more than that of my friend Mr. Hills; no man whose advice I was more anxious to obtain, or that I valued with greater satisfaction. Well, sir, it has only been within the last few days that I have learned of an event which took place some time ago—the death of Mr. Passmore. I was very grieved indeed to hear it. He also was a man who discharged duties of great importance to this Society with eminent ability and with the greatest possible temper and steadfastness. He was one of the several excellent officers that this Society has had

the good fortune to gather round it. There is another loss which, I understand, you will presently refer to, and which therefore I will not mention; but all these things coming this year so closely following our year of Jubilee, show how extremely great are the vicissitudes of life. I could not come here without adding something to that which you have already said, because I have had the great privilege of knowing all those we have lost very intimately for many years, and I can say conscientiously that they were all men who could bear the light of day; you had not to make any apology for them; the more you knew them the more you esteemed them. I will add no more, but I could not refrain from saying just so much.

Mr. LOMAS said there were one or two points on which he should like to say a word. The Council got no credit for what they did, but it was only right they should know that the members appreciated their services. A past member of the Council once told him that he was on the Council for three years, and the result was he lost valuable time, did hard work, and received abuse, and that was about the truth. The recent decision on the sale of poisons was very important, and threw on them increased responsibility. The absence of a contest showed that men would not come forward to serve on the Council, and was another proof of the necessity for more members of the trade to join the Society. If they were all united they would receive more attention from the Government. He was glad to see that during the past year the Council had got Mr. Gainsford Bruce, Q.C., to represent them in Parliament, but he was an outsider, and there ought to be some one from their own body who could step into the shoes of Jacob Bell and represent them in the House of Commons. He was glad to see the reduction in the life membership fee, and, still more, that not one of the existing life members had raised any objection to it. He considered the Journal was far more read than it used to be, and wished members would be a little more jealous of their own honour and that of the Society, and not condescend to such practices as were too common, such as exhibiting an attractive sign with the words "So and So, low priced pharmaceutical chemist.' It only resulted in others following suit, and you saw articles ticketed in the windows at absolutely starvation prices. These men were only doing a trade at the expense of their more honourable brethren. It was satisfactory to find that so many outsiders had joined during the last year, but more ought to do so as a matter of duty, to strengthen the hands of the Council, and if they thought anything wanted improving they would then have an opportunity of doing something. The trade would have been in a far worse position but for the action of the Society.

Mr. ATKINSON said I am very sorry, Mr. President, that I arrived so late as only to hear your concluding observations, which may place me at some disadvantage. The annual meeting I know is looked forward to generally as a fitting opportunity for exercising the true British privilege of airing your grievances, but it has struck me that on this occasion there was not that readiness amongst the gentlemen present in getting up and telling their numerous grievances which is generally shown. That points, I think, to some little improvement. The complaint used to be that the President was prone to ride rough shod over all the constituted laws of the realm; and if it did not take that shape, it would take another—that pharmacy was going to the bottom of the stream. It has been a long time going there. There are men who may deplore the enforced withdrawal of the last Pharmacy Amendment Act, but I do not consider that that is really a matter for regret. The Council has provided out of their wisdom for at least one portion of that scheme, and I am by no means certain that in the long run it will not be done better than it would by any legislation. I mean the extension, not only in relation to the time but the character, of the examinations. It is scarcely accurate to say—as Mr. Long did—that young men are inveigled into the business under false pretences. Time after time the President, not here only, but on a hundred platforms, has raised his voice to point out that you must have increased education, and without it you can do nothing towards raising the position of pharmacy. We have a right to claim that those who are going to join this Society in future shall be drafted from a higher class than that which has furnished them before. We want cultured young men who will have some aspirations; who, when they emerge successfully from the Examination Rooms will bring a dignity to their calling, which will have its effect on the general public. Speaking of this ideal reminds me of a paper published in the Journal a great many years ago of very high merit, which deserved, perhaps, more than an ephemeral notoriety. It was a paper which, if placed in the hands of the young men who have come into this Society since, if they could only have assimilated a small proportion of it, might have rendered the pharmacy of the present day very different from what it is. I refer to the paper entitled "Pharmaceutical Ethics," and the author was, I believe, Mr. Joseph Ince. I have not the honour of that gentleman's acquaintance, but I desire to testify my gratitude to him. That paper was probably a quarter of a century in advance of the ideas of pharmacists of that day, or rather of the average chemist and druggist. I am not quite sure that I should overstate the case if I said it was a half century in advance, because it is an ideal we have not yet reached. That we shall reach it I do not for a moment doubt, but the time is perhaps not yet. I had not the advantage of hearing what the President said in relation to a matter which I called attention to at the last annual meeting, but I do not think we have seen the last of it yet. I am referring now to the recent decision, which is really the same as we had three years ago, with regard to the proprietary medicines. Leaving that subject I will come to one which I think is worth the consideration of this meeting. It is also a question of Inland Revenue. So long as the Act of George III. remains on the Statute book it is the bounden duty of everyone in our business to conform honourably to its provisions. I know also that if you have any doubt—and there often is a doubt, because there is a certain ambiguity in the wording of labels which might lead even an expert astray—but in all these cases if you will take the trouble to write to the authorities at Somerset House they will promptly and courteously give you the information you seek. It is not to that I am referring, it is to the iniquitous, un-English way that informations are laid to which I want to draw your attention, and I will do so by giving a little personal illustration. You receive one of those little blue documents which says that recently—no date—you have sold a preparation which was liable to stamp duty and did not bear a stamp, and if you have any explanation to make why you should not pay a penalty or be proceeded against for ten guineas, you had better make it at once. Now, there are men who have two or three assistants in their business, and they may do all they possibly can to carry out the Act. When you get a notice of this kind, you naturally ask your assistants whether they have committed the offence. It may happen that everyone may be prepared to go into a court of law and to swear that they have not done so. You may send any explanation you like to the authorities, but the end of it is, you receive a notice that on payment of one guinea to the nearest Inland Revenue office no further proceedings will be taken. Now I want to know if we ought quietly to submit to a species of blackmail of this kind, for I

can call it nothing else. The chemist knows perfectly well that if he had the best defence in the world, and he may have a perfectly good defence, it would cost him infinitely more in time, money, and annoyance, and the unenviable publicity, and it is better to pay the money than have anything further to do with it. You may put the case this way, that it is not to your interest to sell this article without a stamp nor to the interest of anyone in your employment to do so, but it is to the interest of the informer to secure a penalty or a conviction. He stands in pretty nearly the same position as a young policeman—he cannot afford to be six months on his beat without a case of some sort. I do think we might get some reform in this matter. I cannot see that it would interfere with the justice of the procedure if it were required to be stated at the time of the purchase that the offence had been committed. You all know how the vendor is protected in all recent enactments; take the Adulteration of Food and Drugs Act for example; but here you pay your guinea as blackmail on the *ex parte* evidence of some one you have never seen. In the case I am referring to I applied to the authorities for the date when the sale was alleged to have taken place and asked permission to see the package. It was refused, and I have no alternative but to pay the guinea.

The PRESIDENT: Did you go yourself or simply write for the package?

Mr. ATKINSON: I wrote. I say it is not so much the guinea, it is the feeling that you are placed in a degraded position; it is not right that chemists and druggists should tacitly submit to anything of this kind, and until you begin to break some of these miserable links which have bound pharmacy so long how can we make advancement? I am not going to suggest what, in my opinion, might be the best method of meeting the case, but I think it is a matter upon which there might be a little discussion; whether it should take the form of a deputation to the authorities or some other which may be thought more feasible I do not know, but I think in matters of this kind the Council of the Society might be of very great assistance.

Mr. HYSLOP: I shall not detain you long, sir, but I am very anxious that the apparent unison of sentiment which now seems to prevail amongst our body, as instanced by there being no contest to-day, should not be misinterpreted abroad. It is important to notice that two years ago with a severe contest, as we all well remember, it seemed to me, and it seems so still, that that time was like the meeting of two thunderclouds, the closing of one period in our history and the opening of another. We know what angry feelings existed on that occasion, but how they all subsided at the last election, and how they still seem to have subsided; the hub-bub and the noise. It seems as if there had been a clearance in the atmosphere, and that some light had been spread abroad. There had been dark clouds gathering for years and years, and it was all the same old topic, it was animosity, hatred against the principles upon which this Society was first founded. That hatred was shown by various ebullitions from time to time, and it was in part revealed too on the occasion I spoke of two years ago. There seemed to be a gathering up of the unruly elements to a final encounter. Whether it was the final encounter or not, I consider that those who were inveterately at enmity with our principles and acts became on that occasion severely beaten, and have not been able to gather strength since, and I think they never will during the next fifty years. It was not our might or wisdom, but it was the reference to stated facts, and the light that was shed on pharmaceutical matters which gentlemen in different parts of the country and even in London had never seen before. At that time an Association or two sprang up, and chemists and druggists, we small men, were sent abroad to the dark places round the outskirts of the pharmaceutical field as Divisional Secretaries, and we met with all sorts of strange notions, but they only wanted stating to be exploded at the instant. In my opinion that is a great deal the cause of the present subsidence of feeling and the reason why there is no contest on this occasion. Again, I should say surely we are peacemakers, and love peace. It is said, and said truly, that commerce is a child of peace and its foster-mother as well, and surely men of science and artists —and every pharmacist should be a happy combination of the two—must be men of peace, inasmuch as he knows the advantages which are likely to accrue from it, and he endeavours to work out the principles which he knows and feels in his heart to be at the bottom of all improvement and the mainspring for the raising of any scale of Society working on these principles in quietness and urbanity, after the splendid pattern of those who are departed, and who have been so fitly alluded to to-day. Before I sit down I should like to say that this pregnant discussion on proprietary medicines seems to me to require some caution. We have certainly lately been getting in the way of regarding our profession as consisting mainly of purveyors of packages. We have seen in our shops—we cannot call them pharmacies—a deplorable assortment of dummies. We know they are dummies, and almost every customer knows they are dummies, and not only so they are dirty dummies, looking as if they had been there for months and months, but I think we are awakening to the fact that unless chemists and druggists are to carry on business in a better way than that there is no hope for them. We must depend on cultivating the sciences of botany and chemistry, and all the sciences which bear on our calling. We must be all round scientific as well as somewhat mathematical men, and we must bring the principles of applied science as well as exact science to bear on our business. In that way we shall be qualified to be teachers of the youth, and those entrusted to our care will be drawn to us by that magic influence which those who know their position as being secure can exact. There is one further matter I would refer to, and that is that we enjoy at the present time more than ever before the confidence of the medical profession. Let us take care that we do not forfeit it and that we are worthy of it. We are a branch of the great science or art, whichever you like to call it, of the healing profession. Surely the pharmacist who sticks to his colours and keeps the ground will be drawn closer and closer into connection with those who make the alleviation of human suffering their chief business and delight, and a more useful sphere no man could wish for.

Mr. BARNARD: I have great pleasure in supporting the adoption of the report. There is no doubt that the action of the Pharmaceutical Council during the past year has met with the general approbation of the members and associates. I refer particularly to its action with regard to the prosecution of unqualified vendors of poison. The questions with regard to the finances of the Society have been satisfactorily explained, because the expenses you have had to meet in the past will not occur again, and therefore we have every prospect of a thoroughly sound financial position in future. But I do think something should be done by this Society to get its members and associates recognized by the Government. I hardly know how and when we can ventilate this grievance; but it can hardly be credible to those who are members of various local boards that about six weeks ago the Bethnal Green Board advertised for a dispenser of medicine, who must be either a licentiate of the Apothecaries' Company, or a registered man; and the Local Government Board refused to sanction the payment to that man of a salary higher than £120 a year. At the same

time they appointed a paid clerk to give out the provisions, &c., and they readily sanctioned his salary, commencing at £140 to increase to £180. Now I think the Society should try to get a recognition of the worth of a man after he has passed the examination. It is useless for us in our shops when we have public competition to mark our goods as high again as the stores or the general shopkeepers. We cannot get it there, but here we have the state itself positively saying that examined men of the Pharmaceutical Society are not worth so much money as the paid clerks and relieving officers and others from whom no educational qualification is required. I hope in future the State will recognise the pharmaceutical chemist, and I hope through the research laboratory we shall see many men holding the appointment of county analyst or public analyst. We want to get the Pharmaceutical Society better recognised, but the fact is we accept anything we can get for our services and no one seems to kick against it. I do hope the Council will take into consideration the salary paid to various pharmaceutical chemists who hold positions under the State in the Army and Navy, and especially those holding appointments under the Local Government Board.

Mr. WIGGINS said he did not wish to speak on the subject of poisons or patent medicines, but to bring before the notice of the meeting a case of semi-starvation which came before him last week, in the hope that by so doing he should touch the hearts of those who had never yet subscribed to the Benevolent Fund, and endeavour to make them open their purses and subscribe at once. As he was standing behind his counter a very respectably dressed man walked in whom he thought was a customer, but he asked for a little assistance, and when he said he did not give indiscriminate assistance he said that he was a chemist, that he did not want money, but that he was literally starving; he had not broken his fast for two days. He had not much to give him, as he did not live on the premises, but he got him some bread and cheese, which he ate ravenously. He asked him if he had made any application to the Benevolent Fund at the Square, and he said he had been there, but he was told that Mr. Bremridge was gone out, and would not be back until the latter part of the day. He told him he was sure if he made a proper application there he would not be turned away hungry, and the end of it was he said if he could get down to Chatham he had some friends there who would not see him starve. He therefore gave him a trifle, he seemed very thankful, and went on his way rejoicing. He believed there were many men who called themselves chemists and belonged to the Society who had never given a shilling to the Benevolent Fund, and it was to them he appealed. It was not because they were in a good position to-day that they might not require assistance themselves; he might be on the Fund some day, for none could see what was before them, and he only hoped the remarks he had now made would touch the hearts of some of these niggardly men and induce them to at once send in donations to the Fund that such cases as that he had narrated might be at once relieved.

Mr. HILLS: Mr. President, before you put the motion to the meeting I should like to add a word or two. This seems to be a day of mourning with us, and perhaps that is one of the many reasons why there is less contentious matter than usual before us. In the report to which we have listened we noticed the deaths of three of the leaders of pharmacy, three men who had been associated with the Society from its earliest days. I do not propose to say a word about Professor Redwood, because there are many in this room who are better able to speak of him than I am, but it may not be altogether out of place if I just refer to two of the men whose deaths are recorded here, and say just one word about each of them, viz., Mr. Hills and Mr. John Barnard, as naturally I knew both of them better than anyone here. Although they are dead they yet speak, and I would just like to call the attention of this meeting to one trait of each of their characters which may perhaps be of use to us. And I will first speak with regard to Mr. Hills, of his intense loyalty to this Society. He would never allow anything to interfere with his duties in Bloomsbury Square. Often has he said that he never missed an evening meeting of this Society, and although not professing to be a man of deep science he said he never came away without having learnt something to his advantage. Perhaps I can best illustrate that point by just reading to you two of his favourite quotations. One is this: "I hold every man to be a debtor to his profession from the which, as men of course do seek to receive countenance and profit, so ought they of duty to endeavour themselves by way of amends to be a help and ornament thereunto." Only a day or two ago I came across a note book of his in which I found this quotation, "All should unite and guard what all may share; a common cause should be a common care." With regard to my dear friend, John Barnard, who was unknown, perhaps, to many of you, but who was known to many gentlemen who are in business in various parts of the world, I may say he was one of those quiet, unassuming men who did good work without its being perhaps recognised by the public generally. If you wish to have the character of John Barnard, I would ask you to turn to what has been described as the biblical definition of a gentleman in the 15th Psalm. Surely the writer of that wonderful psalm must have had such a character in view when he penned it, or in the words, perhaps, of a later writer, John Barnard was "One of those benignant lovely souls, who, without astonishing the public and posterity, make a happy difference in the lives close around them, and in this way lift the average of earthly joy."

Mr. PICKARD: I fully agree in all that has been said with regard to Mr. Hills and Mr. Barnard. I knew them both thoroughly, though not so fully as the last speaker. I rose to ask a question as to the finance statement. I see we have over £20,000 invested in leasehold properties. Various insurance companies are issuing policies providing for the repayment of the fund at the end of the lease. I do not know whether the Council has considered the expediency or otherwise of taking out such a policy. With regard to the patent medicine question, I feel we are now justified in thanking the Council for their patience in waiting so long in this matter. If we had forced the question to a premature decision, I think it is extremely probable that it would have been very different to what it is. By waiting and letting a Government body take the matter up, we show that our hands are clean; we are clear from any suspicion of self-seeking and interested motives in the matter. I should be glad if you could give me some light as to what labelling is. I do not know whether labelling the outside paper of the bottle containing the poison would be deemed sufficient. I know some time ago one of the medicines which has a very large sale contained inside no label at all. If I had simply affixed a label to the outside of the bottle, should I have labelled the contents? If I had so labelled it, it would have been of no great advantage.

The PRESIDENT: If no other member desires to say anything, I may reply to the observations which have been made by several speakers; for instance, Mr. Atkinson's observations as to his difficulties with the Inland Revenue authorities. I think it is very proper he should mention them, and one sympathises always

in cases where a man or his servant is, as it were, entrapped apparently, into committing an offence. Mr. Atkinson must remember that when the authorities ask him for a guinea they are condescending, to use a legal phrase, to take a nominal sum, not considering the explanation of the man as being sufficient to allow them to mitigate what would be called the penalty. I do not see that Mr. Atkinson's complaint could be seriously entertained if he asked in writing to have the evidence which they possessed, on which they might have to sue him in court. I go so far as to say that if Mr. Atkinson had gone himself, or if he had written to me or the Registrar, they would have given us the whole of the evidence. They have done so repeatedly, and have always shown us the greatest courtesy and consideration. In the administration of all laws you must now and then get hard cases. It is only really in revenue matters in this country that what may be called spies or informants are specially employed. It is true that they get a portion of the penalty—in fact, I believe the chief object of the Government department at Somerset House when they mitigate the penalty is to get enough to cover the sum to be paid to these men. While sympathizing with Mr. Atkinson very much, I am glad to say that my experience in taking up cases and going into them for my brethren has been such that in most cases they have had little to complain of. I have had statements made to me from time to time of apparent hardship, which, on careful investigation, appeared not to bear the interpretation put upon them. Nevertheless, as I said before, in cases of dispute between members or associates and the Government department, we have been frequently called upon to act as intermediaries, and I can assure you there is no one who is received at Somerst House, whether on Inland or Excise questions, more courteously than the President of this Society, whoever he happens to be. His advice is frequently asked for in regard to proposed alteration in legislation. It was the case with my predecessor in the chair, and I have had a considerable number of interviews, officially and unofficially, with the authorities upon the subject. I think I may venture to say that if a man has incurred a penalty of £10, and is let off with £1, and pays it, you are bound to take the general view that he has committed the offence. Their object has always been—and I must say, so far as I have been able to follow it, it has been justified—not to get penalties, but to have the law obeyed. We have the same principle to contend with in carrying out the Pharmacy Act. As an instance of their consideration I remember a case in which a very respectable pharmaceutical chemist, a man of very considerable standing, was justifiably caught, if one may use the expression, over a simple preparation he was in the habit of selling with a Patent Stamp—the old-fashioned Gregory powder. The house, of which he was the proprietor, is an historic one, and is well known. A stranger came in and asked for half-an-ounce of gregory powder; he received it in paper from an assistant, and this clever gentleman, finding wrapped round some other article sold by the same house a recommendation of gregory powder as a cure for certain things, pounced upon him and claimed a penalty. He had two or three dozen gregory powders duly stamped, but selling from bulk he was within the law. A member of the Society gave me the facts of the case, and upon calling at Somerset House and explaining them, the matter was at once withdrawn. It is a different thing when I have gone on cases of the same kind and have been told, "I have never done anything to bring me within the law," to find bills, labels and all sorts of things, which seem to have been forgotten by the individual when complaining to me. It is very difficult, sometimes, to have to stand up for one's own people. I beg to assure Mr. Atkinson, if he has a case of that sort again, that if he will communicate with the President or Secretary, we shall be glad to do all we can.

Mr. ATKINSON: I do not think you have quite caught my point. I was not so much objecting about myself, as personally I do not care two straws about it; my objection was to the way in which these informations are laid.

The PRESIDENT: Probably it is one of the things to which we shall apply the word "un-English." I thought I had practically covered it by saying that up to the present time this sort of thing has been enacted only in the case of Government measures for the collection of revenue. The question is whether this sort of thing is going on or not. That is a special rather than a general question. Mr. Barnard has referred to the position of public dispensers. You will be glad to know that through the instrumentality of this Society dispensers in public institutions have been benefited. The President has been in communication with the centres of all services and I have spent many hours with the Local Government Board upon the subject. The Society has never either through its Council or Secretary or Registrar shirked any form of work which can be beneficial to the trade at large. I think I may now put the resolution that the annual report and financial statement submitted by the Council be received and adopted.

Mr. LONG: I had a case with the authorities at Somerset House through one of my assistants putting a wrong label on cough lozenges, and I then found that if you screwed them up in a bag you might recommend them through thick and thin. The half-ounce of Gregory's paper was the same, I think.

The PRESIDENT: No, it was labelled. If you screwed up two pills and did not label them, they are outside the Act.

Mr. LONG: And the same with cough lozenges?

The PRESIDENT: Yes.

The resolution was then put and carried unanimously.

The PRESIDENT: I have officially to notify to you that the following fourteen members of the Society have been nominated for election to the Council, and I beg to propose that the following gentlemen be elected:—

M. CARTEIGHE, London.
T. GREENISH, London.
N. M. GROSE, Swansea.
R. HAMPSON, London.
J. HARRISON, Sunderland.
WALTER HILLS, London.
J. JOHNSTON, Aberdeen.
N. H. MARTIN, Newcastle-on-Tyne.
W. MARTINDALE, London.
G. T. W. NEWSHOLME, Sheffield.
J. G. F. RICHARDSON, Leicester.
G. F. SCHACHT, Clifton, Bristol.
D. STORRAR, Kirkcaldy.
W. WARREN, London.

The resolution was put and carried.

The PRESIDENT: I declare the Council for the ensuing year to be composed of the following gentlemen:—

ABRAHAM, ALFRED CLAY, 87, Bold Street, Liverpool.
ALLEN, CHARLES BOWEN, 20, High Road, Kilburn, London, N.W.
ATKINS, SAMUEL RALPH, Market Place, Salisbury.
BOTTLE, ALEXANDER, 37, Townwall Street, Dover.
CARTEIGHE, MICHAEL, 180, New Bond Street, W.
CROSS, WILLIAM GOWEN, Mardol, Shrewsbury.
GROSE, NICHOLAS MALE, 5, Castle Street, Swansea.
GREENISH, THOMAS, 20, New St., Dorset Sq., N.W.
HAMPSON, ROBERT, 71, Aberdeen Rd., Highbury Pk., N.
HARRISON, JOHN, 33, Bridge Street, Sunderland.
HILLS, WALTER, 225, Oxford Street, London, W.
JOHNSTON, JOHN, 45, Union Street, Aberdeen.
LEIGH, MARSHALL, 46, Dyke Road, Brighton.
MARTIN, NICHOLAS HY., Northumberland Road, Newcastle-on-Tyne.

MARTINDALE, WILLIAM, 10, New Cavendish St., W.
NEWSHOLME, GEORGE THOMAS WILKINSON, 74, Market Place, Sheffield.
RICHARDSON, JOHN GEORGE FREDERICK, Elmfield, Knighton, Leicester.
SCHACHT, GEORGE FREDERICK, 52, Royal York Crescent, Clifton, Bristol.
SOUTHALL, ALFRED, 17, Bull Street, Birmingham.
STORRAR, DAVID, 228, High Street, Kirkcaldy, N.B.
WARREN, WILLIAM, 24, Russell Street, Covent Garden, W.C.

APPOINTMENT OF AUDITORS.

The following gentlemen were appointed to act as Auditors.

BUTT, EDWARD NORTHWAY, 13, Curzon Street, Mayfair, W.
LESCHER, FRANK HARWOOD, 60, Bartholomew Close, E.C.
STACEY, SAMUEL LLOYD, 300, High Holborn, W.C.
UMNEY, CHARLES, 50, Southwark Street, S.E.
YATES, FRANCIS, 64, Park Street, Southwark, S.E.

The PRESIDENT: Now I am sorry to have to report to you that on Monday last our dear friend Mr. Sandford died and is to be buried to-morrow, and I am afraid I cannot say any more. One ought perhaps to remember that very largely—perhaps solely—through his instrumentality, through his perception at a period of the Society when we were disposed to consider we were better than our neighbours in the drug trade, he had the ability to keep before him two great points; one was the importance of an association of the whole trade in one great corporate body, the registration of all such persons by compulsion, that is to say by statute, and the prevention of any outside body, whether Medical Council or Government, touching the class to which he belonged. When you remember that the Medical Council itself was really the cause of much of the legislation that took place in 1868, when I remind you, as I did in my previous observations, that they had proposed themselves to take in hand this part of the subject, and when on the other hand I remind you that there was an organization which was called the United Society of Chemists and Druggists, which was got up in direct antagonism to this Society, and had to be dealt with; when I remind you of these facts, that on the one hand you had the Government of the day, the Medical Council and the United Society, I think I may say for Mr. Sandford that it was a very grand piece of statesman-like work which he did when, beginning in 1863 and ending finally in 1868, he succeeded in uniting the members of that outside society, as it was called, with us inside, in getting us agreed, and getting the Pharmacy Act of 1868 passed. His foresight, too, was shown in the fact that he, differing very largely from a number of members of the Society at the time, thought it desirable that every person who in future became a chemist and druggist by examination should also become eligible to be a member of the Society. I mention this now because we have actually had to undo that which in consequence of a special meeting held in this room, in which I had of course an interest and a share, the examined men of the time objected to Mr. Sandford's proposal that Minor men, as they were called, should be made members, and we of the Council had considerable difficulty in getting our members to accept the Bill as it was eventually presented to Parliament. There was not an unnatural feeling on the part of those who had been examined and passed the Major examination, and spent their money under a voluntary system, that it was very hard that someone who had passed another examination which they considered a lower one should be admitted to membership. What followed? In order to get our examined members to agree to the proposition of the Council we were obliged to accept a modification of the wording of the clause, which was to this effect, that all Major men should be members and Minor men associates. Mr. Sandford advised "associates in business" in order to give all the political power to the Minor men without giving them the name of member. I wish to remind you that, when this proposition came before the Council after a special meeting had been held, I remember perfectly well that every member of the Council felt that they must sever themselves from their chief in order that this Bill should be agreed to by our own people, and the only hand that was held up against the proposition which, I think, was moved by myself, but that does not very much matter, was the hand of our friend Sandford, who was consistent and who insisted, and rightly insisted as we now know, that he knew very much better than any of us. He foresaw that the time would come when it was desirable that whatever a man's professional qualifications were, and whether he had passed the Minor examination or the Major examination, what you had to do was to get them all together in one bond of brotherhood, associated together without any distinction of title. Mr. Sandford was a man very much like Mr. Hills in this respect, that he was not a man of science, he had been apprenticed in the country, and became associated with a house in Piccadilly which bears his name somewhere about the year 1838 or 1839. At the foundation of this Society he was an assistant and an associate, though not eligible to be a member, he not being a partner in the house to which he subsequently belonged. From the time he slowly and gradually saw the advantage which this Society would have for the whole of the trade in the course of time, when some of the giants of 1842 were gradually gathered to their forefathers, Sandford, with his quiet manner, his sympathy for the trade, his tact, judgment, and true sense, was selected to be a councillor, and about the year 1854 became a member of Council. In fact, I think he joined the Council somewhere about the time when our friend Elias Bremridge joined us. It is curious that from that moment Mr. Sandford gradually took an active part in the Council, and in due course was appointed President. In those days the qualification for the President was generally assumed to be special scientific knowledge amongst other qualifications, and of course such men there have been—Morson and others. Sandford was elected President, and it was during the first year of his presidency that the Medical Council began to move in this direction, and show a desire for interference or getting the Government to interfere with laws which would affect chemists and druggists. The United Society of Chemists and Druggists was also at work, and he from that moment set himself the task, while holding up steadily and steadfastly the interests of the members of this Society, of getting the different bodies into closer union. He set himself to work with considerable success, and ultimately achieved what was very much like a union between what were then called outsiders and insiders. Of the difficulties he had to contend with, I know nothing previous to 1866, for during the first year of his presidency I was a student in this house. But from 1866 and onwards we were very much drawn together. I think it is only fair to say that his firmness, his breadth of view, his commanding appearance—we used to jocularly call him the member for Bloomsbury, and anyone who had seen our friend with his white hat walking along Piccadilly would have said at once, "there goes a member of Parliament"—all these external characteristics of the gentleman, with the gentleman inside, have been of great value to us. In his interviews with exalted official persons the effect produced was always of the very best. His influence was enormous, his opinion was sought for on every conceivable question, and

whenever he wanted help he took his Vice-President, Thomas Hyde Hills, to approach someone he did not know. I remember not long before the Act was passed we had to bring two or three members of Parliament to show them this house, and how we were giving to our pupils education without stint, and out of our own subscription. These men went back to the House of Commons and said they were so satisfied that this was a Society to be trusted, that they felt it might be a department of Government without risk. This is just an indication of the value given by influential Members of Parliament to a good educational system; in fact I believe if we had been simply a corporate body without educational ends, and if we had not been doing all we could to educate our people, the Act of 1868 would not have been passed. I believe that the respect in which the Pharmaceutical Society is held at the present time is very largely due to the character of the President, who was instrumental in obtaining the passing of that Act. He was associated with Sir John Simon; they were in a certain sense adversaries during the progress of the Bill, because Sandford had to face the great difficulty of dealing with people who did not understand the subject of poison. When I mention to you that even such a person as Sir John Simon actually drafted a clause to prohibit a registered person from selling more than one dose of poison at a time it will give you some idea of the opposition which Sandford had to deal with in getting any legislation at all. I think that while all of you must feel extreme sorrow that a great man has left us—I say it without exaggeration, I do not want to put one man before another, but after Bell, certainly comes Sandford—I think you would have been probably displeased if I had not referred to it, although it is very painful.

Mr. BURDEN: I am sure we have all listened with great interest to the remarks which you have made, and especially with regard to the names of the great men who have passed away from the Society. When you came to the last you have just now mentioned we cannot but feel that we have again lost a man who ought to be held in memory, and I am sure will be held in memory for many years to come; indeed, to all time in regard to the first commencement of the history of this Society. Everyone knows the great interest which Sandford took in the formation of the Pharmaceutical Society and in the legislation with regard to it. We all knew also his genial disposition, that he was not only an individual man, but a man of great strength of character, and he supported that character to the backbone in the advances on behalf of the Association. Therefore, we cannot but respect the memory of the man who could so adorn the Society whilst he lived, that his name should be handed down to posterity as a benefactor, at any rate by those with whom he was connected. I should like to propose—

> "That this meeting recognises the loss that the Society has sustained through the death of Mr. Sandford, and desires to sympathise with the Council in the loss they must feel by his removal."

The Council deserves the sympathy of the whole body of pharmaceutical chemists upon this occasion.

Mr. GILES: I will second that resolution, and in doing so I may say that I thoroughly agree with everything that has been said. I felt some little doubt about whether it would be quite in form, or I should have made some such proposition myself. I am sure the proposition will have the warm approval of every person who has known the Pharmaceutical Society when Mr. Sandford so ably guided it.

The resolution was passed unanimously.

The PRESIDENT then called attention to the fact that the following registers had been laid upon the table in compliance with the provisions of the Act:—

Register of Members, Associates, and Students of the Society.

Register of Pharmaceutical Chemists.

Register of Apprentices and Students under the Act of 1852.

Register of Chemists and Druggists under the Act of 1868.

Mr. J. L. EWING (Chairman of the North British Branch): Mr. President and Gentlemen, allow me to express to you on behalf of the North British Branch our sincere sympathy with you in the loss you have sustained, and to which our President has so feelingly referred. Mr. Sandford was not so well-known amongst us, though we all knew the great services he rendered to the Society. But Hills was held by us in affectionate regard. We loved Mr. Hills. He presented to us one of the finest types of the fine old English gentleman. Gentlemen, it is now my pleasing duty to propose a hearty vote of thanks to those gentlemen who are retiring from the Council. I am sure we are very much indebted to them for the time and labour which they have given to the Society and to our interests. I am sorry that we are losing a highly respected representative from Scotland, but I rejoice to think that we have provided in his place a worthy successor. In Mr. Storrar we have an excellent representative, and I may take the liberty of saying that Scotland has been well and ably represented on the Council in the past by such men as Mackay, a name held in deep reverence amongst us and amongst those living, I may mention the name of Mr. Hodgson. You have lately seen recorded in the Journal, no doubt, some account of the prosecutions which have taken place in Glasgow, but I am afraid these do not disclose to you the true state of pharmacy in Glasgow, because pharmacy exists there under different conditions to elsewhere. Knowing the opposition the Bill has met with in Glasgow, I take the opportunity of saying that while there we have to suffer from the honest and intelligent opposition of gentlemen whom we all respect and honour, yet those prosecutions have shown that behind the scene there are other influences at work which are fatal to the growth of pharmacy, and most prejudicial to the interests of the medical profession. I quite understand the drift of our President's meaning, when he referred to the Pharmaceutical Society of Great Britain. I know the troubles which have taken place between you and us, and I am bound to say you know and appreciate that, when we are somewhat ruffled, we are rather a stubborn race. Much of the goodwill of Scotland toward the Pharmaceutical Society depends upon the President. Sometimes we looked upon the President with a little suspicion, and I took the liberty of saying so when I presided at one meeting, but now you have won our hearts. I may say that so long as Mr. Carteighe fills the place which he adorns so well, all things with regard to pharmacy in Scotland will go on smoothly and well. I can only hope that those who follow him will treat us with the same consideration. In Scotland, I am glad to say, a warm interest is taken in the Society, and I hope and trust that all of us, according to the measure of our ability, will do what we can, not to promote our own selfish, narrow interests, but in an honest and manly way strive to promote the best interests of this Society.

Mr. BELL: I would ask the Chairman of the North British Branch to amend his proposition, which is as I take it a vote of thanks to the retiring Council. If he will amend it in this form—a vote of thanks to the President and Council of the Pharmaceutical Society—for we must not forget that only a certain number retire, I shall have great pleasure in seconding the motion. I think the members of the trade are deeply indebted to the Council for the work they have done in the past. I think that fact is shown very

plainly by there being no contest on this occasion for the Council.

Mr. EWING; I shall have great pleasure in altering the resolution in the way you suggest.

The resolution was passed unanimously.

The PRESIDENT: Gentlemen, on behalf of my colleagues and myself I thank you most heartily.

Proceedings of Societies in London.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting was held on Thursday, May 12, Mr. H. Garnett, Vice-President, in the chair.

A paper was read on "Bismuth and its Salts" by Mr. R. Walkington, who gave an account of the history, properties, and uses of the metal, and the composition and methods of preparation of its various salts.

A discussion followed, in which the Chairman, Messrs. Jowett, Gane, and Fuge took part.

A short account of "Spiders and their Ways" was next given by Miss M. E. Buchanan, who treated the subject in a very interesting manner, and illustrated it with drawings and specimens of the creatures and their productions.

The paper gave rise to a discussion, in which the Chairman, Messrs. Jowett, Taylor, Gane, and the Secretary took part.

A note on the "Tea Industry of Ceylon," by Mr. W. B. Hoile, was then read by the Secretary, and after a short discussion on miscellaneous business, the meeting adjourned.

Reviews and Notices of Books.

DISCUSSION ON ANÆSTHETICS. Edited by J. WALKER DOWNIE.*

This is an account of a discussion which took place in the Medico-Chirurgical Society of Glasgow, in October, 1890. The book contains a large number of opinions on this important subject emanating from such eminent members of the profession as Dr. MacEwen, Dr. Coats, Sir George Macleod, Dr. George Buchanan, Dr. Hector Cameron, and others.

The subject seems to have been discussed from every point of view, and the volume concludes with an admirable summing up by the distinguished President of the Society, Dr. MacEwen. Nothing but good can result from the publication of this valuable report.

THE MEDICAL ANNUAL, 1892.†

This volume contains as usual a very large amount of valuable information. It deals with every department of medicine and surgery, including also an account of the year's work in bacteriology, sanitary science, and medical photography. Every care has been taken to make it complete; numerous illustrations, and even coloured plates have been introduced. The names of the contributors intrusted with the work of winnowing the chaff from the enormous quantity of medical periodical literature are, in themselves, a sufficient guarantee of the excellency of the work. This book is simply invaluable to those engaged in general practice, especially when living at a distance from large towns, where visits to a well-stocked medical library can only be made at rare intervals. The Annual will remedy this defect by giving him the best and latest information on every professional subject.

* Glasgow: Alex. Macdougall. Pp. 136.

† Bristol: John Wright and Co. 7*s.* 6*d.*

BOOKS RECEIVED.

PHARMAKOGNOSTISCHER ATLAS. By Dr. J. MOELLER. (Berlin: Julius Springer).

THE PHARMACAL CALENDAR for 1892. By C. S. HALLBERG. Chicago. Price: One Dollar.

PRACTICAL PERFUMERY. By an EXPERT. London: Offices of *The British and Colonial Druggist.* Cloth, 1*s.* 6*d.*

LECTURES ON PRACTICAL PHARMACY. By BARNARD S. PROCTOR, F.I.C. Third Edition. London: J. and A. Churchill. From the Publishers.

WATTS' DICTIONARY OF CHEMISTRY. Volume III. By MORLEY and MUIR. London: Longmans and Co.

GUIDE TO THE ADMINISTRATION OF ANÆSTHETICS. By HENRY DAVIS, M.R.C.S. Second Edition. London: H. K. Lewis.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith. Matter intended for publication should be written on one side of the paper only.*

POISONOUS CONFECTIONERY.

Sir,—Having recently had occasion to examine a specimen of so-called "almond-rock," which had produced toxic symptoms in some children who had eaten of it, I found that in place of almonds it contained the kernels of plumstones. As these contain amygdalin and emulsin, hydrocyanic acid would of course be liberated in the stomach of anyone who had eaten it. To determine the amount of acid formed, I macerated some of the substance in acidulated water, distilled out a portion of the liquid, and titrated the distillate with silver. In this way the "rock" yielded ·054 per cent. of real HCN; that is to say, 1 ounce yields the equivalent of 11·8 grains of B.P. hydrocyanic acid, which is, of course, a most dangerous quantity. I mention this result, as it seems not unlikely that others may meet with cases of poisoning from the same cause. E. F. HARRISON.

NOTICES OF MEETINGS.

Society of Arts.—May 23.—Fourth Cantor Lecture: "Recent Bacteriological and Chemical Research," by Professor Percy F. Frankland. May 25. Lecture: "Researches in Photochromy," by F. E. Ives.

Royal Institution.—May 28.—Lecture: "Agricultural and Forest Botany," by Professor H. M. Ward.

School of Pharmacy Students' Association.—May 26. Papers: "Fluorine," by R. H. Jones, and "Electricity as applied to Lighting," with experiments, by T. J. Hayton.

Isaac Bowen.—Mix the wine and syrup, reserve half the water in making the mist. amygdalæ, and mix the two liquids together. Dissolve the salt in the remainder of the water and add by degrees to other ingredients, shaking gently after each addition.

Edward F. Linstead.—Refer to volume two of 'Watts' Dictionary of Chemistry' (new edition), where you will find particulars, and references to the literature of the subject.

Bernard Lancaster.—We are unable to recommend any work upon the subject you name, which cannot be conceived as coming within the legitimate sphere of pharmacy.

F. G. R.—Any well-authenticated cases of infringements of the Pharmacy Act such as you refer to will be dealt with by the Registrar of the Pharmaceutical Society on receipt of adequate information. With reference to the other matters you mention see the report of the President's speech at page 971.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Wright, Blount, Evans, Kirkby, Hill, Pratt, Thomas, Henry.

NOTES ON PHARMACEUTICAL MICROSCOPY.

Examination of Powdered Drugs. In the concluding lesson of a course at the College of Pharmacy in New York, designed to illustrate the use of the microscope in recognizing drugs of vegetable origin, the lecturer, H. Kreamer, insisted that in the microscopical examination of powdered drugs it is essential that the observer should be familiar with the anatomy of the pure drugs, both in a whole and in a powdered condition. The more common impurities and adulterations in all drugs should also be known. In preparing specimens care should be taken to thoroughly triturate all powders before examination, because of the varying specific gravities of the different tissues in the drugs, and, as a further precaution that all the constituents are dealt with, several slides should be mounted of each powder. For clearing specimens, and so enabling the structure to be more readily defined, old essential oils, glycerine, concentrated chloral hydrate or zinc iodide solution, liquid carbolic acid, and other media should be utilised (*Pharmaceutical Record*, xiii., 16, p. 269).

Disintegration of Woody Tissues. Soak the tissue thoroughly in a 10 per cent. solution of bichromate of potassium, rinse once quickly in pure water to remove excess of the salt, and immediately immerse in concentrated sulphuric acid. When the acid has acted for a short time, remove the tissue to a vessel containing a large quantity of water. On examination it will be found to be more or less completely disintegrated, the structural elements being separated, whilst there is but little corrosion of the cell walls (*Journ. R. M. S.*).

Identification of Tubercle Bacillus. Pharmacists who may be asked by physicians to examine sputa with a view to ascertaining whether bacilli, etc., are present, will be pleased to know of the following new and simplified process, communicated by P. Kaufmann (*The Lancet*, 3586, p. 1156). The sputum is dried and fixed on a cover glass, then stained with hot carbol fuchsin as usual. The cover is next moved to and fro in water at a temperature between 208° and 212° F., during one to three minutes. The specimen may now be mounted in water and examined forthwith, or it may be double stained if thought necessary. In order to obtain good results the film must be as thin as possible and evenly distributed. The great advantage of the method is its simplicity, boiling water being obtainable when acids are not at hand. It is just possible, too, that the staining will remain more permanent than when acid is used. *The Microscope* quotes from a paper by Professor Heneage Gibbs, who says he concludes that phthisis and bovine tuberculosis are distinct diseases in their causation, although destruction of the lung substance is the result in both alike. He considers that the tubercle bacillus is not yet proved to have any causal relation to either, but would seem to be a concomitant of the process of caseation. Further, though the tubercle bacillus has a characteristic relation to certain staining processes, the leprosy bacillus and some others, together with some micrococci, are similar in this respect. Investigation by some German observers has also brought to light the fact that any ordinary bacillus, when cultivated in sterilized material to which 20 per cent. of fatty matter has been added, acquires the characteristic reaction of the tubercle bacillus.

Microscopical Examination of Urine. C. Rice finds that the addition of staining material to liquids is of remarkable assistance in the recognition and differentiation of the various objects which come into view when such liquids are examined microscopically. He has applied this method to the examination of urine, using aniline colours that dye vegetable and animal tissues without mordants. All organic *structural* material (such as epithelial and other cells, casts, etc.) takes the stain more deeply than the surrounding liquid, whilst all the inorganic constituents (urates, uric acid, triple phosphates, calcium oxalate, etc.) and non-structural organic material, such as pus, remain uncoloured. Various violets and blues soluble in water may be used, but a mixture of equal parts of "Hofmann's violet 4B" and "Brilliant Green," dissolved in water (2 grains of each in 1 fluid ounce), is to be preferred. In use one or two drops of this solution should be added to about 2 c.c. of the sedimentary part of the urine in question (*American Druggist*, xxi., 8, p. 117).

Drawings of Bacteria. At the April meeting of the Royal Microscopical Society a note, sent by Dr. Giltay, was read, in which he recommended the use of a powerful lamp to illuminate the drawing when using a camera lucida in bacteriological work. He also suggested that the drawing be tested by slightly altering the position of the paper so that the drawing and the projected outline may be compared side by side. It may be stated that this is a good plan to adopt generally, particularly if the Abbe camera be used, as there is thus more certainty about the results. The illumination of the paper must be varied according to the amount of magnification. In dealing with bacteria this will often exceed 2000 diameters, and the small amount of light transmitted through the microscope must not be greatly exceeded by that on the drawing. Working with a magnification of 100 or less, it will be found desirable to somewhat increase the amount of light on the drawing, whilst reducing the intensity of that transmitted by the mirror. Contracting the iris diaphragm or interposing tinted glass under the stage will produce the desired effect.

Cleaning Lenses of Objectives. Great care is necessary when cleaning lenses, particularly those forming the objective of the microscope. A fine cambric handkerchief (preferably an old one), well washed, and dried without being got up by the laundress, is perhaps most suitable for general use, and cannot be improved upon for the eyepiece lenses, mirrors, etc. It should be kept in a dust-proof box when not in use. Objectives should be cleaned as little as possible, and, with care, hardly ever require it. Pieces of well-dried white blotting paper, tied in small rolls, cut off evenly at the ends, have been recommended. These are used by rubbing the ends with a gentle circular movement against the lenses. *The American Monthly Microscopical Journal* for April states that the so-called Japanese filter paper, often used by dentists when filling teeth, is being used for cleaning lenses. It is free from the small particles often present in cloth or chamois leather, and may be thrown away after use. Being absorbent, too, it removes liquid or semi-liquid substances, hence is specially indicated for removing immersion fluid from objectives.

If this fluid be cedar oil, it should be removed by means of a piece of the paper moistened with benzol; if glycerine, wet the paper with distilled water. In either case use fresh pieces of dry paper afterwards for the final polishing.

Labelling Slides. When ordinary gummed labels are attached to glass slides there is often great difficulty experienced in causing them to adhere perfectly. The adhesive qualities of the gum may be greatly improved by adding a little aluminium sulphate to the mucilage. A formula given in the *Journal of the Chemical Society* some time ago is very satisfactory. Dissolve 2 grammes alum. sulph. in 20 of water and add to 250 grammes of strong mucilage (2 of acacia gum to 5 of water). A similar addition may be usefully made when the mucilage is made from dextrine. Professor Penhallow, of Montreal, has sent some slides to the Royal Microscopical Society to illustrate his improved method of labelling. Instead of using a paper label he writes directly on the glass and afterwards covers the writing with a thin coating of Canada balsam to make it permanent. Presumably the hardened balsam dissolved in chloroform or benzole will be used rather than natural balsam, which would take an objectionably long time to dry and attract dust in the interval.

Fixing and Hardening Tissues. When it is proposed to study the histology of plants it will be found necessary to prepare the tissues of fresh specimens somewhat before proceeding to actual work. And, according to the manner in which it is proposed to study the specimens, the method of this preliminary preparation will vary. When it is simply the general histology of the plant that is to be studied, the kinds, shapes, and relative positions of the different tissues, it is sufficient to *harden* these so that they may be sufficiently firm to admit of thin sections being cut satisfactorily. If, however, it is desired to investigate the cell contents *in situ*, and particularly the structure of the protoplasm and nucleus, the histological elements must be *fixed*, *i e.*, rapidly killed, so that the different elements may retain unchanged the forms they had whilst alive as well as their relative positions. The more skilfully this is effected the better the results and the greater the dependence that can be placed upon them. Simple hardening of vegetable tissues is best effected by means of alcohol of 90 per cent., and sections may afterwards be cut without further preparation of the mass. For all ordinary purposes methylated spirit of 64 o.p. (old form) will serve, but for special cases a mixture of equal parts of absolute alcohol and rectified spirit, B.P., is better. Objects may be preserved in these media for an indefinite time, undergoing no change, apart from the extraction of chlorophyll, resin, and other substances soluble in spirit, except the acquirement of a certain degree of brittleness. This may be remedied, and excessive hardness in fresh specimens also removed, by placing the object, some hours before cutting, in a mixture of equal parts of glycerine and strong alcohol. The latter, on exposure, gradually evaporates, leaving the glycerine to saturate and toughen the tissues. Another method is to soften in a mixture of water and glycerine in equal proportions as long as may be desirable. Fixing, which of course is accompanied by hardening, may be performed by means of absolute alcohol, or an aqueous solution of picric acid (saturated) or chromic acid (0·1—0·5 per cent.). The after-treatment with the first named will depend on the length of time the immersion continues, and this in turn will be regulated by the nature of the specimen. Very soft specimens must remain until hardened sufficiently to bear the knife, others may be cut straightway, and only when any are left very long will it be necessary to toughen by means of glycerine, as in the former of the two methods already described. When the acids are used there should be thorough permeation by the reagent. This may take from a few minutes to several hours, and must be ascertained by actual experiment. On removal, the tissues must be washed thoroughly to remove all traces of the acids. With picric acid washing with 70 per cent. alcohol (methylated spirit diluted with one-fourth its bulk of water) is to be preferred. Chromic acid should be removed by washing with water. Specimens prepared by either method may be afterwards preserved in 90 per cent. alcohol until required for use. In all fixing and hardening processes objects should be immersed in about twenty times their bulk of the selected fluid, and this should be agitated from time to time to ensure thorough penetration.

CONTRIBUTION TO THE STUDY OF CANGOURA,*

A New Convulsive Poison from Salvador.†

BY CARLOS RENSON,

Pharmacist, Gotera, San Salvador.

The Cangoura is a large liana or tropical climbing plant, evergreen and woody, which grows on the banks of streams in the warm and humid forests of Salvador. The plant disappears in proportion as the agriculturist destroys the forest, and for this reason it is almost quite unknown in the central and western portions of the republic, regions all covered with coffee and sugar-cane plantations. As a general rule one finds it even in its proper habitats but rarely, and only on the borders of little watercourses (*quebradas*), among the few trees which man has not thought fit to cut down.

The strange properties of this liana are unknown to the few inhabitants who are acquainted with the plant. They know that it is a violent poison, that is all.‡ It serves to poison dangerous animals. To this end, the natives prepare a paste with the bruised seeds and some *Nistamal* (maize boiled in water containing wood ashes). They pretend that one may die on eating

---

* Translated from *Les Nouveaux Remèdes*, April 24.

† In publishing this note I have no other aim than to draw the attention of competent individuals to this novel poison, which may perhaps in time be introduced into the therapeutics of cerebral affections. The little material at my disposal in Central America, and the indifference with which the advancement of natural science is viewed on the part of men who by their diplomas and their influential position are called to protect it, have not permitted me to present a more complete work upon this substance. At the end of the past year I sent to Dr. Bardet a specimen of this new poison that he might make, with his accustomed precision, physiological experiments with it in his laboratory, but on account of the readiness with which the activity of the seeds disappeared, this experimentalist has not been able to ascertain anything very clearly; it will be necessary to make fresh attempts with an extract prepared directly in Salvador.—[C. R.]

‡ Up to the present time I have never been aware of criminal poisoning by the Cangoura. I attribute this fact to the rarity of the plant, for assassinations by poisoning are committed here from time to time and are almost always performed with the latex of *Hura crepitans*, which is very common in many places.—[C. R.]

châchas (a kind of wild fowl) when the seeds of Cangoura are mature: "They feed upon them with impunity," say the natives, "but the man who then eats their flesh will succumb." This assertion appeared to me probable enough, because a hypodermic injection of a cubic centimetre of a liquid extract of the seeds has been withstood by a young cock, although the half of this dose produced great disturbance in a dog of average size. I was assured that herbivorous animals in general may equally feed upon it without danger, but I have not yet verified how far this is correct.

Three circumstances attract especial attention to the mode of action of this new poison: (1), the relatively great length of time which elapses between the moment of its introduction into the organism and that of the first symptoms of poisoning (with a moderate dose it is three days); (2), the strangeness of its action upon all display of nervous activity, and especially the cerebral disturbances it provokes (the animal appears a prey to furious madness); (3), the total duration of the nervous phenomena (about twenty days).

Botanical Description.

The plant is a tall, evergreen, hard-wooded climber, with thinly scattered leaves. These are without stipules, compound, imparipinnate, opposite; they have three to seven shining, coriaceous leaflets of a very dark green colour, and about six centimetres long by three broad. The flowers are in clusters, hermaphrodite, regular, small and white; having five half-united sepals, five free petals, ten (?) stamens, with the filaments united at the base in a ring surrounding five free ovaries, each of which is surmounted by a style and contains two ovules. The fruit is a capsule measuring eighteen millimetres in length by six in breadth, containing a single seed, and dehiscing by a longitudinal slit. Seed arillate, with straight embryo, and without albumen.

These characters belong, if I am not mistaken, to the Connaraceæ. For want of sufficient material I have not been able to determine the genus. The plant flowers in the spring and autumn, but produces no seeds except after the first flowering. The seed of Cangoura is eleven millimetres long and six broad; it is black, slightly arched on one side, more or less wrinkled on the other, with bluntly pointed extremities, and it is furnished with an aril of a brown colour covering about a fifth of its surface. If fractured it appears green when fresh, brown in the dry state. In consistence it resembles oily seeds and contains an oil of a greenish colour. This constitutes the liquid extract which is the preparation that has been made use of.

In its mode of action upon dogs it is necessary to distinguish two kinds of poisonous effects; the acute poisoning produced by a very strong dose, causing the death of the animal within twenty-four hours; and the poisoning produced by a small dose, provoking strongly marked cerebral disturbances during several days, but terminating in a restoration to health.

First or Acute Form of Poisoning, followed by Death.

Two or three hours after the hypodermic injection the animal commences to vomit without great effort, it expels fecal matters, and trembles a little. An increase of activity in the salivary glands is then observed, a clear and limpid liquid trickling from the mouth, drop by drop and in quantity relatively great, as though jaborandi had been taken. Soon the movements in walking become uncertain, the animal stumbles, and appears intoxicated. Later it remains lying down and there is a loss of voluntary movements. At last convulsions occur, the mouth remains open, and the pupils are dilated. These convulsions are accompanied by moans and blinking of the eyelids. Then appears a most curious phenomenon. The dog, although lying on its side, executes the movements of walking. With ears and tail erect, it shakes its head in an almost lively manner, and there is no doubt it believes it walks. This dream, if I may so call it, immediately follows the convulsive attack. The attacks are repeated a great number of times, and in the intervals there are hiccups and sudden starts. At last the animal, completely worn out, falls into a comatose state, its respiration becomes unequal, it emits a little blood by the nostrils,* and dies at the end of ten to twelve hours.

Second Form of Poisoning, followed by Recovery.

It suffices to introduce half a cubic centimetre of the liquid extract of Cangoura into the organism, either by means of the skin or the stomach, to produce the following effects in a dog of average size. The day of injection and the following day the animal appears perfectly well. Two days afterwards the cerebral disturbances appear. Suddenly, without apparent cause, it rushes about in an unbridled career, barking loudly, and seeming to pursue an imaginary prey. After that it stops, with its tail between its legs, and begins to howl in a very disagreeable fashion. It now stumbles left and right, so that one might believe it drunk with alcohol. During the fit it scarcely lets itself be approached by its master, whom it regards with a threatening air. Other attacks then occur, during which it involuntarily expels solid and liquid excrementitious matters, whilst it indulges in a furious and noisy run. Suddenly it stops, seized with a slight nervous trembling, and as it shivers one would say it had cold. The strange way in which it then begins to sniff the air causes the belief that there is also a disordered sense of smell. Now, abruptly springing up, seized with a great terror, and with its tail between its legs, it runs away crying, and hastens to take refuge in dark corners or under the furniture, or it seems to defend itself by barking at an imaginary phantom. It is these dreadful visions which above all predominate, but they soon give way to attacks of rage, or to a stupid desire to make a noise. The fear is very great and the sensibility over-excited, an object, however slight, such as a small piece of wood, thrown to the dog during the fit causing it to utter loud cries. When it begins to drink the reflections from the water as it is agitated appear to make the animal afraid and it shrinks away. Later it is seized with an attack of mastication, and flakes of white foam issue from its mouth. The salivary secretion continues very excessive, though intermittently, during three days, in the course of which the dog is observed to slumber momentarily, with open eyes; then abruptly, at the end of some seconds, it moves as though awaking; in brief, *it has lapses of consciousness.* This is very characteristic. All these symptoms are repeated during six to eight days, after which the dog is restored to health. Subsequently it remains for some time subject to epileptic-like fits, but the animal, which had become of a gloomy and sad disposition, recovers little by little its normal state.

* In certain cases, but not in others.

PRELIMINARY EDUCATION AND EXAMINATION.†

BY CHARLES SCHMIDT.

In the consideration of the evolution of the pharmacist, two factors of equal importance and in a measure related force themselves to the front. The first is the preliminary school or academic education of the prospective elaborator and dispenser of drugs and medicines, and the second, the requirement of such an education and the determination of its extent or degree by the schools or colleges of pharmacy at which the tyro in pharmaceutics may apply for entrance to receive his technical education and train-

† From the *Pharmaceutical Review*, May.

ing. These two factors have not hitherto, and do not now receive the attention which their importance demands on the part of those upon whom this attention naturally devolves—parents or guardians, when placing their sons or wards as apprentices in the employ of a pharmacist, young men when choosing pharmacy as their vocation, pharmacists in selecting their apprentices, and colleges of pharmacy in admitting students to their classes.

Although the subjects of preliminary education and preliminary examination have already been discussed by many minds, they still form vital topics, and their discussion and agitation will continue in order until pharmacists and colleges of pharmacy alike throughout our land shall have realized their importance and shall act in accordance with this realization. Why should a prospective pharmacist have a sound fundamental education? It may seem that this question should not need to be answered, yet my own observations convince me that many pharmacists of this country, and their apprentices, too, in reality do need that answer, although they may not heed it.

Every pharmacist, in the selection of his apprentices, shoulders a certain responsibility, not only for the kind and character of the pharmacists of the future, but also for the position which pharmacy will occupy in the ranks of the professions. Pharmacists are the representatives of the profession of pharmacy, and this profession will be esteemed in a direct ratio of the mental and moral worth of its representatives. In the material world, if we wish to produce a good article of manufacture, we must begin with good, well-chosen material. Thus good pharmaceutical products can be prepared only from good, hence properly selected drugs. A poor quality of clay will never produce fine pottery, no matter how skilled the artist who may model it. The steel armour-plates of war-ships are tested, selected, before being placed in position. And so good pharmacists will develop only from well-selected apprentices. The youth who may be permitted to enter the business of the apothecary simply because he wishes "to learn a business," without having inquired into or without having had pointed out to him the real demands of the calling, is not likely in after life to prove a desirable acquisition to pharmacy. The pharmacist's vocation embraces not only a business, but likewise a profession, and in its daily pursuit it is an inextricable medley of both. Hence it requires both a business and a professional education for its successful conduct. Such a youth, when he arrives at the period when he wishes to enter a college of pharmacy, may find himself wholly unprepared to pursue the studies here, or, worse than this, he may have no liking for the sciences taught. The acquisition of this technical or professional education on the part of pharmacists of this country is becoming a more urgent necessity each year, thanks to the progress of pharmacy legislation in most of the States of the Union.

To what extent young men are found wanting in their school or fundamental education can readily be judged by those to whom the conduct of the preliminary and other examinations is entrusted by the colleges of pharmacy.

With the indifference displayed by pharmacists in the selection of their apprentices confronting us, what wonder that applicants for matriculation will locate the Himalaya Mountains "in Washington Territory," or the Andes "in Africa," or prove themselves wholly unable to work out the simplest example in percentage, to say nothing of their Hottentot orthography and grammar.

In building a structure all natural laws demand that we begin with the foundation and build the upper portion upon that foundation. The stability of a structure depends in the largest measure upon the firmness, thoroughness and extent of its foundation. So in the higher education of men, of pharmacists, a foundation is needed, and this foundation is the preliminary school or academic education. The tyro in pharmacy should have been prepared by this training for the reception and digestion of the principles and truths of the sciences embraced in the curriculum of colleges of pharmacy. Alas! The seed strewn abroad in the lecture halls and laboratories of these colleges often falls upon rocks, or better, upon blocks, where they can and do take no root, and from which it takes not a whirlwind, but only the gentlest breeze to scatter them. Permit a young man with deficient school education to enter a college of pharmacy—and this is, unfortunately, often the case—and what a spectacle of bewilderment he becomes! He is thoroughly confused. His ideas, if he has any, are scattered, and before he has had time or could muster sufficient intellectual force to collect them, the college session is ended and the day, or better, the year, is lost.

Consider then, the conditions under which such a young man must most likely pursue his studies. More than 75 per cent. of students of pharmacy are employed in stores while attending college. How much time do these find to devote to their books, besides attending the lectures and laboratory instructions? Most of them will find time only in the evening, when body and mind are wearied and worn from the toils of the day, and surely this is no condition that permits good mental work. At the close of the first college session such a young man may have been convinced of his own deficiencies, or, if he possess not sufficient intelligence, which is quite probable, to be thus convinced, he will attribute his failure to the only cause he believes to exist, namely, too rigid examinations by too rigid examiners, professors, or others. Young men of this character serve only to clog the wheels of the laboratory and lecture courses. They are in everybody's way, most seriously in their own. They have no enthusiasm for their studies and can receive and impart none. They may expect their instructors at the college of pharmacy to reorganize and reorder their mental faculties by means of some magical power with which they suppose them to be endowed, and to supply during the college course the deficiencies that should have been guarded against by school or academic instruction. This is not the business or aim of colleges of pharmacy. If we contemplate what such young men are likely to present as their thesis, if their course should ever reach this critical period, our pity for them will only be intensified. Pity? Yes, they need and deserve our pity. They have either never been directed at all, or else have been totally misdirected, and thus far a portion of life has practically been wasted.

It oftentimes happens that a period of three or more years elapses between the time a young man leaves school and the day he wishes to enter college. By this time the mind, like the books the young man used at school, has become mouldy from disuse, and although this applicant for matriculation may be able to produce a certificate from the school or academy he may have attended, he would, upon examination, be found wanting. The school certificate thus in many cases becomes the passport by which the weak are permitted to enter where they are in danger of being trodden down, and it becomes an open question whether certificates should be accepted in lieu of the Preliminary examination.

Now, as to preliminary examination by colleges of pharmacy. If preliminary or fundamental education is essential to the would-be student of pharmacy—and no sane man can doubt that it is—then preliminary examination on the part of schools or colleges of pharmacy, for the purpose of ascertaining the degree of fundamental education possessed by each individual

applicant for matriculation, becomes likewise a necessity. It is perhaps true that pharmacy in this country never knew the day when, as a rule, men of very great mental ability chose it as their life's vocation. Certainly this has not been the case within the past half century, and it is far, very far, from being so to-day. Indeed, the difficulty of securing apprentices of even average mental calibre seems to be growing greater each year. The number of those entering pharmacy who have won the degree of B.A. is probably represented by a very small fraction of 1 per cent. This condition is doubtless brought about by the unremunerativeness of the business and the slavish life it imposes upon its devotees, a life that tends to cripple both body and mind and "freezes the genial currents of the soul." Similar conditions exist, or have existed in England as to the class of men entering pharmacy there. In an address delivered by Professor Attfield, in December, 1881, before the Manchester Chemists' and Druggists' Association, on "Education and Examination," etc., the following passage occurs: " . . . . Principles are but slowly apprehended, especially by the class from which pharmacists are drawn—at all events in England—for pharmacy is here too unremunerative to attract any large proportion of men of great brain power." But do our colleges of pharmacy meet this long standing necessity of the times? With the conditions just reviewed surrounding us, their duty in this direction becomes only more imperative. As far as I can learn, only a small number of colleges of pharmacy require a preliminary education and conduct a preliminary examination. Is it not possible that by a mutual agreement between the colleges of pharmacy *all* would establish this requirement and subject all applicants for matriculation to a preliminary examination that *shall be worthy of the name?* Such an agreement has been entered into by the schools of medicine of this country in reference to a three years' course. The agreement suggested between the colleges of pharmacy should not be an impossibility; indeed, it should become a reality in the very nearest future. The writer has been informed that when a similar arrangement was attempted a number of years ago, several colleges of pharmacy refused to co-operate, claiming that the times were then not ripe for such a requirement. This, if so, was simply a perversion of the truth. The times never were that were not ripe for this requirement. The trouble lay not with the times, but with the colleges of pharmacy. *These* were not then, and indeed seem not now, "ripe" for this requirement. Let them close their "big eye to business" and open their doors only to those who shall prove themselves prepared to receive the light and the truths of higher pharmaceutical education, and the cloud that now conveniently hides this glaring necessity from their view will vanish and be a thing of the past.

PIMENTO CULTIVATION IN JAMAICA.*

BY ALLAN ERIC.

Pimento is almost exclusively a Jamaica product. Indeed, so plentiful are the pimento trees on the island of Jamaica that it has been called, though improperly, "Jamaica pepper." Pimento trees are to be found in the other West India islands, in Cuba, Hayti, Trinidad, in Domingo, Antigua, and all along through the leeward and windward islands, and more or less in all the islands of the Caribbean; but Jamaica is the banner pimento producing island, and the groves of the spice trees found there are magnificent.

We read of spice-scented islands in the tropics, and are often almost inclined to think of it as a myth, but it is no myth so far as Jamaica is concerned, for, as I approached the island from the leeward side, standing on the bridge of the steamer, the wind — here nothing more nor less than the trade wind blowing from the land—came laden with a sweet perfume, which was wafted to our nostrils like a breath from paradise. I have experienced the almost intoxicating sweetness of the zephyrs which have swayed the vast spice groves of Jamaica, and I can testify that spice-scented winds, breezes laden with the perfume of spices, are a reality, though since it seems to me more like a dream. But it was no dream. I noticed the sweet odour, and was amazed that I should have experienced my own ideal of the tropics before I had landed even; but I knew not what that sweet perfume was until a week thereafter, when I was walking in the midst of a grove of pimento trees, and then the experience on the bridge of the steamer came back to me in the form of a blissful reality.

Fully three-fourths of all the pimento sold and used in New England, and more than one-half of all that is sold and consumed in the United States is grown in and comes from the Island of Jamaica. Its proper name is pimento or pimenta, and it is more commonly known as allspice from a supposed resemblance in its flavour to a mixture of cinnamon, nutmegs and cloves. The pimento tree is indigenous to the West Indies. It is not what might be called a large tree, rarely growing higher than twenty or thirty feet, though I think I have seen some old trees in Jamaica that were fully forty feet high, with a spread of branches of fully fifty feet. The leaves are oblong or oval in shape, and their colour is a deep, shining green. They average about four inches in length. Numerous axillary and terminal trichotomous panicles of white flowers are followed by small dark purple berries. It is a very beautiful tree, with straight trunk and much branching head, and about the month of July is covered with an exuberance of flowers, which diffuse a rich aromatic odour. The leaves and bark partake of the aromatic property for which the fruit is valued; and while riding for the day on horseback beneath the hot tropical sun in the pimento districts of Jamaica, I delighted in chewing the leaves, and found that beside their pleasant taste they were an excellent preventive of thirst. The fruit, when ripe, is filled with a sweet pulp, and the aromatic property, which so strongly characterizes it in the unripe state, has in a great measure disappeared. The gathering of the berries, therefore, takes place as soon as they have reached their full size, which is about that of huckleberries. They are gathered by hand and dried on raised wooden floors, either in the sun or by artificial heat, during which process great care is taken by turning and winnowing to prevent them from being injured by moisture. The colour changes in drying from green to reddish-brown, in which condition they are familiar to us in northern markets.

Properly speaking pimento is not cultivated at all in Jamaica. The trees are found in greater or less numbers all over the island: but in some sections of the country they are the predominating trees, and being indigenous there they are always found growing wild. The nearest approach to cultivation is to clear away the underbrush and keep the pimento groves free from undergrowths and creepers. This is no small task in this wild tropical land, where everything grows spontaneously in the wildest luxuriance. Sometimes the trees will be found singly, sometimes in sixes, or by the dozen or score. In other places a few hundred will be found; while in ten principal pimento districts in the parishes of Manchester, above Kingston, and St. Ann's, there are great forests of pimento trees. The bark of the tree trunk is rather rough and almost white, and even the bark of the branches is very light

* From the *Oil, Paint and Drug Reporter*, April 25.

in colour; which, in contrast to the dark rich green of the beautiful glossy leaves, produces a very striking effect. The principal problem which faces the pimento producer is the picking of the berries. As soon as the fruit is ripe it falls to the ground, and in a ripe state pimento is of no commercial value. It possesses the pungent aromatic properties that render it valuable when the fruit is full grown, but unripe. It is often difficult to secure enough help from among the indolent natives to pick the crop of pimento; and one large producer in the parish of St. Ann's told me that he had lost, that season, fully 3000 bags of his pimento, which had ripened and fallen to the ground, simply because he could get no one to pick it. After the berries are picked by natives with the aid of ladders that are used for reaching parts of the tree which cannot be reached by climbing, the berries are spread on cloths or mats spread on raised wooden floors and dried in the sun, being taken in every evening to prevent injury from moisture. For the same reason the berries are almost constantly turned and moved over during the process of drying, which takes about a week if the weather favours. Some of the producers in the parish of Manchester are kiln-drying their berries. This has the effect of preserving the pungency of the fruit more perfectly.

When I first arrived on the island I visited a pimento grove near Port Antonio, but this was on the low coast and the season was over then, so there were no berries on the trees. But when I arrived in the mountainous districts of St. Ann's and Manchester—which are the pimento districts proper, and some 6000 feet above the sea level—I found in many places that the crop was just in picking condition, and I therefore had the pleasure of witnessing the process of picking, curing, packing, and sending to market. After the drying process is completed the pimento is packed in bags, in very much the same way as coffee is packed, and transported to the coast to await shipment. Kingston is, of course, the great point of shipment of the pimento crop of the island, though large quantities are shipped from the various outports along the coast.

The total exports of pimento from Jamaica in the year 1889 were as follows:—To the United Kingdom, 21,267 cwt., valued to the producers at £22,032, or $110,160; to British possessions 94 cwt., valued at £94, or $470; to the United States of America 24,507 cwt., valued at £25,390, or $122,950, or a total export of 46,179 cwt., valued at £47,842, or $239,210. It is, of course, impossible to estimate the loss on account of the fruit which ripened and fell to the ground, but it is safe to place it at fully one-third the amount of the entire export.

A SIMPLE METHOD OF CALIBRATING A DELIVERING PIPETTE.*

BY PROFESSOR FRANK CLOWES, D.SC., F.I.C.

The following will be found to be a simple and accurate way of estimating the capacity of a pipette, no stop cocks or other additional apparatus being needed.

The clean and dry pipette is first provided with an arrangement for closing the delivering end, so that it may be weighed while it contains water.

This arrangement is effected by slipping a strip of rubber 4 inches long and ¼-inch wide over the lower end of the pipette, then drawing up the free ends on opposite sides under slight tension and binding them tightly with copper wire. The rubber now forms an elastic loop, with which the end of the pipette may be closed at pleasure. An india-rubber ring cut across answers admirably for this strip.

In the process of calibration the rubber loop is drawn aside and the pipette filled by suction. The pipette is allowed to empty and drain for half a minute and, the end being immediately closed by the rubber band, is weighed at once. Distilled water at 15°·5 C. is now introduced into the upper end of the pipette by means of a fine wash-bottle jet, until the graduation is reached. The pipette is now weighed again. The increase in weight should be equal to the weight of the registered number of c.c. at 15°·5 C. Should this not be so, a little water may be added or taken away by means of a piece of glass tube drawn out into a slender capillary.

Having adjusted the weight of water so as to correspond with the registered volume, the graduation is then made in the usual manner.

* From the *Journal of the Society of Chemical Industry*, April 30.

FLUORINE.*

BY HENRI MOISSAN.

I was the first person to obtain the element fluorine in a state of purity, and this I did for the first time in the year 1887. Since then I have considerably enlarged and improved my apparatus, which is now capable of turning out 160 cubic inches of the gas an hour. I obtained this result by passing a strong current of electricity from twenty-six or twenty-eight Bunsen batteries through hydrofluoric acid in which was dissolved a metallic compound, to increase the conductivity. Every part of the apparatus is constructed of platinum with stoppers of fluorspar, through which pass the wires conveying the current. The purifying vessels, tubes, and connections are also of the same metal, fastened together by nuts and flanges with lead washers, which, when acted on by the escaping gas, expand and seal any leak.

The tube in which the generation takes place is kept at a temperature of —9° F. by the evaporation of a very volatile organic liquid contained in an outer vessel, and the first member of the purifying series at —58° F. by the same means; the greatest care having to be taken that even the vapour of the refrigerating liquid does not enter any part of the apparatus, or else violent explosions occur.

Fluorine gas is of a yellow colour, with a smell resembling bleaching powder. Every precaution has to be used in studying its action on other bodies, both on account of its dangerously irritating action on the eyes and mucous membrane of the operator and its marvellous energy, far exceeding that of anything hitherto discovered. There is hardly a gas, liquid, or solid that it does not attack, usually with the greatest violence; in fact, its mere contact with any other substance is nearly always signalized by the sudden evolution of intense heat and light and loud detonations.

As a supporter of combustion, fluorine leaves oxygen far behind. Lampblack bursts immediately into brilliant flame and gets red hot in a current of fluorine gas, and charcoal is made to give an interesting exhibition of its porosity by first filling its interstices with the gas and then burning spontaneously with sparkling scintillations. The diamond, however, is able to withstand its action, even at high temperatures. Silicon, a crystalline substance closely resembling the diamond, gives a very beautiful reaction, showers of brilliant spangles being scattered in all directions from the white hot crystals, which are finally melted. As they do not fuse under 2,190° F.,

† From *Annales de Chimie et de Physique*. Reprinted from the *Scientific American*, April.

some idea can be formed of the immense energy set free during the combination.

All the metals, with the exception of gold and platinum, are rapidly attacked by fluorine, and even those in less degree. Iron combines in the cold with splendid energy, becoming white hot; and rust, when heated, behaves in a similar manner. Zinc, if slightly warmed, bursts into gorgeous luminosity, accompanied by bright white flames, so intense as to be almost blinding. Mercury is attacked violently in the cold. I once attempted to pass a quantity of the gas into a tube standing over mercury protected by an inert fluid; but when inclining the tube the two elements came into contact, there was a violent detonation, and the containing vessels were broken to atoms; with silver very little action occurs until 212° F. is reached; at a red heat, however, incandescence is observed, the product melts, and on cooling has a sheen like satin. Gold, on heating, forms a volatile fluoride which, when carried to a slightly higher temperature, splits up again into the metal and the gas.

The behaviour of liquids with fluorine is usually very energetic, and experiments have to be conducted with much caution. If the gas be passed into the middle of alcohol, the result is very striking; the whole mass is violently agitated, and each bubble, as it appears, becomes incandescent in the middle of the liquid, finally vanishing in flame. If a few drops of chloroform are shaken up in a tube full of fluorine gas, a violent explosion takes place, and the tube is reduced to fragments.

Hydrogen combines fiercely with fluorine, even in the dark, and at —9° F., the issuing stream burning with a blue flame, bordered by red. In every other known case, heat or some form of extraneous energy is required to induce the combination of elementary gases. Oxygen is one of the few bodies that appear to have no affinity for fluorine. Even when they are heated together up to 932° F. nothing is observed to take place between them. If a few drops of water are placed on the floor of the experimenting tube and fluorine gas is passed in, a dark fog is seen surrounding each drop, which presently clears and resolves itself into a characteristic blue vapour, apparently more than an inch in thickness, and which is found to be that most interesting condensed form of oxygen—ozone—in a state of great density.

PRESERVED GINGER.*

The marked difference between the Chinese preserved ginger and that from the West Indies has been the subject of inquiry by the authorities at Kew as to whether both articles are really the product of the true ginger plant (*Zingiber officinale*). The evidence—other than that of the root—pointed at one time to the fact that the same plant yielded both commercial articles; subsequent materials, however, indicated that Chinese preserved ginger was the rhizome of *Alpinia Galanga*, while that from the West Indies was from the original *Zingiber officinale*. It would seem, however, that still further research into the matter has restored the origin of Chinese ginger to the same plant as the West Indian.

Of the practice of ginger cultivation and the process of preserving but little is generally known. As ginger is, however, an important article of commerce, both in its dried and preserved conditions, the following notes on the subject from the December number of the *Bulletin of the Botanical Department of Jamaica* may be of interest. The most suitable soil for ginger culture is said to be a well drained clayey loam. The land should be well dug and cleared of weeds. Small pieces or protuberances of the root, one or two inches long, are planted during March or April, four inches deep and nine to twelve inches apart. It is well to cover the land with a moulding of dead leaves, weeds, straw, or litter mixed with manure. In a few months the whole ground will be covered. The flowers appear in September. When the stalks wither in the following January or February, it is time to dig up the roots. When the tubers have arrived at maturity and have put forth stems they are fibrous, but before this takes place, while they are still succulent and the young stalks are not more than 5 or 6 inches long, they should be taken up for preserving. Ginger is an exhaustive crop on the soil, and should not be planted in the same ground two consecutive years. The yield per acre is said to be 4000 pounds and upwards.

Black ginger of commerce is prepared by washing the root in water, boiling for a quarter of an hour, and then drying in the sun. White ginger, a much superior article, is prepared from the best and soundest roots, by scraping off the outer dark coloured part, and then carefully drying, without boiling.

Preserved ginger is made from the young tubers, which are scalded, washed in cold water, and then peeled. The roots are then covered with a weak syrup, and left for two days. The syrup is then poured off and replaced by a stronger syrup, and this is repeated two or three times until the syrup is thick and the ginger bright and nearly transparent. The following is given as the best method of preparing preserved ginger. Pour boiling water on your ginger, and let it steep for a day and night, then peel and pare away all discoloured and hard parts. Boil a syrup of 1 pound lump sugar to 6 pints of water (this is for 12 pounds of ginger). Put your ginger into a stone jar and pour the thin boiling syrup on it, let this stand for a week or ten days, then draw off the syrup and throw another, exactly the same as the last, again boiling, over your ginger; let this stand for another week, then throw off the second syrup and drain the ginger well on a hair sieve, return it to the jar, and pour over it the final syrup, made as follows:—12 pounds of loaf sugar to 12 pints of boiling water; stir till the sugar is dissolved, for fear it should settle and burn, then boil till it is as thick as good honey, and drops slowly from a silver spoon; now pour boiling water over the ginger and let it stand till cold, when you can put it into the bottles or jars in which it is to remain. Put in the pieces of ginger, first, as close as they will pack, then fill right up to the cork, to leave no room for the air. The corks should be new and good, not old ones that have been pierced by corkscrews.

* From the *Journal of the Society of Arts*, May 13.

THE CULTURE OF THE CASTOR BEAN.*

The beans should not be planted until all danger of frost is passed—say from March 15 to April 10. The ground should be prepared the same as if for planting corn, only in rich soils the beans should be planted about 4 to 4½ feet apart and in poor soil from 3½ to 4 feet. They should always be checked, so as to be cultivated readily and gathered easily. Cultivate just as you would for corn, and as long as you can plough through the rows without breaking the limbs and stalks too badly. They are more easily cultivated than corn or cotton, because, after thinning, you can do it all by "riding" on a cultivator or plough, thus enabling one man to easily cultivate 40 acres. And, while requiring closer watching and care than the cotton plant, it is not nearly such hard work—and much more profitable, and the crop is gathered much earlier,

* From the *Oil, Paint and Drug Reporter*, April 25.

leaving the children more time for schooling. As a general thing, a peck of beans will plant 5 acres, 2 quarts always being ample for an acre, even with the close planting required for poor soil. Put three or four in a hill; after the stalk has attained a height of about 6 or 8 inches, each hill should be thinned to one stalk. It will be found a good plan, where a large field is planted, to have the fifth or sixth row 6 feet wide, so as to permit a cart to go between in gathering. Many people make a great success in planting every fifth or sixth row in beans in their cotton patch; but in doing this care must be taken that you do not plough too deep close to the plants in dry weather, as this will make them shed their fruit. The spikes or bunches begin to ripen from the bottom, and should be cut as soon as the lower beans on a bunch begin to crack open or turn brown. This will begin about July 1 to 15, according to how early they were planted, and they should be gone over at least once a week (oftener in dry weather), and all bunches having brown or opening beans should be cut and carried to the yard where they are to be dried and spread in the sun. The best way to dry them is to have a plank floor inclined to the south with side of plank or cloth 6 or 8 feet high to catch the beans as they pop out, as they jump some distance in popping. Many farmers in Kansas and Missouri, as well as in Texas, simply clean off a level piece of ground where it is dry and spread the bean on it. This is as good as any, only a shed must be built, in which to store the beans when it rains. A shower will not injure them, but several days of rain will; and they must be housed as they dry, anyway. The last cutting in the season is generally so late that artificial heat will have to be resorted to in order to dry them and make them pop, though these late beans may be left in the shed until spring, when they will pop. When the beans have popped out of the shells, they can be separated from the hulks (cleaned) either by winnowing or by grain fans, with riddles to suit, or a suitable fanning machine may be purchased.

ASSIMILATION OF FREE NITROGEN BY PLANTS.

A further contribution to this important and interesting subject is furnished by B. Frank (*Deutsche Landwithschaftliche Presse*, 1891), who gives the details of a fresh series of experiments, made chiefly on *Lupinus luteus* and *Pisum sativum*. He found that, even when the presence of a symbiotic fungus is excluded, both these plants can obtain their nitrogen from nitrogenous manures, such as calcium nitrate, ammonium phosphate, or urea; but that the symbiotic fungus alone, without these manures, is more favourable to the crop than the manures without the fungus. The pea is, however, more dependent on the nitrogenous manure than the lupin. In good soils both these plants have the power of absorbing free nitrogen directly from the atmosphere without the intervention of the symbiotic fungus. In soil containing but little nitrogenous material the lupin is almost entirely dependent for its subsistence on the symbiotic fungus. The red clover behaves in almost exactly the same way as the pea. It follows from these observations that the yellow lupin is an exceedingly valuable plant for increasing the nitrogenous contents, and hence the productiveness, of a poor soil. The conclusions of the author are not in accordance with those of Hellriegel, who maintains that leguminous plants are entirely dependent on the symbiotic fungus for obtaining their supply of nitrogen from the atmosphere. According to further experiments by Herr Frank, some plants not belonging to the Leguminosæ, such as the asparagus, buckwheat, oat, rape-seed, etc., have the same faculty of obtaining free nitrogen from the atmosphere, although their roots are not infested by a symbiotic fungus, and hence of fertilizing the soil by increasing its nitrogenous constituents.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, MAY 28, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE LAW RELATING TO STILLS.

A phase of the law which affects pharmacists in the exercise of their business is now being put in motion in a manner that may be productive of much inconvenience, and it is therefore fitting that attention should be directed to the circumstances of the case. By an Act passed in 1846 the imposition of a uniform annual licence duty of ten shillings, to be paid by every person keeping or using any still or retort, was extended in its application to the whole of the United Kingdom, instead of being restricted to Scotland and Ireland, as it was by the Act passed in the reign of George the Fourth. That provision of the Act extends to all persons carrying on the business of a chemist or any other trade or business requiring the use of stills, but not to distillers, rectifiers or compounders of spirits, inasmuch as the licensing of persons so engaged is otherwise provided for. The licence must be taken out yearly; it expires on the fifth of July, and the Act provides that any person committing the offence of keeping or using a still without having a licence shall forfeit the sum of fifty pounds. It is also provided that any "still or still head or worm of a still" shall be forfeited when found in the possession of a person who is not in some way authorised by an excise licence to have them. It will be seen from this account of the Act that its application is very general, and it may be understood that, as the object of the Act was to prevent fraud on the Revenue by illicit distillation of alcoholic liquors, it is fitting that the provisions of the Act should be stringent and of wide application. But at the same time the fact was not lost sight of that, altogether apart from the distillation of spirit, the keeping and using of stills are necessary for many other persons besides those who are, in the special excise sense of the words, "distillers or rectifiers or compounders of spirits or vinegar makers." Consequently the fourth section of the Act has a provision that the Commissioners of Excise shall have a discretionary power of granting permission for the use of stills, without licence, by persons carrying on trade or otherwise engaged in indus-

trial or experimental work. The procedure requisite for obtaining such permission is that notice is to be given to the nearest Excise officer of the intention to keep or use a still and of the desire to have permission to do so. If that be granted by the Commissioners of Excise such regulations as they may think fit to prescribe must be complied with. By a subsequent Act passed in 1861 it is provided that an Excise officer may at any time enter the premises of every person who, by virtue of licence or permission, keeps or uses a still or retort, for the purpose of examining the still or retort and ascertaining that they are not misapplied. The only limitation of this power of entry is that when it is exercised between the hours of 11 p.m. and 5 a.m., the presence of a constable or other lawful peace officer is necessary.

The Acts of Parliament above referred to are annually published in the Calendar of the Society; but as we have reason to believe that the actual state of the law on this subject is not within the cognizance of many members of the trade, the foregoing particulars are given for their information. It has, we believe, been held to be necessary, even in the case of having a still for water, to report the fact and ask for permission to use the still without a licence. When that is done the Excise authorities are liberal in their recognition of cases to which the Act is not intended to apply and, provided that there are no grounds for suspicion, we have not heard that the power of entry to examine has ever been unduly exercised. It is therefore obviously the wisest course for every user of a still, if no licence be needed, to obtain permission, as the Act provides.

But the point to which we now desire to draw attention more particularly is the question, What is a still? Having regard to the object of the Act above referred to, it is obvious that apparatus adapted for carrying out the entire process of distillation is therein pointed to, not merely for the production of vapour from a liquid, but also for the condensation of that vapour in a form to be of practical utility. And as the distillation of alcoholic liquids for obtaining spirit is an operation in which the value of the product is dependent upon the freedom of the distillatory apparatus from any contamination which would give objectionable colour, smell, or flavour to the spirit distilled, it is also obvious that many stills used in technical operations would be quite unfit for the distillation of spirit. In such instances it might be inferred that no licence would be requisite, inasmuch as there could be little probability of the stills being used for the purpose of illicit distillation of spirit. However, it appears from the report of the case at page 960 that the Excise authorities are disposed to take a more stringent view of the law, and to assume that every kind of still must be brought into conformity with the Act, either by a licence or by permission for its use without one. A distillatory apparatus regularly used for extracting ammonia from gas liquor would appear to offer little chance of being applied to the purpose of defrauding the Revenue by illicit distillation of spirit. It appears to have been upon such a view of the matter that the Sunderland magistrates dismissed the summons, but notice of appeal has been given and it is probable that the question will yet have to be fought out. As it is still *sub judice*, any further discussion would be out of place; but it may be pointed out that according to the newspaper reports of the evidence given for the prosecution, a very comprehensive interpretation of the term still was put forward by some of the witnesses. If the term still is properly applicable to any form of apparatus that is or may be used for the production of vapour from a liquid, it is very difficult to say where the line is to be drawn. The boilers of locomotives and marine engines, as well as old ladies' tea kettles, might be equally in danger of having to be worked under Excise licences, while even the evaporating pans of factories and of chemical laboratories would not be altogether exempt.

PRELIMINARY EDUCATION.

We reproduce at page 983, from a new American contemporary which we are glad to welcome, a thoughtful and convincing article, dealing with the academic education of those who intend to devote themselves to the study and practice of pharmacy. It is well known that it has been our constant endeavour to keep this subject of the education of pharmaceutical students, actual and would-be, prominently before British pharmacists. With what measure of success our efforts have been attended it is, perhaps even yet, too soon to speak. The pressure of other, more directly important, matters has left but little inclination to deal with the subject generally. Maybe, too, a trace of innate selfishness induces a certain amount of unwillingness to take steps for what is, on the face of it, the advantage of posterity. However this may represent the true state of the case, it is certain that the time is fast approaching when the question will have to be considered in all its bearings.

Mr. Schmidt specially indicates what is perhaps the weakest spot in the system of pupilage, *i.e.*, the inferior and totally unsuitable material from which the ranks of pharmacy are in great measure recruited. It is utterly useless to expect a youth, without real education, without culture, and without ambition, to develop into a good pharmacist, imbued with faith in the capabilities of his profession and an enthusiastic desire to develop its latent possibilites in the direction of assisting in the progress of medical science. Nor is it likely that such a one will feel incited to work harmoniously and charit-

ably with his fellows with a view to increasing their general usefulness. It is doubtful if he would even combine with others for the defence of his own interests if there were the least possibility of any small amount of self-sacrifice or personal endeavour being involved.

Whatever propositions may be advanced by utilitarians with the intention of proving that what is not purely technical and practical in early education must necessarily be useless, such arguments are not supported by facts. The older systems of training may have confined attention too exclusively to the study of the "humanities," but their results were certainly such as to encourage belief in their power of inculcating right and generous feelings. A scientific education, pure and simple, will not, even with otherwise good material, produce an ideal pharmacist, any more than an acutely logical mind will of necessity arrive at right conclusions. In the latter instance the arguments must be based on sound premises, and in the other a wide, intelligent, and sympathetic grasp of the principles underlying the everyday actions of humanity is equally essential. This of course cannot be tested by any system of examination, but we are fain to believe that pharmacists might effect a great improvement by exercising a discretionary power in selecting their pupils. We heartily commend Mr. SCHMIDT'S paper to the consideration of our readers.

THE LABELLING OF PROPRIETARY PREPARATIONS.

IN view of the numerous inquiries that are being made as to the proper procedure to be followed in cases of the sale of stamped proprietary preparations known or reputed to contain poisons within the meaning of the Pharmacy Act, it would appear that chemists generally are anxious for information on this subject. We are glad, therefore, to be able to notify the fact that some of the large firms engaged in the sale of these articles are wisely recognizing the necessity of conforming to the law as it has been construed by Mr. LUSHINGTON in the prosecution recently instituted by the Treasury. Not only are circulars being issued announcing the fact that certain preparations contain a scheduled poison, and stating that they will consequently in future be labelled "poison" in accordance with the requirements of the Pharmacy Act; but the retail dealers in these articles are informed that a label containing the name and address of the seller must be attached in every instance of the sale of these articles, and further that the preparations now referred to can only be sold retail by legally qualified chemists. The evidence thus furnished presents a marked contrast to the bombastic declamation lately put forward ostensibly in the name of the proprietors of such articles, and it may be inferred that proper steps will be taken to secure such an observance of the provisions of the Pharmacy Act as will be consistent with its paramount object of affording protection to the public in the sale of poisons.

THE LATE MR. SANDFORD.

IT was not possible last week to prepare an obituary notice that would do adequate justice to the memory of this eminent leader of pharmaceutical affairs, though we could not omit to couple with the notification of his death a slight mention of the great services he had rendered in connection with the passing of the Pharmacy Act. This week, however, we have been enabled to submit to our readers a more complete record of Mr. SANDFORD'S work as a pharmacist, as a member of the Society, of the Council, and as the PRESIDENT of the Society during the eight years that he occupied that position. In doing so we have endeavoured impartially to place on record the facts of the history, which show that throughout his career Mr. SANDFORD was actuated by a sincere desire to promote the original objects of the Society and the welfare as well as the advancement of the entire body of chemists and druggists.

A NEW POINT IN THE SALE OF FOOD AND DRUGS ACT.

The report of a prosecution under this Act at page 999 furnishes a curious illustration of the ingenuity of lawyers. For the defence it was contended that a seidlitz powder should be divided into three parts when purchased for the purpose of testing its quality. The magistrate accepted this construction of the provisions of the Act and not only dismissed the summons but refused to state a case for appeal to a superior court. This ruling would have the effect of excluding many articles from the application of the law. If, for instance, it were necessary to divide a five grain Dover's powder into three parts, in the event of its being desirable to ascertain whether it was of the nature, substance and quality of the article demanded, the result would be absurd. It is therefore satisfactory to find that the Chelsea vestry authorities intend to apply for a mandamus to compel the magistrate to state a case, so that the question may be authoritatively settled.

BIRTHDAY HONOURS.

AMONG the recipients of Birthday honours we notice that her Majesty has been pleased to confer the honour of knighthood upon Dr. GEORGE JOHNSON, F.R.S., Physician Extraordinary to her Majesty, and Mr. ROBERT MICKS, the Secretary of the Excise Department of the Inland Revenue Board. Mr. COURTENAY BOYLE, the Assistant Secretary to the Board of Trade, and Mr. GODFREY LUSHINGTON, Permanent Under-Secretary of State, Home Department, are promoted to be K.C.B., and Mr. W. T. THISELTON-DYER, Director of the Royal Botanic Gardens, Kew, is appointed Companion of the Most Eminent Order of the Indian Empire.

THE CHEMISTS' BALL.

WE are very pleased to make known that the success attending the annual Ball this year was so considerable as to permit of a donation of twenty-five guineas being presented by the Committee to the Benevolent Fund out of the surplus proceeds.

Obituary.

GEORGE WEBB SANDFORD.

BORN, 1813. DIED, 1892.

In Memoriam.

As announced at the annual meeting of the Society by the President, Mr. Sandford died at his residence in Cromer on Monday, the 16th May, in the 80th year of his age, after an illness which had confined him to his bed for only a week.

By the death of this distinguished pharmacist and gifted man the Society has lost one who, since the death of Jacob Bell, has achieved more substantial good for pharmacists than any other member of our body.

Coming of a family long resident in Norfolk, George Webb Sandford was born at Cromer, in the same house in which he died, in the year 1813, and acquired at a good school at Norwich that thorough knowledge of English of which his subsequent literary contributions to this Journal, in the form of leaders and articles, bear ample evidence.

Having served the usual apprenticeship with Mr. Sadler, of North Walsham, in Norfolk, he came to London in 1832, and applied to the late Mr. Thomas Herring (a native of the same county, and a member of the well-known firm of Herring Brothers, of Aldersgate Street) to help him to obtain an engagement in a London house. Sandford in later years was fond of relating his experiences at this, to him, critical time, —of his first calling on the late Mr. Alexander Blake, of Piccadilly, who considered him too young (at that time he was only 19), of his trying elsewhere and eventually returning to Mr. Blake, who arranged that he should be taken on trial for six months.

The six months developed into a period of sixty years, and for nearly fifty of these he was in partnership with three generations of the same family, endearing himself to each by his amiable and generous disposition.

Sandford joined the Society as an Associate in 1842, and in 1843, on becoming associated with Mr. Alexander Blake and his son as a partner, he was elected a member. In course of time he attracted the attention of Jacob Bell and the other pharmaceutical leaders of that day, and in 1857 he was nominated and elected a member of Council. He became a disciple of Bell's, from whom he learned the stages by which the legislative powers of that time had been achieved, and the direction in which it might be possible in after years to unite the whole of the chemists and druggists into one corporate body, so as to obtain statutory powers for the education, training and examination of every future aspirant in the pharmaceutic art.

The death of Bell in 1859 produced consternation among his colleagues on the Council, who felt how difficult it might be in the future to find anyone who possessed that broad view of the pharmaceutical situation and knowledge of the rank and file of pharmacy requisite for obtaining fresh powers from the Legislature. The members of the Council were men of much influence throughout the country, and many were distinctly eminent in various scientific directions, but they had been so long accustomed to leave pharmaceutical politics and policy to Bell, that they turned to Sandford as best qualified, by his eminent capacity for public work, to succeed him. In 1861 he was elected Vice-President, and in 1863 President. Coincident with his appointment to the last-named office began that movement from the Medical Council, then a young body, which ultimately led to the passing of the Pharmacy Act of 1868. The Medical Council prepared a draft Bill which was to be an amendment of the Medical Act of 1858, and it was to include the regulation of the practice of pharmacy. The propositions relating to pharmacy were as follows:

1. The establishment of a general system of education and examination, to be *regulated* by the Medical Council.

2. The registration of all persons qualified to practise pharmacy, as tested by such examinations.

3. The restriction to qualified practitioners in pharmacy of the right to dispense or compound the prescriptions of physicians or surgeons, and the imposition of a penalty upon those who should keep open shop for compounding medicines without having passed the required examination.

4. The appointment by the Medical Council of inspectors, whose duty it should be to see that the provisions of the Act, affecting pharmacy, were duly carried into effect.

5. The prohibition of the sale of all secret remedies, and the imposition of a penalty for selling any patent or quack medicine, unless a sworn certificate of the composition of such medicine were exposed for inspection in the shop or place where it was sold.

These propositions, though in themselves favourably received by all the members of the Council of the Pharmaceutical Society, had this seeming defect, that the Society had been founded and had obtained powers to deal with this branch of legislation. It was also a matter of grave consideration how far a body constituted like the General Medical Council was capable of satisfactorily carrying out the work. Moreover, there was a strong feeling in favour of self-government as distinguished from government by a Medical Council, not only amongst the members of the Pharmaceutical Society but among the members of the United Society of Chemists and Druggists, a body which had been formed a few years previously and was antagonistic to the older Society. A meeting of the United Society was held to condemn the proposed legislation, and mainly through Sandford's influence the Medical Council was induced the following year to withdraw its proposals and to suggest instead to the Home Secretary the importance of a legislative enactment to ensure competence in persons keeping open shop for dispensing medicines and the compounding of prescriptions. This was the keynote to legislation for the pharmacist, and Sandford's statesmanship prompted him to take advantage of the fact that our Society had been pointed to by the Medical Council, as being the proper body to take charge of education, examination, and registration for

the future chemist and druggist. Sandford soon won the cordial support of the Medical Council and of the Colleges of Physicians of London and Edinburgh to a proposition that the Council of the Pharmaceutical Society should draft a Bill, and at a special meeting of the members in 1864 the Council was urged to make application to Parliament for further powers without delay.

A Bill (No. 1) was accordingly drafted, and soon after another Bill (No. 2) was drafted by the Committee of the United Society—a simple Poison Bill.

The Bill of the Council was submitted to the Home Secretary and encouragingly received by him, but he was soon placed in difficulty by receiving a counter deputation from the United Society. Ultimately a suggestion was made that both Bills should be referred to a select Committee. This was assented to by both parties and in due course the Committee met. After hearing evidence and getting soon weary of the subject it closed its sittings by recommending legislation on the sale of poisons. Sandford's chief duty after this was to try to come to terms with the United Society on matters of title, admission to the Society, and the like. He saw that the only chance of carrying a Pharmacy Bill through Parliament was for both Societies to agree upon a measure and direct their united efforts towards getting it passed.

Accordingly, a deputation from the Executive of the United Society was received by the Council and supplemented by informal communications between some of the individual members of each Executive, the results of which were to remove many difficulties, correct many misapprehensions and clear the ground for the draft Bill, which was ultimately accepted by the United Society, notwithstanding the strong efforts of their Secretary to prevent it.

This happy result could not have been achieved without Sandford as President; and the Council, in June, 1867, feeling the importance of his retaining his position, passed the following resolution:—

> "That in unanimously requesting Mr. George Webb Sandford to continue the onerous duties of President for another year, the Council desire most earnestly to express their thanks for his past services. They are conscious of the encroachment upon his time that is necessitated by the appointment, but believing that his continuance as President is important to the well-being of the Pharmaceutical Society, request him again to accept the office."

In May, 1868, the Bill was introduced into and passed the House of Lords. After many modifications and amendments in the Commons, chiefly instigated by the Medical Department of the Privy Council, it became law on July 31, 1868.

At the Conference meeting in Norwich, in August of that year, steps were taken to show how thoroughly Sandford's services were appreciated by those who had been opposed to his policy, as well as by those who had been participating in his work. A Committee was formed to collect subscriptions, one of the three Honorary Secretaries being the last president of the United Society, and the outcome was a testimonial in the shape of a personal gift of plate of the value of 200 guineas, and a portrait of Sandford by J. P. Knight, R.A., at a cost of 300 guineas, for the Council room of the Society.

On May 19, 1869, the plate was presented amid most hearty demonstrations, and in the evening a complimentary dinner in Sandford's honour took place at the Freemasons' Tavern.

A few days later he gave a small dinner party to a few of his London colleagues, and the late T. N. R. Morson, who was one of the guests, sent a parcel to our host which arrived just before dinner, and was opened by him in the presence of his guests. It contained a beautiful toy white elephant, bought in the Burlington Arcade, wrapped in a paper on which was written, "Pharmacy Act, 1868, by G. W. Sandford." "What will he do with it?"—Absit omen.

Sandford's work was not over with the passing of the Act. Bye-laws had to be prepared, passed and approved. Regulations for the keeping, selling and dispensing of poisons had to be considered and drafted in conformity with a pledge given in the House of Commons, in committee on the Bill, that if such regulations did not form part of the Bill, they ought to be made by the Pharmaceutical Society.

When these regulations were prepared by the Council and submitted to the Society at the annual meeting in 1870 they were not carried, but a resolution embodying the same draft as *recommendations* was passed at the following annual meeting, being based upon a resolution previously passed by a majority of the Council in April of that year, 1871, on which occasion Sandford, with some indignation, resigned the office of President, to which he had been again elected after an interval of a year, in June, 1870. The effect of the decision come to at the annual meeting in 1871, coupled with the keen contest for seats at the Council on that occasion, convinced Sandford and the Medical Department of the Privy Council that resolutions having the force of law, as contemplated in the 1868 Act, would not be passed by the Society.

Attempts were then made by the Privy Council to make the *recommendations*, agreed to at the meeting, regulations having the force of law by special legislation; but the Bill introduced was vigorously opposed—as many previous Government Poison Bills had been—and it had to be withdrawn.

From that moment Sandford accepted the inevitable with a courage and dignity befitting a defeated but not dishonoured warrior, and he continued to act as a member of Council until June, 1879, when he was again elected President and discharged the duties of the office with his usual ability for a year. Finally, at the election in 1881, he decided not to accept nomination, and retired, with every feeling of respect and regard from the Council, after twenty-four years' uninterrupted and unceasing service.

He devoted two more years to active work in Piccadilly, and then retired to his favourite resting place, the home of his boyhood, at Cromer, where surrounded by relatives and friends he spent the last few years of his life in peaceful happiness.

Sandford never married. He did much good by stealth and, never shirking responsibility or duty, ministered to the material care of many relatives and others, as though they had been his children.

Of Sandford as a man it may be said that he had a fine presence and distinguished bearing, qualities of great value in commanding the respect of all classes of men. A native courtesy, a strict sense of honour, in

business as in other matters, and a judicial habit of mind were characteristics which stood him in good stead in the chief work of his life, and led many of his friends to rely implicitly upon his judgment.

Deliberate in coming to a conclusion, he was, as his colleagues in official life well knew, not easily turned from his decision; yet his modesty was as characteristic as his firmness of character, and it cannot be better illustrated than by the following quotation from his reply on receiving his testimonial plate. "There are certain ideas associated with it which will always be present to my mind. It will not be necessary for me to tell my friends that I am respected; that plate will speak for itself. It is inscribed on every piece of that plate, just as legibly as if by a graver, that I have your approval of the course which I have adopted, and your confirmation of the opinion that the Pharmacy Act will work well for the general benefit. But, sir, I claim no separate merit for this work. In the last article which was published in the Journal in Jacob Bell's lifetime, I find this:—'All that remains to be accomplished is the more direct recognition of the Society by Act of Parliament, by such an extension of its powers, under proper control, as may enable it to bring to an early and successful completion the work which has already made satisfactory progress; by which means pharmacy will be fully established in its proper position, in the hands of persons duly qualified and entitled to the confidence of the public.' That, gentlemen, was, I believe, the last article written by Jacob Bell, and that has been my text. I have stuck to it, even when some of my friends have thought me obstinate. I determined, if possible, to carry it."

In private as well as in public life Sandford made many friends, and may be said to have lost none. Although many of his own generation, who enjoyed his close intimacy, have predeceased him, many yet live who look back with pleasure to his genial hospitality, love of art in all its forms, and social manly bearing. To younger men he equally endeared himself, ever encouraging them to take an active interest and pleasure in their work, and many will miss his wise counsel and ever ready sympathy.

At his funeral, in addition to his own relatives and his friend and partner in the third generation, Mr. Charles Blake (to whom he has bequeathed the service of plate presented to him in 1869), were assembled a number of his Norfolk friends. The President, and Vice-President of the Pharmaceutical Society, Mr. Gostling, Mr. Greenish, and Mr. Walter Hills, members of the Council, together with the Registrar, Mr. Richard Bremridge, also attended to represent the Society he loved so well.

The service was impressively read by one of Sandford's old friends, the Vicar of Cromer, the Rev. Frederick Fitch, and as the coffin was carried to its last resting place by six brightfaced but rugged fishermen on a brilliant sunny day, we felt grateful to an allwise Providence that the lad who had left the little Norfolk coast town to fight the battle of life in the great metropolis *had* fought a good fight and had deserved well of all his comrades in pharmacy.

We take a last look and, with tearful eyes, whisper farewell to our dear old chief, Farewell!

WILLIAM DYMOCK.

Pharmacists throughout the world will regret to hear of the death of this distinguished writer on Indian materia medica. Dr. Dymock died at his residence, Malabar Hill, Bombay, on April 29. He joined the Bombay medical service in 1859, and saw some war service during the mutiny with the Kathiawar Field Force acting against the Wagheers. He was present also at the capture of Dautal Hill. For two years he was attached to the Indian navy, and visited the ports of the Persian Gulf and East African Coast. In 1871 he was appointed to the medical stores, and from this time he appears to have devoted all his energies to the study of materia medica and pharmacy. The present efficient condition of the pharmaceutical department is entirely due to the great interest he took in the art of pharmacy. He largely increased the local manufacture of galenicals, and introduced the most improved machinery for their preparation. For his skilful and efficient management he was thanked by Government on three separate occasions. Dr. Dymock's first contribution to the *Pharmaceutical Journal* was on "The Asafœtidas of the Bombay Market," published in May, 1875; other papers soon followed, and his "Notes on Indian Drugs" were eventually amplified and published in book form as "The Materia Medica of Western India." A second edition of this work was called for and issued in 1885. This in turn has given place to the "Pharmacographia Indica," including the materia medica of the whole of the Indian Empire. In this undertaking he was ably assisted by Dr. Warden, of Calcutta, and Mr. Hooper, of Ootacamund. The sixth and last part of this work was not quite completed at Dr. Dymock's death. This history of Indian drugs amply testifies to his knowledge of Eastern languages. He was well versed in Hindustanee, Persian and Arabic. The value of his services to materia medica was acknowledged in his election as honorary member of the Pharmaceutical Society of Great Britain in 1880, and again by the award of the Hanbury Medal in 1887.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

Osmosis and its Relation to Plant Life.*

BY H. GARNETT.

It will be well in the first place briefly to consider osmosis from its purely physical aspect, and then pass to its bearing on various biological phenomena. Much work has of recent years been done with a view to elucidate the chemico-physical bearings of osmotic action, a detailed discussion of which would be beyond the scope of a botanical paper.

If a strong solution of any soluble substance (preferably a crystalline salt) be placed in the bottom of a vessel and a layer of pure water carefully poured over it, avoiding mechanical admixture, in course of time the salt will gradually diffuse, rising through the water against the force of gravity, although the temperature remains constant and the vessel is not agitated; the diffusion goes on until the strength of the solution is uniform. If, however, a membrane be interposed between the solution and the water the passage of the dissolved substance into the water is to a certain extent hindered, so that a greater volume of water passes into the solution than of the latter into the water, the amount of the substance passing through the dividing septum depending on the nature of the substance and of the membrane employed. Graham was the first to investigate the subject thoroughly, and divided soluble substances into *crystalloids*—bodies as a rule capable of crystallizing or of forming crystalline salts and capable of ready diffusion, and *colloids* which are non-crystallizable (taking their name from *colla*, glue) and take a long time to diffuse, or do not diffuse at all. The material of which the membrane is made also

* Read before the Chemists' Assistants' Association, March 31, 1892.

affects greatly the amount and rate of diffusion, or as it is called in this case, osmosis. Among other workers, Pfeffer and de Vries have done much to elucidate the nature of osmosis and the circumstances on which depends osmotic pressure. If a glass cylinder be closed at the lower end with a securely-tied piece of bladder or of vegetable parchment, a solution of any readily diffusible salt placed inside the cylinder and the whole set down in water so that the level of the two liquids is the same, after a short time the liquid inside the tube will rise; and if the cylinder be filled quite full, and a tube securely fitted to the upper end and connected with a manometer, the latter will indicate a certain amount of pressure in the cell. If, however, the water outside the cylinder is tested it will be found that a certain amount of the solution has passed out by osmosis through the membrane, which evidently exercises a certain, but limited, resistance to the outward passage of the salt molecules. This property is made use of in dialysis, by means of which a readily diffusible salt is separated from a colloid or non-diffusible body.

Certain artificially prepared membranes, however, form much more perfect osmotic septa, and can be used for measuring exactly the osmotic pressure of any substance; such membranes may consist of precipitated ferric hydrate, cupric ferrocyanide, silica, or tannate of gelatine. For the purpose of quantitative experiments in osmotic pressure, one or other of these substances is precipitated on the surface, and in the substance of a porous earthenware cell. Thus an osmotic cell may be prepared as follows:—The cell is first washed with dilute hydrochloric acid, then with dilute potash, and finally with water; it is then placed in boiled water and the vessel placed in the receiver of an air-pump and exhausted until no more bubbles of air are given off. The cell, thus saturated with water, is transferred to a 3 per cent. solution of copper sulphate, and allowed to remain for several hours, when the solution is poured out, the interior of the cell washed with water, dried with absorbent paper, and allowed to stand for a few hours in the air until partially dry. It is then filled with a 3 per cent. solution of potassium ferrocyanide and set down in the copper solution to the required height. After twelve hours the cell is complete and may be rinsed out with water, and afterwards filled with the solution; the chief difficulty is found to be in making a joint at the top (from which a tube leads to a manometer) which will withstand the great pressure set up in course of time. Membranes such as these are found to be practically impervious to the molecules of most dissolved substances, while they allow water to pass readily, so that if a solution, say of sugar, is filtered through under great pressure, pure water only passes through the membrane. Pfeffer, Van t'Hoff, and others have made many measurements of the osmotic pressures of solutions; even dilute solutions exert enormous pressures, that of a 1 per cent. solution of potassium nitrate being equal to three atmospheres. Without entering into details it may be stated that it has been found that a salt in solution behaves in many respects like a gas, its pressure varying with temperature according to Charles's Law, and being exactly the same as that which it would exercise were it in the gaseous state and occupying the same volume as it does in the solution; in other words, it obeys the Law of Boyle, and the pressure is proportional to the molecular weight of the substance.

The living vegetable cell consists essentially of three parts, the cell-wall, the lining of protoplasm or primordial utricle, and the cell-sap, which may contain various bodies in solution; besides these there are often substances deposited in the cell in the solid state. The cell-wall consists of the carbohydrate cellulose, which is highly elastic and extensible; it is non-porous yet readily permeable by liquids; another very important property it possesses is that of imbibition, or swelling up with water. It must be understood, however, that this swelling is not in any way comparable to the swelling of a sponge with water, as in the cellulose wall there are no cavities or capillary passages; according to Naegeli the cellulose substance is composed of minute particles—perhaps aggregations of molecules—to which the name *micellæ* is given, which exert a strong attractive force for particles of water, so that each micella is separated from the surrounding ones by a film of liquid; this state of things is perhaps comparable to the manner in which the water of crystallization is held in a crystal. In all probability the cell-wall alone is incapable of acting as an osmotic membrane, or only does so to a slight extent, as it readily permits the passage of molecules of dissolved substance. The protoplasm which in the newly formed cell has almost entirely filled the cavity, is usually found after growth has taken place to occupy the position of a lining of plastic matter inside the cell-wall and often closely applied to it, while the cavity of the cell is filled with the sap. Such a cell presents many analogies to the porous earthenware cell with its membrane of copper ferrocyanide; on the other hand there are many important differences. From its power of imbibition the cell-wall is able to take up and pass on water or solutions of salts from cell to cell, not opposing any marked resistance to the filtration of dissolved substances; it, however, plays a very important part through its property of elasticity and extensibility; it is the lining of protoplasm which is the real osmotic membrane of the cell; this does offer most marked resistance to the passage through it of substances in solution, not, however, to the same extent as the artificial membrane; and, further, it appears to be capable, to a certain extent, of exercising a selective power, deciding which substances shall pass and which shall not, and under different conditions its osmotic relation towards the same solution seems to vary. The protoplasmic layer of itself is not possessed of much rigidity, and so is unable to support any great amount of pressure from within; here, then, is the importance of the elastic but firm cellulose wall giving it support. Assuming, then, that the vegetable cell is under suitable conditions capable of allowing osmosis to take place and of exhibiting and sustaining a certain amount of osmotic pressure, we can consider some of the more important bearings that osmosis has on the life of the plant; and I propose to describe only those relating to the higher forms, possessing a fibro-vascular structure. In these plants all the necessary water (or practically all), and therefore all the nutrient materials which are taken up in the state of solution, are absorbed by the roots, not by their general surface, but by root-hairs, which are unicellular, much elongated, epidermal cells, possessed of a very delicate cell-wall; they are crowded together in great numbers towards the growing-point of the root, and as this latter increases in length, fresh root hairs are developed, those further from the apex gradually dying away. These root hairs apply themselves very closely to the particles of soil, which is charged with the water containing the various salts. It need hardly be said that substances cannot be absorbed except in the state of solution; and very dilute solutions (1 or 2 per cent.) are much more beneficial than stronger ones. Many of the more important plant-constituents exist in the state of soluble salts, as nitrates of the alkali metals and of calcium, soluble phosphates, and salts of ammonia (chlorides and sulphates). These comprise most of the essential elements required by the plant, which are phosphorus, sulphur, chlorine, iron, potassium, sodium, calcium and magnesium; hydrogen and oxygen exist as water. Probably carbon is never taken up by the roots, but is

all assimilated by the leaves; the chlorophyll of which, under the influence of sunlight, breaks down the carbon dioxide of the atmosphere, fixing carbon and liberating oxygen. With regard to nitrogen, up till quite recently it was considered that atmospheric nitrogen was never utilized by plants, and in all probability the leaves or roots have not the power of absorbing it directly, but recent researches have shown that in certain cases (in the *Leguminosæ*, at least), bacteria form nodules on the roots, and are capable of absorbing free nitrogen and handing it on to the plant; in other instances, certain green algæ would appear to act as intermediaries between the free nitrogen and the plant. It is essential to the well-being of the plant that a constant supply of water and of nutrient material should be kept up; in the leaves transpiration is constantly going on, that is evaporation of water through the stomata or breathing holes on their surface; the leaves, too, may be looked on to a great extent as the laboratory of the plant, where are elaborated from the crude products of assimilation the various nutrient materials required to maintain the growth and functions of the various organs. Although in order to be absorbed all substances must be in the state of solution, yet they do not necessarily so exist in the soil; this difficulty is in many cases overcome by the plant, for the root-hairs are almost always charged with an acid sap, and being applied very closely to the solid particles in the soil, small quantities of the acid diffuse out through the delicate cell-wall and dissolve substances which are insoluble or sparingly soluble in water. If the roots of a growing plant are allowed to strike downwards through the soil till they come in contact with a polished marble slab placed some few inches below the surface, the rootlets will grow along the surface of the marble, and if this be examined after a short time the tracks of the roots will be found as delicate grooves in the surface where the calcium carbonate has been dissolved away by the acid sap. Dolomite can be shown to be similarly attacked, also apatite. Opinions differ as to the nature of the acid which is present. Sachs formerly considered it to be CO_2 while, later, Oudemann and Rauwenhoff have thought it to be acetic acid; this latter or some similar vegetable acid would appear more probable, as carbon dioxide would not attack calcium phosphate. Another authority (Shulz) states that the young rootlets of leguminous plants have an alkaline reaction; nevertheless the corrosion figures on the slab of marble shown this evening are evidence of the acidity of the sap in the case of the rootlets of the bean, which was the plant employed.

The root-hairs then act as osmotic cells, containing substances in solution which exercise an attractive force upon the moisture in the soil; of the nature of these substances there is no exact information, and probably they vary in different plants and in different parts of the same plant; very probably they are in many cases vegetable acids. If instead of cultivating plants in soil they are grown in diluted solutions of the various salts required by the plant, it is found that the salts which pass in by osmosis do not do so necessarily in the same proportion as they exist in the solution; hence the so-called "selective-power" of roots which was formerly considered to be an incomprehensible vital function, but which may arise from natural causes; for if any one constituent is required by the plant in greater proportion than another, that constituent will be used up more quickly by the plant in its metabolic processes, so that a further supply has to pass in to take its place.

The sap, having found its way into the root-hairs, passes on by osmosis from cell to cell of the thin-walled parenchyma of the root-cortex, until it reaches the fibro-vascular column. It has been conclusively shown that the path of ascent of the sap in the stem is the wood of these fibro-vascular bundles; but wood cells differ from those of the parenchyma, in that they do not act osmotically; the altered cellulose, however —the lignin of the wood-cell walls—permits the filtration of water. The sap, then, having reached by osmosis the innermost cells of the cortical layer, is forced by osmotic pressure through the walls of the wood cells and vessels. Apparently, there is no reason why this pressure should be exerted towards the interior of the root, rather than in an outward direction. Sach's theory is that the innermost layer of cell-wall and protoplasm may be supposed to resist filtration only to a slight extent, so that the liquid escapes by the weakest point in the system and filters under pressure into the woody vessels. Perhaps, too, owing to rapid transpiration from the leaves, there exists a partial vacuum in the interior of the wood-cells, which favours the inward filtration.

On account of the osmotic activity of the cells of the root, there is set up what is known as root pressure, giving rise, when the stem is cut, to the phenomenon of bleeding, which takes place more especially in perennials in the spring, when active growth is renewed; it has been noticed for a very long time, but the first quantitative experiments were made by Hales in 1721. He attached a mercurial manometer to the cut-off and bleeding root-stock of a vine, and obtained a pressure equal to 38 inches of mercury. Among many others, Clark has experimented on root-pressure in the case of *Betula lenta*; he found that in the night time the pressure ceased; indeed, in some cases there was a suction, but pressure commenced soon after sunrise. He attached a manometer to the root, cut across at a distance of 10 feet from the stem, and on one occasion observed a pressure of 75 inches of mercury, equal to $2\frac{1}{2}$ atmospheres; this is almost equal to the pressure observed in artificially prepared osmotic cells. The amount of liquid escaping from a bleeding root-stock has been measured by various botanists; in one experiment over 1000 cubic centimetres was expelled from a sunflower stem in thirteen days, the greatest rate of discharge being 14 c.c. per hour.

It may well be asked whether the sap is actually forced up to the leaves by the osmotic pressure set up in the roots; as stated above this pressure is, in some cases, capable of supporting a column of water 80 or 100 feet in height, but this will not account for rise of water in stems 200 feet or 300 feet high; in the case of annuals and of non-lignified stems osmotic pressure probably is the only important factor in the ascent. Capillarity was formerly supposed to play a part in the rise of water in the wood-vessels, but this must be exceedingly trifling, as the vessels are not of sufficiently small calibre; and in stems of the gymnosperms which contain no vessels but only closed cells or tracheïdes the use of water goes on to the same extent as in ordinary woody tissue. It used also to be considered that the sap passed on by ordinary osmotic action from one cell to another up the stem; such a movement, however, would be much slower than the ascent is found to be. This rate of ascent may be measured by allowing the roots to absorb coloured solutions and then noting the extent of the rise by the coloration of the tissues. A better method, devised by McNab, is to water the plant with a dilute solution of a salt of lithium, which is afterwards readily recognized in the stem by means of the spectroscope. This has shown that the ascent may, in cases of rapid transpiration, be as great as six feet per hour. But the most important feature in connection with the ascent of sap is that when transpiration is most active and therefore the upward current must be greatest, on taking a section across a woody stem the vessels are found to be empty, pointing to the fact that the transmission of sap takes place not in the

cavities but in the lignified walls of the vessels. Up to the year 1879 the mechanism of the transpiration current had been entirely misunderstood; Naegeli, Sachs, and others have shown that this power of imbibition and transference of water by wood is an inherent property of lignified tissue, the height of the column of water in no way interfering with the action. When through transpiration of water from the leaves the molecules of wood at the upper part of the plant part with some of their imbibed water there is an immediate flow of water from below to supply the deficiency.

Besides this rapid transpiration current, by means of which large quantities of water pass rapidly through the plant, there exists a slow current, or rather a transference of material from one part of the organism to the other, its direction and amount varying according to the needs of the plant; this current is entirely due to osmosis. A good example of this may be seen in the storage of starch as winter approaches in the roots or underground stems to serve as a reservoir of food-material on which the plant is able to draw when it requires a large amount of nourishment for its growth in the spring. The carbon of the carbon dioxide in the atmosphere is fixed by the action of the chlorophyll of the leaves, making its first appearance as starch, which is speedily—probably through the action of an enzyme—transformed into dextrose or other soluble carbohydrate; this passes through the cell walls of the parenchymatous matter of the leaf and afterwards of the stem, through the outer cortical portion of which it makes its way to the roots or tubers, in whose cells it is finally, through the action of small nuclei of active protoplasmic matter, again changed into the form of insoluble starch. By the removal of the sugar from solution and deposition as starch the osmotic equilibrium of the cells is disturbed, calling for a further supply of material from the leaves. That this downward slow transfer of food material takes place by the cortical portion of the stem is shown by the fact that if a ring be cut from the outer portion of the stem of a potato, although the growth of leaves and transpiration of water takes place as before, no starch will be formed in the tubers. The fact, too, that if a growing stem be kept firmly constricted, increase in thickness only takes place above the point of constriction, while below very little growth occurs in an outward direction, points to the fact that the downward flow of sap takes place in the outer portion of the stem.

Not the least important purpose of the flow of liquid through the plant is the maintenance of a proper degree of turgidity (or osmotic pressure) in the cells. Probably no cell-growth can take place unless the cell-wall is in a tense or stretched condition. After its formation the young cell grows by additions to its substance of cellulose, which is secreted and deposited by the protoplasm, the fresh particles being either deposited in between the original ones or in the form of a layer on their surface; in either case the cell-wall is increased in substance, the pressure from within causes distension of the elastic wall, which is thus enabled to receive fresh additions of cellulose particles. By a purely chemical and physical process we can imitate both this turgid condition of the cell consequent on osmotic pressure, and the subsequent growth by additions to the cell-wall. The artificial cell was devised by Traube and is formed as follows:—A few crystals of cupric chloride are dropped into a dilute solution (about 2 or 3 per cent.) of potassium ferrocyanide. Immediately a thin film of insoluble cupric ferrocyanide is formed around each mass of crystals; inside this cell is a highly osmotic substance, cupric chloride, which attracts water through the film but cannot itself pass out; very soon the outward pressure becomes so great that the film can no longer support it and consequently ruptures. But immediately that the copper solution flows out and comes in contact with the potassium ferrocyanide a fresh film is formed, and the cell is again closed, and by a repetition of the process will continue its growth for a long time, reaching in time the surface of the liquid; while the method of wall-formation is entirely different the growth is somewhat analogous to that of the vegetable cell.

In other ways, too, is the importance seen of a turgid condition of the vegetable cell. The comparative rigidity of even soft, succulent, herbaceous plants is largely due, not to any hardened frame work, but to the turgidity of the tissues; this explains the phenomenon of withering when the supply of water is cut off from the roots for a time, or when the transpiration from the leaves is so rapid that the supply from the roots is unable to make good the loss.

The turgescence of the cells in a living plant may be easily seen in any thin-walled tissue by taking a section so that some at least of the cells are uninjured; in these the osmotic pressure forces the protoplasmic lining close against the cell-walls; if now the section is irrigated with a strong solution of almost any readily diffusible salt, the latter passes through the cell-wall, and by its greater osmotic attraction on the water of the cell sap than is exercised by the dissolved substances of the sap water passes out through the protoplasm, causing what is known as *plasmolysis*, the protoplasm being loosened from the cell-wall and shrinking towards the centre of the cell; if the salt solution is displaced by pure water the protoplasm returns to its original position and the cell once more becomes turgid. By regulating the strength of the salt solution until the osmotic pressures inside and outside the cell equal, the osmotic pressure of the cell has been approximately calculated.

Various other interesting phenomena in the life of the plant are connected with the turgescence of the cell, among the most striking being the movements of various organs which take place under the influence of a stimulus, whether mechanical or caused by the action of sunlight or warmth, usually known as "sleep movements." The periodic drooping of leaves and leaflets in the absence of light is generally brought about by an organ which appears as a swelling at the base of the petiole. This organ is composed of thin walled parenchymatous tissue with a slender central fibro-vascular strand joining on to those of the main stem. The upward and downward motions of the leaf are brought about by the varying turgescence of the cells of the upper and lower surfaces of the organ, and this variance is probably caused by an alteration in the retentive power of the protoplasmic lining of the cells. Thus, under the influence of a certain stimulus, the cells of the upper surface may be supposed to lose their power of retention, so that their contained sap is forced out by internal pressure through the walls either into neighbouring cells or intercellular spaces. The cells are thus reduced in size, causing a shortening of the upper surface of the organ; at the same time the cells on the under surface through a reverse action become more strongly turgid, so that the lower part increases in length. As the organ is situated at the axis about which the whole leaf moves, this latter is raised from the drooping position which it at first occupied.

Other movements in plants are not always associated with special organs, but in all cases depend on varying conditions of turgescence in the cells. Of the nature of the change which the protoplasm undergoes under the influence of a stimulus, or of the way in which the stimulus is communicated to it, little or nothing is known. Perhaps as our knowledge extends many of the phenomena of plant life which are now supposed to be connected with some mysterious "vital force" altogether beyond our comprehension will be found to

be explicable by the ordinary laws of chemistry and physics.

Provincial Transactions.

BRITISH PHARMACEUTICAL CONFERENCE.

At the special meeting of the local Committee already referred to, which was held in the House of the Pharmaceutical Society, 36, York Place, Edinburgh, on Monday, the 11th inst., at 11 a.m., Mr. J. L. Ewing, Vice-Chairman, presided. Mr. J. R. Young, Chairman, was also present, though suffering from a severe cold.

The minutes of last meeting being read and confirmed, reports were received from various committees, appointed at a previous meeting to look after the hotel, excursion and reception arrangements.

Mr. Aitken, Convenor of the Hotels Committee, read a letter from Mr. Grieve, of the Waterloo Hotel, embodying his terms, and offering the Waterloo Rooms for the reception and other meetings of the Conference. A letter was also read from Mr. Stephenson intimating that the University Court had granted the use of the Materia Medica Class Room to the Conference for its meetings. After discussion it was unanimously agreed to hold the various meetings in the Waterloo Rooms, these being convenient as a centre, comfortable, and very commodious.

Mr. McLaren then submitted a report from his Committee as to the excursions. Melrose and the Trossachs had been found impracticable, and the Committee unanimously recommended Killin, on Loch Tay, for the Thursday's excursion. The route suggested would not only take the members of the Conference through some of the finest scenery in the Perthshire Highlands, but views in passing could also be obtained from the train of Linlithgow Palace, Stirling Castle, Doune, Callander, Ben Ledi, the Pass of Leny, Loch Lubnaig, Braes of Balquidder, Loch Earn, Glen Ogle, Ben More, Glen Dochart, Ben Lawers and Loch Tay. It was intimated that permission had been given to picnic in the grounds of Finlanrig Castle.

After discussion this trip was unanimously agreed to, and it was thought that it would be especially acceptable to English visitors. The afternoon excursion on Tuesday was arranged to be to the Forth Bridge and Dalmeny, the seat of the Earl of Rosebery; and on Wednesday to Roslin Castle and Chapel, the conveyances to be Highland coaches. On the way to Dalmeny the excursionists will partake of tea at Inveralmond House, through the kindness of Mr. George Mackay.

Mr. Stephenson wrote that business arrangements would prevent his being able to carry out the work connected with the Reception arrangements, and Mr. J. L. Ewing was appointed convenor of this committee. A committee of ladies was also nominated to make arrangements for the special entertainment of the ladies during the Conference week. The meeting was well attended, and much interest is being taken in Edinburgh in the forthcoming gathering.

EDINBURGH CHEMISTS' ASSISTANTS' AND APPRENTICES' ASSOCIATION.

Apprentices' Prize Competitions.

The Committee announces the prize schemes for the session 1892–93, and directs attention to an important change in the subjects of examination for the Association Prizes Competition. It was decided last year to substitute elementary botany for the subjects of English and arithmetic, and the other subjects have been slightly modified. It is trusted that these changes will induce a larger number of apprentices to compete.

These competitions, instituted ten years ago, form an interesting and most valuable feature of the work of the Association; and, since they have a direct application to the profession of pharmacy, the course of study which the candidates must undergo cannot fail to be of much value to them in preparing for the examinations of the Pharmaceutical Society; while the habit of study thus early acquired will necessarily tend to their future success as pharmacists.

While regarding the success which attended the previous competitions for the "Association Prizes" and for the "Ainslie Pharmacy Prize" as very encouraging, the members of the Committee are convinced that the number of competitors might be considerably increased. They earnestly desire to see a large number of senior apprentices competing, especially for the "Ainslie Pharmacy Prize," where practical experience is a most favourable condition for success. Of course, they do not wish to see the slightest falling off on the part of junior apprentices, who have hitherto taken a highly creditable position. They also find it again necessary to urge all apprentices who study for these competitions to present themselves for examination. By so doing, they can gauge the results of their study, while they may win a prize, and will acquire that coolness in the examination room which will prove a useful attainment on future occasions.

In thanking all masters and assistants for their co-operation on former occasions, the Committee requests a continuance of their influence in encouraging the apprentices under their charge to come forward to the competitions of the coming session. In order that apprentices may have an idea of the scope and style of the examinations, the questions set during the last six years may be seen in the house of the Pharmaceutical Society, 36, York Place. Further particulars may be had on applying to the Secretary, Alex. J. Dey, 21, Duke Street, Edinburgh.

DUNDEE CHEMISTS' ASSISTANTS' AND APPRENTICES' ASSOCIATION.

The annual business meeting of this Association was held on Thursday, April 28, in the Association's room. There was a large attendance, and the President, Mr. James A. Kinnear, occupied the chair.

The Secretary, Mr. William Mair, presented the annual report on the session's work, of which the following are the principal points.

Your Committee, in presenting the annual report and financial statement for the third session, has to congratulate the members on the satisfactory position of the Association. The membership consists of 20 assistant members and 28 apprentice members, an increase of 16 upon last year. Including 36 honorary members, the total is 84.

The balance-sheet, presented herewith, shows a balance of £1 15*s.* 5*d.* on the year's transactions, and a satisfactory balance at the bank in favour of the Association. The work of the session was commenced with an enjoyable series of excursions to various representative industries in which interesting chemical or technical processes are involved, including sulphuric acid works, gas works, paper works and the like. These were sufficiently successful to suggest the desirability of their being continued during the coming session.

The winter's work has consisted of a series of weekly meetings which have been held regularly from October to April. Your Committee was fortunate in securing some of the best local scientific talent available and the lectures and demonstrations which have

been given have proved eminently instructive to those members who have availed themselves of the privilege of attending. In securing the services and sympathies of such men as Messrs. Maben, Jack, MacEwan and others, it is hoped that the cause of pharmacy may have been advanced. The popular and highly successful lecture by Mr. W. L. Howie was an original idea which has been adopted elsewhere with advantage. While good work has undoubtedly been done it may be said that original research work has been left severely alone.

It has been found that the examination system affords altogether more satisfactory results than the essay competitions. Mr. Jack's prize of a copy of Bentley's 'Botany,' for the best collection of algæ found in the basin of the Tay, still remains uncompeted for.

The average attendance has been good, about 30. A pleasing feature has been the attendance at many of the meetings of a greater number of the honorary members and honorary office bearers.

The Committee has this year deemed it advisable to erect a bookcase to receive what may be the nucleus of a museum collection. In this connection the thanks of the Association are due to the various donors of books, specimens, and prizes, and for the liberal encouragement which has been accorded to the Association in the various departments of its work by the local trade and wholesale houses.

The pharmacy classes have been continued during the session, and, it is hoped, may prove of some service to those students preparing for the Minor examination. We would again express our indebtedness to the senior Association for the use of the materia medica cabinet.

Your Committee has pleasure in reporting that it finds the Association in a flourishing condition in every department of its work, and hopes that through individual effort and the accession of new members this condition of things may long be continued.

The direct advantages of the Association are now so evident that it is difficult to see why any member of the trade in Dundee should remain outside. We are losing at this time some of our best members, and it is hoped that others may come forward who will worthily fill their places.

The report and financial statement were unanimously adopted as read.

The President, Mr. James A. Kinnear, presented the report of the Association's classes. The examination papers had been corrected *incognito* by the Committee, and the results were as follows:—1st prize (gold medal), Mr. Andrew J. K. Paterson; 2nd prize, Mr. David McNaughton; 3rd prize, Mr. Alex. T. Reoch. Mr. Maben's prize had been awarded in the Apprentices' Competition to Mr. Norman Gauldie, and an extra prize by the Association to Dr. David Ferrier.

The task of adjudicating in the essay competitions had been entrusted to Mr. J. Rutherford Hill, M.P.S., Edinburgh, who made the following awards:—1st prize, Remington's 'Practice of Pharmacy,' presented by Messrs. Burroughs, Wellcome and Co., London, Mr. Edward O'Brien; 2nd prize, Books to the value of 10*s.* 6*d.* (presented by the proprietors of *The British and Colonial Druggist*), Mr. A. J. K. Paterson.

Mr. S. Crowden's prize of a 'British Pharmacopœia' for the best essay on the work of the session was awarded to Mr. David McNaughton.

The prizes were afterwards distributed by the President.

A collection of fine essential oils, presented by Messrs. W. J. Bush and Co., London, was handed over to the Association.

In the course of the proceedings Mr. W. G. Smith, B.Sc., was presented with a microscopical dissecting case and turntable in recognition of services rendered in connection with the Association's classes, and Mr. Wm. Mair was called upon to receive a Beck's "Star" Microscope for similar services.

The various retiring office bearers having been thanked for their services, the following were elected for next session:—Honorary President, Mr. Charles Kerr; Honorary Vice-Presidents, Messrs. J. H. Thomson, T. S. Peebles, A. B. Anderson, and C. Cummings; President, J. A. Kinnear; Vice-President, Harry J. Hunt; Honorary Secretary and Treasurer, William Mair, Dundee Royal Infirmary; Assistant Secretary, John Ireland; Committee, Messrs. Lee, Paterson, O'Brien, and McNaughton.

Mr. Robert Young was elected an honorary member of the Association on the occasion of his leaving for Edinburgh.

A vote of thanks to the Chairman concluded a successful meeting.

LEICESTER AND LEICESTERSHIRE CHEMISTS' ASSOCIATION.

A meeting of the above Association was held at the Clarendon Rooms on Tuesday evening. Mr. T. Howard Lloyd (President of the Association) took the chair, and nearly 50 members were present, including Messrs. Woolley, Thirlby, Hutton, W. H. Lloyd, Butler, Daniells, Ellis and Ward (Hon. Sec.).

The meeting was called for the purpose of forming a botany class and of considering the position of the Association.

The President referred to the successes achieved by members of the Association in previous years, and to the great value of the Association to all who were working for examination. He pointed out to the members the importance of steady perseverance in their study, and reminded them that the success of the Association in future depended upon the united and persevering efforts of the members.

A botany class was then formed, with Mr. Elliot as teacher, and twenty names were given in.

Messrs. Woolley and Thirlby both addressed the meeting, after which an excellent programme of songs and recitations was given, under the direction of Mr. Daniells, and thoroughly enjoyed.

Parliamentary and Law Proceedings.

A Shrewsbury Chemist Heavily Fined.

At the Mayor's Court, Shrewsbury, on Thursday, May 19, Harry John Ison, Chemist and Druggist, was charged with having, on April 4, had in his possession two articles capable of being used internally as medicines, namely, Friar's balsam and liniment of iodine, in the preparation of which methylated spirits and the derivatives of methylated spirits were used contrary to the statute.

Mr. H. Hughes prosecuted on behalf of the Inland Revenue, and Mr. F. W. Williams was for the defence.

Mr. Hughes said the charge was brought under 43 and 44 Victoria, sec. 130, cl. 24, the penalty being £100 and the forfeiture of the articles. He reminded the bench that while there was a considerable duty upon rectified spirits there was no duty upon the methylated, and referred to the provisions of the Act of 1855, which enabled the rectified spirit to be used in the arts and manufactures free of duty conditionally upon its being mixed, as provided, with wood naphtha. In that form it paid no duty, and the cost per gallon wholesale was 2*s.* 3*d.* as compared with 23*s.* for the pure spirit. To use such a noxious compound as

methylated spirit for an internal medicine was a fraud upon the public, and it was a fraud also upon the Inland Revenue.

George Naylor Stoker, an analyst at Somerset House, stated that on April 4 last he went into the defendant's shop with two other officials, and found there some Friar's balsam which he believed contained methylated spirit. The defendant being told so replied that he thought there was no harm in that so long as it was used for horses and such like, to which the witness replied that it was illegal to have it on the premises at all. Iodine liniment similarly prepared was also found, and defendant said that was not for internal use, but as a liniment only. Witness replied that liniment of iodine was not allowed to be made with methylated spirit, and that there were only four liniments which could be so prepared, namely, soap, camphor, aconite and belladonna, notices to that effect having been sent out by the Board of Inland Revenue.

Cross-examined: Witness said he could not state when the notices were served, or that Mr. Ison ever had one. There had been a recent correspondence with the Board on the use of methylated spirits in veterinary preparations. As he understood the law, no veterinary surgeon could use methylated spirit instead of the rectified spirit.

Other evidence was called in support of the charge, and Mr. Williams, in defence, said twelve months ago the defendant was fined £50 under the same section, and it was not at all likely that he would risk incurring a still greater penalty by wilfully using one spirit for the other for the profit he might make out of the difference in the price. The fact was that Mr. Ison sold a large quantity of medicines for live stock, and the articles in question were not intended for internal use by his customers at all. The Friar's balsam, as it was called, was made up as a sample in the case previously before the court, it was labelled "Methylated Friar's Balsam," and was really not represented as Friar's balsam at all, while the liniment of iodine was, beyond all question, for outward application only.

The Mayor said the bench had given the case their best consideration, and were unanimously of opinion that both charges had been proved. The defendant would be fined £50 and costs in the first case, and £25 and costs in the other.

Mr. Williams said the defendant would appeal against the decision.

Prosecutions under the Sale of Food and Drugs Act.

At Westminster, on Friday, May 20, the vestry of Chelsea prosecuted three persons, Henry James Sharp (chandler), Mrs. Mary Ann Radcliffe and Alfred Taylor, for infringing section 6 of the Adulteration of Food and Drugs Act by selling seidlitz powders which were not of the nature, quality and substance demanded.

Mr. Francis Smith, solicitor, prosecuted for the vestry, and Mr. Beck for one of the defendants.

Mr. Polsen, the sanitary inspector of Chelsea, obtained, through an assistant, three seidlitz powders from the shops of the defendants, and samples of these, on being analyzed by Dr. Louis Parkes, the Medical Officer of Health, were found to be very different from the formula laid down in the British Pharmacopœia. In each case there was a considerable deficiency of tartarated soda, the most expensive part of the composition, and in one case a large excess of bicarbonate of sodium. At Radcliffe's shop 2d. was charged for each powder, at Sharp's 1½d., and at the other defendant's 1d. Among the arguments offered for the defence was the one that each separate powder was not actually divided into three parts by the purchaser. The vestry contended that leaving a third part of each purchase, practically one intact seidlitz powder, with the seller, was a compliance with the Act. Their solicitor pointed out that to break or cut into three the two packages of each powder would prevent the accurate weight of the constituent parts being ascertained, and that the breakage of bulk might lead to chemical action being set up. It was, Mr. Smith urged, practically an impossibility to do other than the vestry had done. That had hitherto been considered sufficient for a conviction both in this court and many others.

Mr. Sheil dismissed all the summonses on the ground that the samples were not trisected as the Act required.

The vestry's solicitor asked for a case.

Mr. Sheil said in his mind the matter was so clear that he should not grant a case. The vestry might go to the superior court for a *mandamus* to compel him to state a case, and if he was wrong he would soon be set right.

Mr. Smith said the matter was one of very great importance, and the vestry would certainly apply to the High Court for a *mandamus*.—*Times*.

Reviews and Notices of Books.

Manuale Pharmaceuticum Seu Promptuarium. Dr. H. Hager, Editio Sexta.*

The publication of the sixth edition of this valuable work was commenced in 1890, and although the editor promised in the prospectus that the whole work would certainly be finished before the end of the year, it was so near the close of 1891 before the last part was issued, that the publisher was justified in dating the title page for the present year. The work has thus been in our hands a few months, and having had ample time to make use of it as a work of reference, we have no hesitation in saying that for that purpose it is simply invaluable. Originally published in 1858, the work has been so well received that it has been distributed over almost the entire globe, and has gone through several editions. This latest edition differs from those that have preceded it, in that it is in many parts largely rewritten, the matter thus being entirely modernized, while the addition of new material has necessitated a considerable increase in the size of the work. This has been rendered necessary, says the editor; for during the decade, in comparison with preceding decades, there has been a great increase not only in the number of new remedies, but also of official and unofficial formulæ that have been introduced into the medical world. This is due largely to the new editions of the pharmacopœias of Austria, Germany, Great Britain and the United States having been issued in the interval; and the new matter in these has been incorporated in the 'Manual.' Further improvements have been introduced to the extent that the doses are now given; the technical directions for preparing chemical substances, etc., have been amplified; while the molecular formulæ of definite bodies have as far as possible been given. One feature remains in this edition; namely, that the text is in Latin, which is retained in order "to keep up the wide-world reputation of the book," although the various synonyms are given in the language of the authorities from which the formulæ are taken.

The result of the compilation of the vast mass of material embraced in the many pharmacopœias and formularies that have been consulted, is of necessity of very considerable importance. The book, which is much increased in size as compared with former editions, now forms a handsome volume of 980 pages, and the enormous area covered may be gathered from

* Leipsic: Ernest Gunther, 1892.

the fact that the index contains more than 10,000 references. There are in all from 6000 to 7000 different formulæ, and as these are gathered from all sources that have any standing of importance, it can at once be seen that for a pharmacist the work is one of the most valuable in existence. The general object of the book, namely, the collection into one volume of all or nearly all the formulæ from the most important pharmacopœias and formularies in the world, has on the whole been well kept in view, but it would be looking for too much if we were to expect that it would contain everything. We had occasion to refer to it in vain on one occasion, though it is only fair to say that Squire, Martindale, the French Codex, and the German and U. S. Pharmacopœias were all equally at fault, but as a rule it is wonderfully complete. We do not say that the best form has always been taken, but this is probably because the best source of information has not been consulted. We notice, for example, that the U.S. National Formulary process for making hypophosphorous acid is quoted, though it is generally accepted that the B.P.C. formula is preferable. It is curious, however, to note that the unofficial formulary is not even mentioned as being quoted from, and we can find no traces of its having been used, from which we draw the conclusion that either the editor has not seen the B.P.C. Formulary or that he has considered it beneath his notice. Whichever hypothesis we accept the result is not entirely satisfactory. We are inclined to find fault with the arrangement of the contents of the book, though we do not suppose the difficulties could have been entirely overcome. It would, we think, have been better to have had a strictly alphabetical arrangement throughout rather than the "mixed" system adopted. Still, the index is very complete and the cross references are abundant, so that any inconvenience is reduced to a minimum. The work as a whole is of very great value, and we can recommend it to all pharmacists.

AN EPITOME OF MENTAL DISEASES. By JAMES SHAW, M.D., etc.*

This is a useful book, and seems admirably adapted for the purpose for which it was written, viz., as a practical book of reference for general practitioners, and to serve as an introduction to more comprehensive works. The book is arranged on a somewhat novel plan, the various symptoms being arranged on the plan of a dictionary. The section devoted to Legal Regulations and Forensic Psychiatry seems to be given with much detail and care. The information as to existing regulations as to single patients will be particularly useful to many practitioners.

LEPROSY. By GEORGE THIN, M.D.†

The great attention which Dr. Thin has devoted to leprosy is well known, so that any remarks he makes upon this dreadful malady are sure to be read with especial interest. The publication of this valuable volume comes at a time when the interest of the profession and the general public has been thoroughly aroused in this ancient disease. The chief object of the volume is to systematise the knowledge which has been recently acquired in connection with the micro-organism, or bacillus lepræ, associated with the lesions in leprosy. The book worthily fulfils its intention.

Erratum.—We regret that by a reporter's error Mr. J. L. Ewing, in speaking at the Annual Meeting, is represented as referring to a Mr. Hodgson. The name should have been Mr. J. Robertson Young.

* Bristol: John Wright and Co. 8vo. Pp. 345.
† London: Percival and Co. Demy 8vo. Pp. 280. 16*s.*

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith. Matter intended for publication should be written on one side of the paper only.*

CHEMISTS' ASSISTANTS' ASSOCIATION.

Sir,—We trust you will allow us space to reply to a statement made by Mr. Long at the Annual General Meeting of the Pharmaceutical Society, and reported by you.

With expressions of personal opinion as to the average attainments of chemists' assistants we are not concerned; but we wish to emphatically deny that there is any foundation for the statement that it has been suggested amongst us that any papers should be taken as read because the majority would not be able to understand them.

Further, we would point out that the majority of the papers have been contributed by our own members, and have been listened to and discussed with appreciative interest.

In conclusion, we would, on behalf of the Association, cordially invite all who are interested in the advance of pharmaceutical education to render us occasional assistance in our work. W. A. MORRIS and J. C. STEAD.

NOTICES OF MEETINGS.

Society of Chemical Industry (London Section).—May 30—Papers: "Manufacture of Vinegar," by Mr. J. A. Nettleton. "The Petroleum Jellies of Commerce," by Dr. S. Rideal. "Certain Aluminium Alloys," by Dr. C. R. A. Wright.

Royal Institution.—June 3.—Lecture: "Metallic Carbonyls," by Mr. Ludwig Mond. June 4, Second Lecture: "Agricultural and Forest Botany," by Professor H. M. Ward.

A Query.—A correspondent writes to ask if we can explain the origin of the custom amongst chemists of displaying in their windows bottles containing coloured liquids. He also suggests that various symbols, *e.g.*, ℔, ℥, ℨ, etc., had, ori-ginally, meanings much more obscure than most people think. Can any reader oblige by giving the desired explanations?

A. F. Brookes.—The advertisement columns of the Journal would appear to offer themselves with peculiar fitness for such announcements by manufacturers as you suggest. At the present time the only proprietary medicines you would be justified in labelling "poison" are those in which the presence of a scheduled poison has been declared or proved.—See editorial note at page 990.

William Brown.—We believe Pulv. Cretæ Aromat. B.P. is usually dispensed for Pulv. Cretæ Co. Place the programmes in a box between sheets of absorbent paper upon which the desired perfume has been sprinkled.

J. F. L.—Longman's and Cassell's are useful low-priced dictionaries, the former being preferable, since English type is employed throughout. For technical terms beyond very ordinary ones, however, you would need a technological dictionary, such as Tolhausen's, published by Tauchnitz.

M.P.S.—The care for apprentices must not be held to justify the delegation to them of duties which are restricted to legally qualified pharmacists. Neither is it reasonable nor right that onerous responsibilities should be imposed upon them which they are not fitted to discharge independently and without the guidance of those to whom they are entitled to look for instruction. It should be understood that the whole of the facts in connection with any prosecution are rarely published. In the particular case you mention there was satisfactory evidence that the Act was being systematically infringed, and so far from the defendant being deserving of sympathy, the verdict should be accepted as a vindication of the claim of qualified pharmacists for protection.

Fair Trade.—The point you refer to is one of interest but difficult to deal with when modern tendencies in business transactions are considered.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Prebble, Blount, Asten.

"THE MONTH."

Acetyl Fluoride. M. Meslans has succeeded in preparing acetyl fluoride, CH_3COF. It is much more volatile than the chloride, has a boiling point of 19°·5, below which it remains fluid, but readily assumes the gaseous form above that temperature. It is formed when acetyl chloride and silver flucride are heated together in a sealed tube to 260°, but the chloride is more completely converted into fluoride when its vapour is passed through a long tube of silver, filled with dry silver fluoride, and heated to 300°. The issuing vapour, passed into a well cooled receiver, condenses into liquid acetyl fluoride. Other methods of preparation are to allow arsenic fluoride to fall in drops upon acetyl chloride contained in a copper vessel, when energetic action occurs in the cold ; or to substitute solid trifluoride of antimony, or zinc fluoride, contained in a glass flask, for the arsenic fluoride. The most advantageous method is that in which the zinc salt is used. The zinc fluoride is introduced in successive portions into a strong flask cooled by a freezing mixture and containing the acetyl chloride. The flask is sealed, heated to 40°, cooled again, and opened whilst surrounded by the freezing mixture. The acetyl fluoride is then distilled into a second flask containing some dry zinc fluoride and, on redistillation over this, the product is obtained almost pure. Both the liquid and gaseous acetyl fluoride are colourless, and they burn with a blue flame when ignited, the products of combustion being hydrofluoric acid, carbon dioxide, and water vapour. Their odour somewhat resembles that of carbonyl chloride. Water dissolves about twenty times its volume of the gas, but the liquid does not mix readily with water, and the small proportion dissolved slowly decomposes. Alcohol, ether, benzene and chloroform dissolve it in all proportions. Glass vessels may be used to preserve the liquid fluoride, but are rapidly attacked by it if any moisture be admitted (*Comptes Rendus*, cxiv., 1020).

Reactions of Acetyl Fluoride. Acetyl fluoride in contact with water reacts, forming hydrofluoric and acetic acids. $CH_3{\cdot}COF + H_2O = CH_3{\cdot}COOH + HF$. The reaction occurs very slowly as compared with that of acetyl chloride under similar circumstances. Caustic lime rapidly absorbs the gaseous fluoride, acetic anhydride and calcium fluoride being formed.

$$2CH_3{\cdot}COF + CaO = CaF_2 + (CH_3{\cdot}CO)_2O.$$

Ammonia gas reacts energetically with the liquid, a white crystalline mass of ammonium fluoride and acetamide, $CH_3{\cdot}CONH_2$, being produced. Two volumes of ammonia combine with one of the gaseous fluoride.

$$CH_3COF + 2NH_3 = CH_3CONH_2 + NH_4F.$$

Aniline also acts freely, forming hydrofluoric acid and acetanilide

$$CH_3{\cdot}COF + C_6H_5{\cdot}NH_2 = C_6H_5{\cdot}NH{\cdot}CH_3{\cdot}CO + HF.$$

Absolute alcohol not only dissolves the acetyl fluoride in all proportions, but, after being in contact with it in a closed vessel for some hours, is found to form with it hydrofluoric acid and acetic ether.

$$CH_3{\cdot}COF + C_2H_5{\cdot}HO = CH_3{\cdot}COOC_2H_5 + HF.$$

Amylic alcohol acts similarly with production of amyl acetate. The acetyl fluoride acts with difficulty upon sodium acetate, and has still less effect on sodium amalgam and metallic sodium. At a red heat, however, the sodium decomposes with incandescence in the gaseous fluoride, sodium fluoride being formed and carbon liberated, whilst a small quantity of a liquid as yet not described is produced. M. Meslan's conclusion, based upon the various reactions, is that the compound is much more stable than the chloride (*Comptes Rendus.*, cxiv., 1069).

Crystallization of Metals. At the Royal Academy of Sciences, Amsterdam, Mr. Behrens dealt with the microscopic structure of alloys. Crystallization is found to be more easy and perfect in alloys than in unalloyed metals. Copper alloyed with a small proportion of silver, after melting and slow cooling, is found to be chequered by minute threads of an alloy rich in silver. The various types of structure found in crystalline rocks may all be reproduced in alloys. Rectangular wickerwork is most common, isolated clusters of crystals less so. Mechanical stress does not destroy the crystalline structure (*Nature*, 1177, 72).

New Chinese Plants. At the recent meeting of the Linnean Society a paper was read by W. B. Hemsley on a botanical collection made by A. E. Pratt in Western China. The plants were found at high elevations, from 9000 to 13,500 feet, in the neighbourhood of Tat-sien-lu, a town on the frontier. Mr. Hemsley estimates that the collection contains about 500 species, of which some 150 are new to science.

Poisonous Secretion of Batrachians. G. A. Boulenger, in a short but interesting note, draws attention to the toxic properties of the Batrachian integument. He points out that though every species, even including frogs, possesses poisonous properties for mere protective purposes, no individual can spontaneously squirt out its poison. This consists of a viscid or milky fluid secreted by glands and follicles on the skin of the dorsal surface, and is ejected if the glands be pressed or subjected to an electric current. By inoculation it will act even on the individual producing it. The poison is not a septic but acts upon the heart and the central nervous system. That of the toad has been compared, in its effects, with digitalis and erythrophlœum. The properties of the secretion have been variously attributed to an acid and an alkaloid. One observer, however, says that toads and salamanders possess two kinds of glands, one of which secretes a narcotic alkaloid, whilst the other contains an acid secretion which acts as a convulsive (*Natural Science*, May, p. 185).

Physiology of Development in Tubers. A. Prunet has conducted a series of experiments in an endeavour to explain the facts that buds on the upper parts of potato tubers develop earlier and more rapidly than those near the base, and that the anterior halves, as proved by cultivating them separately, give more abundant crops than the posterior halves. Working on three distinct varieties of potatoes, he found that the anterior portions of unsprouted tubers were generally the richer in carbohydrates, nitrogenous substances, organic acids, and phosphates. Germinated tubers furnished analogous results, but with the differences in proportion more strongly marked. The research is summarised in the statement that, in potato tubers, there is always a close relation

between the distribution of the "immediate principles" and mineral substances, and the relative aptitude of the buds to develop (*Comptes Rendus*, cxiv., 1079).

Movements of Minute Objects. M. Marey has explained to the French Academy his method of analysing the movements of minute objects by chronophotography. He replaces the ordinary objective of the microscope by a special form of apparatus, including an objective, an object carrier, and a powerful condenser. He is thus enabled to obtain clear images, showing the movements of blood-globules in and outside the capillaries, also the movements of zoospores in the interior of the cells of cladophora and their migrations thence. Specimens of the chronophotographs, taken with a magnification of 800 diameters, were exhibited, and from the changes in position shown in the successive images, the movements of the objects, their nature, and their rapidity, could be deduced. By projecting the images in order upon a screen by means of an apparatus devised by M. Marey it is possible to apparently reproduce the movements to the eye and show them to a number of persons at the same time (*Comptes Rendus*, cxiv., 989).

Salicylic Acid from the Oil. Since Charteris and others showed that the natural salicylic acid obtained from oil of wintergreen differed therapeutically from the artificially prepared acid usually sold, a demand has arisen for the so-called "physiologically pure" substance. In great measure this has been regarded as synonymous with the natural product, and though the manufactured article is now prepared in a state of absolute purity, the acid from the oil is quoted at a much higher price than other forms. It now appears, however, that safety is not assured even by the latter description, for it has become common to combine artificial salicylic acid with the methyl radical of methyl alcohol, so producing an artificial oil of wintergreen which in turn is decomposed, and the acid produced anew offered as "salicylic acid from the oil" (*The Druggists' Circular*, May).

Deodorizing Iodoform. When iodoform is applied to the skin in combination with Martindale's camphoid the volatilization of the excess of camphor serves to mask the disagreeable odour. It is now said that menthol will render iodoform inodorous after being enclosed with it in a bottle for one or two hours. Cumarin, especially the artificially prepared preparation, is also recommended for disguising the odour and rendering it more agreeable (*The Pharmaceutical Era*, May).

Production of Vegetable Galls. In an interesting note read before the French Academy of Sciences by Professor Laboulbène, he states that an examination of the facts shows that the chief cause of the production of different vegetable galls is due, according to the idea promoted by Lacaze-Duthiers, to liquid substances proceeding from the animal or vegetable gall producers. These liquids proceed sometimes from the glands connected with the female reproductive organs, sometimes they pass through the soft and extensible membranes of eggs. The same cause operates if the liquid is secreted by the cells of a gland opening into the mouth, with or without organs of suction; also, if it transudes by the walls of the body of a larva, or of a Helminthe; or, lastly, if it is furnished by a gall-producing bacterium. Lasting vegetable excrescences then are produced neither by punctures, nor by incisions, nor yet by foreign bodies, but by soluble matters elaborated by animal or vegetable cells. The action of these liquid substances is to be regarded as specially and absolutely necessary (*Comptes Rendus*, cxiv., 720).

Action of Hydrocyanic Acid upon Calomel. A communication by M. Cheynet was read at a recent meeting of the Paris Society of Pharmacy upon the action of dilute solutions of hydrocyanic acid upon calomel. His experiments prove that cyanide of mercury is formed, whilst, at the same time, hydrochloric acid and metallic mercury are liberated. That the acidity of the liquid was due to free hydrochloric acid was shown by the fact that, whilst calomel or hydrocyanic acid apart had no action upon tropeolin, together they coloured this reagent a reddish-violet, thus proving that a strong acid was liberated. M. Cheynet has also isolated the cyanide of mercury produced in the reaction. By treating the cooled liquid with silver carbonate, he eliminated the hydrochloric acid, and, after filtration and concentration, obtained a crystallization of cyanide of mercury containing only a trace of cyanide of silver. M. Patein has occupied himself with similar researches and arrived at the same results (*Répertoire de Pharmacie*, May, 224).

American Species of Rumex. A revision of the American species of Rumex occurring north of Mexico has been undertaken by W. Trelease. His paper on the subject appears in the third annual report of the Missouri Botanical Gardens, but is also issued separately. It is pointed out that the biological interest of the genus arises chiefly from the protective acidity of the sorrels and some docks, and the occurrence in others of tannin and a bitter principle; their protandry and exclusive adaptation to wind pollination; and the adaptation of the greater number of species to wind dissemination, by the enlargement of the inner segments of the perianth during ripening, although some of those with fimbriate valves may profit by attachment to animals (*Nature*, p. 40).

Decomposition of Mannitol by Bacilli. Professor Frankland and J. S. Lumsden, in a communication to the Chemical Society, state that the products of the fermentation of mannitol and dextrose by the *Bacillus etheraceticus* consist of ethyl alcohol, acetic acid, carbonic anhydride, hydrogen, and traces of succinic acid. A considerable quantity of formic acid is also invariably produced when the fermentations are conducted in a closed space, though quite an exceptional product if open flasks (plugged with cotton-wool) be used. It has been shown before that the same phenomenon appears in connection with the *B. ethacetosuccinicus*, and it is assumed that formic acid is one of the primary products of the fermentation, and then breaks up into equal volumes of carbonic anhydride and hydrogen. When these products are prevented from escaping, as in fermentation in a closed space, the decomposition of the formic acid is retarded. Though both alcohol and acetic acid are formed, no trace of ethylic acetate could be detected among the products of fermentation (*Chemical News*, 1692, p. 213).

Test for Grape Sugar in Urine. Rosenbach adds a few drops of sodic hydrate solution and of a saturated solution of sodic nitroprusside and heats the mixture. If grape sugar (even as little as one-tenth per cent.), or other substance reducing Fehling's solution, be present, a deep brown or orange-red colour is developed. The red coloration yielded immediately on the addition of nitroprusside of sodium to alkaline urine disappears on heating, and the brown-red colour caused by the sugar is then apparent. By this treatment urine containing over one-tenth per cent. of sugar does not become turbid, it develops a reddish-brown colour, and on the addition of acid presents a Berlin blue colour. A solution containing sugar heated with sodic nitroprusside and ammonia develops a green colour, which is not permanent and varies in intensity with the amount of sugar present, or in weak saccharine solutions with the amount of ammonia added (*Centralbl. f. Klin. Med.*, *B. M. J. Epitome*, p. 73).

Coco de Mer. A young double cocoa-nut palm, *Lodoicea seychellarum*, has recently been successfully grown at Kew. The plant is a native of the Seychelles and is rarely seen in cultivation. Germination occupies nearly two years and maturity is very slowly attained. The radicle grows down from the large heavy seed in the form of a stout tap-root, and carries with it the plumule enclosed in the sheath of the cotyledon. It is not until this sheath splits that the plumule is able to ascend. The trunk of the adult tree, though barely a foot in diameter, may reach 100 feet in height. The male and female flowers are borne on separate individuals. The immense fruits, averaging forty pounds in weight, contain, within a thick fibrous husk, one, two, or three large nuts with hard and thick black shells. Each nut is divided about half way down into two lobes. The name "Coco de Mer" originated from the fact that the nuts were often found floating in the Indian Ocean, and were variously supposed to be terrestrial fruits petrified through falling into the sea or the product of hidden trees actually growing under the water (*Natural Science*, May, 233).

Photography in Colours. M. G. Lippman, continuing his researches in colour photography, now announces that he has succeeded in improving the sensitive film in sensitiveness and isochromatism. He obtained brilliant photographs of spectra on albumen-bromide of silver films rendered orthochromatic by azalin and cyanin. All the colours appeared at once, without the interposition of coloured screens, after an exposure of five to thirty seconds. Theory indicated that the complex colours of natural objects should appear in a photograph for the same reason as the simple colours of a spectrum. Experimental verification of this was not lacking for negatives were submitted to the Academy of Sciences, which faithfully represented a group of draperies, a many-coloured parrot, a plate of oranges surmounted by a red poppy, and a stained glass window in red, green, blue, and yellow. They showed that the shape of objects is represented at the same time as the colours. Five to ten minutes exposure to electric or sun-light was required for the draperies and the bird. The other objects were exposed to a diffused light for several hours. More perfect orthochromatism and increased sensibility in the plate are indicated as being essential to further improvement in the process (*Comptes Rendus*, cxiv., 961).

Indian Hemp as an Intoxicant. Indian hemp, the *Nepenthes* of the poet Homer and the *Haschish* of modern times, is one of the oldest known intoxicants. Like opium, it may be used as a pill or in a pipe, either as a medicine or as a luxury. Haschish, as prepared for use, does not represent the resinous principle, pure and simple, of the *Cannabis sativa*. It occurs in cylindrical or candle-shaped pointed pieces, of a brown or blackish colour, and when powdered resembles a dried extract. Softening under the influence of warmth, it may be moulded by the fingers; its odour conveys the idea of hemp or impure wax; it is sharp to the taste and easily soluble in water. Ether dissolves it yet more readily, and, on digestion, will remove a dark resin possessing all the properties of the resinous principle of *Cannabis sativa*. Haschish is smoked in the pipe, alone or with tobacco, and is often taken by the mouth, mixed with honey or in coffee. A fatty and aromatic substance prepared from it is chewed (*The Asclepiad*, ix., 33, 48).

The Decimal System. According to a circular issued by the *New Decimal Association* a memorial has been presented to the Lords of the Committee of Council on Education suggesting that, in future, alternative questions based on the metric system of measurement be given in certain of the May examinations in science. The principles of the system are already taught in the higher standards of all elementary schools, and the London and some other schoolboards furnish pupil teachers and advanced scholars with boxwood rules having a decimalized inch scale and a metric scale in juxtaposition. Coloured wall charts of the metric weights and measures are also used, so that the details of the system become gradually familiarized.

Physiology of Germination. Professor Marshall Ward, in the course of his second lecture on "Seeds and Seedlings," at the gardens of the Royal Botanic Society, pointed out that the various changes taking place in the seed during germination and the first stages of growth are now found to be due to a fermenting principle. This acts upon and breaks up the starch and albumen of the seed into a form capable of being absorbed by the infant plant, operating in precisely the same manner as the digestive secretions upon the food of animals (*The Gardeners' Chronicle*, xi., 282, 656).

Manufacture of Gambier. Dr. H. Trimen records the precise mode of procedure adopted in the manufacture of gambier, as he witnessed it at Singapore. The short leafy twigs are rapidly stripped off the plants by hand and carried in baskets to a low thatched shed where large circular vats contain water in a state of complete ebullition. The leaves and twigs are immersed, and men armed with long-handled, five-pronged forks of hard Tampines (*Sloetia Sideroxylon*) wood, stir and bruise them for six hours. The flaccid masses having been taken out and drained into the vat, the boiling ley is next poured into shallow wooden tubs to cool. In colour of a yellowish olive-green, it has the consistence and appearance of thin pea soap. Solidification does not occur on cooling, but is effected by the operator thrusting a short, thick, smooth cylinder of the

very soft wood of Mahang (*Macaranga hupoleuca*) into each of two of the wooden buckets placed before him, and agitating the mass by rubbing his fingers up and down on the surface of the cylinders. The fluid gradually thickens and some solid matter coagulates on the fingers and is wiped off. After the process has been continued for about a quarter of an hour, the whole mass suddenly contracts somewhat and becomes paler in colour. Then, in a few minutes, it sets into a mass of the consistence of soapy cheese. This is probably the effect of the crystallization of the chief constituent, catechuic acid. After a few hours the mass can be turned out as from a mould, and is cut into small cubes (*Ceylon Administration Reports*, iv., H. 13).

Adulterated Mogador Beeswax. The trade in Mogador beeswax is a fairly extensive one, and it is satisfactory to find from the last Consular report that the growing practice of adulterating it with paraffin candles, stearine, and other substances imported for the express purpose, has had its natural result in checking the sale. The price of the impure article being consequently greatly reduced, the inducement to fraud is removed, and the practice of adulterating the natural product of the bees is dying a natural death.

Russian Liquorice. The Acting-Consul at Batoum reports that two factories established by British subjects in Transcaucasia for collecting, drying, and pressing by hydraulic presses liquorice roots, each exported about 4500 tons of dry root during twelve months. The manufacture of liquorice paste is being initiated, but none of the product has yet been exported from the Caucasus.

Bacteria and Field Mice. The *Bacillus typhi murium*, which was discovered by Professor Loeffler some time ago to have the power of producing a definite disease in mice, whilst without effect upon other animals, has now been put to a practical use. The professor was appealed to by the Greek Government to assist in staying the plague of field mice, which threatened to destroy the harvest. Thessaly was the district selected for the experiment, and bread crumbs, saturated with the bacillary substance, were strewn broadcast over certain fields. Within a week the results were visible, and the latest reports announce that the fields are strewn with the corpses of mice (*British Medical Journal*, 1638, p. 1109).

Absinthiin. The chief constituents of wormwood (*Artemisia Absinthium*) are an essential oil and a bitter principle known as absinthiin. To the former of these is ascribed the toxic action sometimes observed as a result of absinthe drinking, while the tonic properties of the drug appear to be due to the absinthiin. The latter is the subject of an investigation by O. Senger made with the view of ascertaining its chemical properties and the best method of preparing it. He has obtained it in a state of greater purity than previous workers have succeeded in doing, by avoiding a high temperature and the use of strong reagents in its extraction. The drug is exhausted with ether, the latter distilled off, and the residue extracted with water, the aqueous solution being purified, if necessary, by treatment with alumina. Pure absinthiin is a yellowish, glassy, amorphous substance melting at 65° C., and having the formula $C_{15}H_{20}O_4$. It belongs to the class of glucosides, and on decomposition by means of dilute sulphuric acid yields a volatile substance which appeared to be an ethereal oil, an amorphous resinous substance $C_{21}H_{26}O_6$, and dextrose. The resinous substance has the constitution of an oxy-acid, and by the action of alkalies yields phloroglucinol. The volatile substance was not obtained in sufficient quantity for close examination (*Arch. d. Pharm.*, 230, ii., 94).

Constituents of Capsicum Annuum. The constituents of the fruits of *Capsicum annuum* have been examined by T. Pabst and found to be very similar to those of *C. fastigiatum*. An alkaloid was obtained in very small quantity, which is not pungent, and resembles the "capsicine" stated to be yielded by the latter; it is regarded by Herr Pabst, however, as not being a normal constituent of the fruit, but probably a decomposition product formed by the action of the chemicals used in the attempt to isolate it. A substance was found somewhat resembling the "capsaicin" which has been shown by Thresh to be the pungent principle of *C. fastigiatum*, but it was not obtained in as pure a condition as by the latter chemist. It was intimately associated with red colouring matter, which Pabst is of opinion was perhaps in combination with it, and it possessed the properties of an acid, whereas Thresh, who succeeded in crystallizing it, describes it as a neutral body. Oleic, stearic, and palmitic acids were also separated from the extract of the fruits, and a colouring substance resembling carotin (*Arch. d. Pharm.*, 230, ii., 108).

Nitric Oxide. It has been shown by various chemists that nitric oxide prepared by the action of copper on dilute nitric acid is not pure, and that the method of purifying it by absorption in ferrous sulphate solution is unsatisfactory, as the latter absorbs some of the nitrous oxide which is present, and forms more by reduction of the nitric oxide. As the result of recent analyses, F. Emich is of opinion that the latter gas is most readily prepared in a pure state by the reaction of mercury, sodium nitrite, and sulphuric acid. When so prepared it is contaminated only by a trace of nitrous anhydride, which is removed by passing it over caustic potash. Herr Emich has repeated with this pure substance some of the experiments which have been recorded by other workers, and he confirms the statement that on heating the gas to a high temperature in a porcelain or platinum tube, nitric peroxide is formed. On passing nitric oxide over silver heated to redness, however, he did not find, either when the gas was pure or when diluted with an indifferent gas, that the whole of it was broken up into nitrogen and oxygen, as has been stated to be the case; but on heating it to a temperature near the melting point of platinum by means of an electric current passing through a platinum wire, the whole of it was decomposed. By heating nitric oxide with caustic potash in a sealed tube, potassium nitrite is formed, and the gas which remains consists of 80 to 90 per cent of nitrous oxide, with unaltered nitric oxide (*Monatsh.*, 13, i. and ii., 73).

Chinese Opium. Consul Forrest, writing on the trade of Amoy, points out that a decrease of £92,191 in the annual returns of imports is due to a considerable falling off in the import of every variety of Indian opium. He is, however, assured that the use of the drug in smoking is everywhere on the increase. The obvious con-

clusion, therefore, is that the Chinese are themselves producing the article in ever-increasing quantity. The report from Hankow bears out these facts. It states that the cultivation of the poppy in that district and in the districts of Ichang and Chungking is an extensive and growing industry. There are doubtless a few old opium smokers who, being accustomed to the taste of the Indian drug, prefer it to the cheaper native opium; but the vast majority of consumers now use the home drug and importation will gradually die out as the old consumers disappear. The consul at Kiukiang also states that if the use of opium is still spreading in that province, it may be taken for granted that it is the native article which finds increasing favour. At Wuhu the importation of Indian opium showed a slight increase, probably due to the fact that the native crop was only about sixty per cent. of a full one. It would further appear from the reports that the exportation of Chinese opium from some ports is largely increasing.

Nitrate of Silver and Seeds. M. A. Barillé has observed that sticks of fused nitrate of silver kept in bottles amongst seeds to prevent them being broken gradually undergo alteration. The surfaces become roughened and eaten away in several places, excavations are seen, the shape and size of the surrounding seeds, and some are deeply incrusted. The seeds themselves—those of coriander, flux, and millet—are also affected, being found to contain metallic silver in varying proportions. The reduction of the nitrate is caused by the action of fixed and essential oils and other organic matters in the seeds. It is, therefore, recommended that a mineral substance, preferably asbestos, or coarsely powdered pumice stone, should be substituted for the purpose (*Bull. de Pharm. de Bruxelles*, May, 157).

Colouring Matter in Shell Fish. Dr. James Leicester describes an experiment which he thinks may throw some light on the change of colour that occurs in shrimps and lobsters on boiling. Unboiled shrimps are allowed to remain in a closed flask containing concentrated hydrochloric acid. A purple colour is soon noticed, appearing close to the tail, whence most of the colouring pigment appears to come. After about four hours the whole of the liquid in the flask assumes a bright purple colour resembling litmus solution. The colour is not permanent, the solution becoming, after three or four days, of a dirty brown colour (*Chemical News*, lxv., 1696, 253).

Excessive Dose of Iodoform. A correspondent of *The Lancet* states that he prescribed a drachm of iodoform, to be used by a patient for surgical dressing purposes. On calling next day, he found that the whole of it had been taken on the previous night. The patient escaped, however, without any ill effects, and even thought his appetite was improved by the dose.

Alleged Decomposition of Sulphur. Dr. Gross has been investigating the position of sulphur as an elementary substance, and, in a communication to the Physical Society of Berlin, states the results of some of his experiments. On fusing barium sulphide in a silver crucible and passing a powerful electric current through the mass, it appeared, after some time, that the barium had combined with the platinum to form a novel compound, whilst some fifty per cent. of the sulphur had disappeared, leaving a corresponding quantity of a new substance in its place. Dr. Gross is said to consider sulphur to be a hydride of this new body. It is clear, however, that much more satisfactory evidence must be forthcoming ere this deduction can be accepted as correct (*Chemical News*, lxv., 1696, 264).

New Synthesis of Tartaric Acid. An interesting synthesis of tartaric acid has recently been effected by P. Genvresse. This acid had previously been artificially prepared by the action of moist silver oxide on dibromsuccinic acid, formed by the introduction of two atoms of bromine into the succinic acid molecule; the latter acid may be formed by the hydrolysis of ethylene dicyanide, so that a complete synthesis is brought about in this way. M. Genvresse, however, started with glyoxylic acid, CHO.COOH, and treated this with zinc and acetic acid. The nascent hydrogen reduces the aldehyde to an alcohol group, a doubling of the molecule also occurs, and tartaric acid COOH.CHOH.CHOH.COOH is produced, in the form of racemic acid. As glyoxylic acid occurs in some plants, M. Genvresse suggests that the formation of natural tartaric acid may occur in this way. The reaction is similar to that which occurs when acetone or benzaldehyde is treated with nascent hydrogen, the product being pinacone or hydrobenzoïne respectively (*Bull.*, [3], 7, 225).

Anemonin. Beckurts has investigated the acrid constituent present in various kinds of anemone and other ranunculaceous plants, and finds the sharp burning taste and irritating effects are due to a substance which he terms anemone-camphor, the composition of which has hitherto been unknown. This substance undergoes decomposition soon after its isolation, under conditions that are not precisely known, as for instance during the drying of the plants in which it occurs. The products of this alteration are anemonin and isoanemonic acid. The plants in question also contain as constituents, or as products of secondary decomposition, anemonin and two acids, anemonic and anemoninic acids. Beckurts finds that contrary to previous statements the composition of anemonin is represented by the molecular formula $C_{10}H_8O_4$. According to its chemical behaviour it is to be regarded as the anhydride of a bibasic acid, and it contains an aldehyde or ketone group but no hydroxyl or oxalkyl group. When treated with acetic anhydride anemonin is converted into an isomeric substance isoanemonin. Anemonin is an unsaturated compound and it combines with four atoms of bromine without separation of hydrobromic acid. The anemonic acid $C_{10}H_{10}O_5$ present in small amount in the *Ranunculaceæ* is also formed by boiling a water solution of anemonin with lead oxide. It is bibasic and contains either an aldehyde or a ketone group. The anemonic acid $C_{10}H_{12}O_6$ occurring in these plants is also formed by heating anemonin with acids—dilute hydrochloric or sulphuric—or with bases—potash or baryta water. It is bibasic and its composition is probably represented by the formula $C_7H_8\begin{matrix}C(OH)_2\\COOH\\COOH\end{matrix}$. The amorphous isoanemonic acid produced by the breaking up of anemonin camphor has the same

composition as anemonic acid from which it probably differs in the same manner that isoanemonin differs from anemonin. The investigation of these compounds will be carried out further (*Archiv. der Pharmacie*, 1892, vol. 230, p. 182).

Scopolamine. Professor E. Schmidt has continued his investigation of the base associated with hyoscyamine in the root of *Scopolia atropoides*,* and the *Archiv der Pharmacie* for May contains a paper in which he describes the results he has obtained. Further evidence is now brought forward in support of the view that the base which has hitherto been termed hyoscine is not an isomer of atropine and hyoscyamine, but that its composition is represented by the formula $C_{17}H_{21}NO_4$. As this base was first identified in the root of *Scopolia atropoides*, Professor Schmidt now proposes to name it scopolamine in order to avoid any confusion with other bases which have already been designated hyoscine. The several steps by which a knowledge of this subject has been extended since the presence of hyoscyamine in *Scopolia atropoides* was observed by Professor Schmidt† have been from time to time recorded in the "Month,‡" and it may be mentioned that the present very interesting identification of the base which occurs in scopola root in very minute proportion is altogether distinct from the investigation undertaken for the purpose of ascertaining the suitability of scopola root as a source of hyoscyamine and a substitute for belladonna.

Apoatropine $C_{17}H_{21}NO_2$. Operating upon large quantities of mother-liquors, obtained as by-products of the manufacture of atropine, Merck has succeeded in isolating a base identical with apoatropine, the salts of which are characterized by a remarkable facility of crystallization. The base in the free state melts at 60°—62° C., is very soluble in ether and alcohol, and but slightly soluble in water. It crystallizes from ether in well-defined crystals. The *hydrochloride* $C_{17}H_{21}NO_2HCl$ may be separated from a water solution by the addition of sodium chloride. It forms brilliant, colourless, anhydrous laminæ, which melt at 237°—239° C. and are but sparingly soluble in cold water. The *hydrobromide* $C_{17}H_{21}NO_2HBr$ has the form of long needles, which melt at 230° C. and change into brilliant laminaæ. A solution containing about 3·7 per cent. of the salt does not rotate the plane of polarization. The *hydriodide* has the form of small colourless needles. The *aurochloride* is anhydrous, melts at 110°—111° C. and is very sparingly soluble in cold water. The *platinochloride* is nearly insoluble in water, and it melts at 212°—214° C. with decomposition. The *hydrargyrochloride* has the form of sparingly soluble, silky laminæ, which aggregate at 115° C. and are gradually decomposed as the temperature is increased. The *stannochloride* is very soluble in hot water. The *chromate* has the form of brilliant yellow laminæ, sparingly soluble in water. The *picrate* is very sparingly soluble in cold water; it is precipitated in amorphous flocks, which rapidly become crystalline. It melts at 166°—168° C. Merck is of opinion that the only difference between apoatropine and the base to which Hesse has given the name atropamine, lies in the circumstance that Hesse did not obtain it in a crystalline state. By heating with potash solution to 100° C. apoatropine is but very little acted upon, and it is only by using alcoholic potash that it is completely decomposed. The products of this alteration are tropic acid $C_9H_8O_2$ and tropine $C_8H_{15}NO$. The basic product obtained by Hesse was considered by him to be pseudotropine on the ground of the melting-points of the platinum and gold salts. Hesse describes the platinum salt from atropamine as being anhydrous and melting at 186°, while the gold salt melts with decomposition at 195°–196° C., but Merck is of opinion that it was not pseudotropine, because he found that the base obtained by the transformation of hyoscine boils at 241°–243° (uncor.), its platinum salts contain water of crystallization, and it melts at 211°–213° C. after previously blackening and with decomposition. The great tenacity with which the platinochloride of pseudotropine retains its water of crystallization is considered by Merck to have been the reason why Ladenburg and Roth, as well as Merling, found the percentage of platinum too low, and thus did not recognize the true nature of this base. Merck considers that his observations show that atropamine is identical with apoatropine, and that the base having a boiling point of 242° and existing in the crude belladonnine of Messrs. Gehe, is nothing else than pseudotropine.

Reduction of Invert Sugar. At the North Louisiana Experiment Station, attempts have been made to grow cane and make sugar on a small scale, with a view to introducing the industries into the southern parts of the Gulf States. The juice is extracted by a process of diffusion or by mills, and it was noted, in working by the former process, that there was a decrease in the proportion of invert sugar in the diffusion juice over that in the mill juice, whenever an excess of lime was used in the diffusion battery, as the special apparatus is called. In many sugar houses, too, where the so-called neutral but really alkaline juices had been treated, a similar reduction of invert sugar occurred. Investigations on a small scale showed that either dextrose or lævulose alone or together (as invert sugar in cane juices), when treated with an alkali or alkaline earth, was destroyed. Experiments were then conducted in which molasses was treated with lime, in proportions varying from one to ten per cent. And, whereas the original molasses contained 10·26 per cent. of invert sugar, under treatment the quantity was gradually reduced until, with ten per cent. of lime added, there was present but 1·23 per cent. Repeated analyses now showed but a slight difference in the double and single polarisations, and the polariscopic tests were corroborated when the sugar was determined by inversion and with Fehling's solution. Further experiments were made on a larger scale, with molasses containing nearly equal quantities of invert sugar and sucrose, using a large vacuum pan for the work and precipitating the lime with acid phosphate of calcium. A thorough chemical investigation subsequently made established the following results:—Whenever a solution of dextrose or lævulose is treated with an excess of lime, a darkening of the solution takes place, with the conversion of these substances into acids which

* *Pharm. Journ.*, li., 267.

† *Pharm. Zeit.*, 1888, p. 572, and *Pharm. Journ.*, xix., 245.

‡ *Pharm. Journ*, [3], xx., 342, 461, 709, 890.

gradually neutralize the lime until finally, if enough lime be present, the entire invert sugar is destroyed, and there remain, in the black solution, soluble salts of lime. The acids have been named glucinic and saccharic. They form with lime soluble salts, and when the lime is precipitated from these solutions the acids are left in a free state ready to destroy the sucrose whenever heat is applied. Unfortunately the only precipitants of these acids (oxides of mercury) are poisonous, otherwise valuable results would be obtained by this process (*New Orleans Consular Report*, 987, 71).

Poison of Toads and Frogs. The use of the poison of the toad by the Chinese and their mode of procuring it by prodding the animal in a jar containing flour is well known, but a more modern method of obtaining it, suggested by Kobert in 1889, is by the subcutaneous injection of a small dose of chloride of barium, which causes, after a few minutes, such a profuse secretion that the animal appears as if coated by whitewash. German violinists are stated, when suffering from moist hands, to check the perspiration by handling toads; and the effects produced by species of *Bombinator* are said to be comparable to the early stages of a cold in the head. A small frog, *Dendrobate tinctorius*, is used by the Indians of Colombia for poisoning their arrows, the animal being exposed to the heat of a fire to cause it to exude the poison. A quantity sufficient for fifty arrows (used especially against monkeys) is thus obtained from a single individual. The frog derives its name from the fact that it is used to alter the colour of parrots' feathers. For this purpose some of the feathers are removed and the blood of the frog injected beneath the skin. The new feathers grow of a yellow or greenish tint on these spots (*Natural Science*, May).

New British Plants. Some further notes on forms and species, new to Britain, of the very difficult genus *Hieracium*, are described by Mr. T. J. Hanbury (*Journal of Botany*, p. 129), whose beautiful monograph of the genus is already well known. These notes possess all the more value that Mr. Hanbury's enormous collection of 4000 sheets of the species of the genus has, to a large extent, been submitted to the critical examination of Dr. C. J. Lindeberg. An "Essay at a Key to British Rubi," in the same journal, p. 142, by the Rev. W. Moyle Rogers, includes new British forms of this intricate genus, and will be found very useful to British field botainists, the prominent features of the different forms being carefully emphasized.

Dioclea Violacea. In an article on the *Leguminosæ* of Ecuador and New Granada M. Micheli mentions that the pretty purple flowers of *Dioclea lasiophylla*, Benth., a climbing plant which grows on the banks of the Magdalena River and are produced between December and February, are exceedingly fragrant. Possibly these and other fragrant plants in South America might yield new perfumes to European enterprise. Some months since the flowers of *Chamædorea fragrans*, which have an odour like that of the *Maréchal Niel* rose, were sent to this country in small quantities from Bolivia, but there seemed to be a difficulty in obtaining them in commercial quantities (*Journ. de Botanique*, May, p. 188).

THE CHOICE OF A MICROSCOPE.*

BY ALFRED S. GUBB, M.D., D.P.H.

In the choice of a microscope one must, of course, be guided especially by the purpose for which the instrument is intended. In the present contribution it is only proposed to discuss the principal points which should be borne in mind in selecting an instrument for use by medical men and students, suitable either for the purpose of identifying the humble acarus or for more recondite and delicate pathological or bacteriological researches. The object in view is to point out how to recognize a good instrument, on what principles to choose the different parts and accessories, and briefly to explain the exact use and purpose of each part of the instrument.

Now, the most essential part of a microscope, the part upon which the value of the image must necessarily depend, is the objective. The objective is, so to speak, the microscope, and the other parts are but accessories. The eyepiece which magnifies the image furnished by the objective, and brings it, a virtual image within focus of the eye; the mirror which reflects the light and renders the rays parallel or convergent, according as its surface is plane or concave; the condenser which focusses the beams and the diaphragm which cuts off superfluous rays, are after all but the handmaids of the objective. Hence the prime importance of devoting special attention to the consideration of this all-important accessory.

Before proceeding to determine the value of an objective, it will be as well to specify exactly what one has a right to expect of it, and this is by no means a simple matter. The beauty of a microscopical image and its practical utility are dependent upon a number of factors of vastly different importance, all of which are rarely found in harmonious combination. Clearness of definition and abundance of detail are two primary qualities, and if to these be added an adequate magnifying power together with a certain depth of penetration, then we have the four desirable qualities to be sought for in a microscope. Each of these requirements supposes certain optical qualities in the lens. Definition is the term given to that quality which gives clearness of outline; the resolving power that which provides for a proper rendering of the details; the magnifying power is that which simply enlarges the object, and the penetrating power the depth of vision into the object, that is to say, the number of subjacent planes visible at one and the same time.

The magnifying power is accorded far too much attention to the exclusion of the other attributes, and the terms used to designate the various qualities are often made use of without a proper sense of their exact meaning. Instead of analyzing the qualities of a microscope, one is very apt to describe it as "penetrating," or as possessing good definition. It will, perhaps, be as well to define somewhat more categorically what these terms really signify. An objective is said to give a good definition when the image is clear, distinct, with well-marked outlines, like a photographic negative well focussed. This quality depends upon the degree of spherical aberration, the tendency of which is to render the image diffuse; and chromatic aberration which gives the edges a coloured tinge. The "resolving" power is the property of a lens to separate the details, to analyse them, so to speak, into their component elements, so that with clearness of outline in the image the most delicate and the finest details are visible. This quality is perfectly distinct from the preceding, and a good resolving power in no way implies clearness of outline. A lens imperfectly corrected so far as the aberration is concerned may, if it have a wide *angle d'ouverture* give a very good

* From the *Medical Press*, May 4.

image of the details, but these are seen with a confused and uncertain outline, having in fact a "fluffy" appearance.

This resolving power is second in importance only to the definition, and is the object, on the attainment of improvement in which the efforts of the manufacturers of lenses are at present concentrated. Even magnifying power has been sacrificed to its attainment since it was recognized that the quality of an image is really more important than its quantity, and that a magnifying power of 1500 or 2000 diameters is altogether useless if this immense image fails to make clear the minute differences of structure, the discovery of which is the aim and object of the microscopist's endeavours. This faculty of disassociation depends much less upon the amount of light passing through the objective than upon the angle at which this light reaches it.

Each point in the objective sends on to the eye-piece a cone of light which is wider in proportion to the excellence of the lens, and the most oblique rays are those most favourable to the refractive effects upon which the clearness of the image depends, and consequently on the enlargement of the cone of light. The degree of enlargement depends then upon what is known as the "opening angle."

The conception of this angle of opening has acquired a fresh significance since the introduction of the principle of oil immersion. This, as most microscopists are aware, consists in the interposition of a highly refractive liquid between the objective and the object. The purpose of this liquid is to prevent waste of light by converting into one homogeneous whole, the object, the cover-glass, and the objective. The degree to which the loss can thus be prevented is directly proportional to the refractive power of the liquid. Any formula, therefore, which is to express the resolving power of an immersion lens must associate this index of refraction with the idea of the opening angle. Now the resolving power is proportional to the product of the sinus of half the angle of opening divided by the index of refraction of the interposed liquid. This product becomes a numerical quantity which may be called the "index of dissolvability" of the objective. There are limits to the widening of the opening angle, and when instrument makers had exhausted their resources in this direction, they availed themselves of the further latitude afforded by the use of more highly refractive substances. *Cæteris paribus* the resolving power of a lens increases with the refractive index of the liquid employed. From 1·26 when water is the medium, it rises to 1·50 with cedar oil, and may reach 1·60 with the monobromide of naphthaline, the refraction index of which is almost equal to that of flint.

The penetrating power of a lens is the property of lenses of small aperture, and it is therefore diametrically opposite to the resolving power, so much so, that an objective cannot at one and the same time be resolving and penetrating to any marked degree, and one or the other property must be selected according to the object we have in view. The penetrating power can, however, be augmented by means of diaphragms with small apertures. This is the same process as that resorted to by the photographer in taking landscapes, in order to obtain a certain depth of image. The frontal space is the interval which separates the lower lens from the object when the microscope is *à point*. It is not the same as the focal distance which is usually somewhat greater and with English and American microscopes it is often not more than sufficient to allow for the thickness of the cover glass.

We may now proceed to discuss the means of testing these various properties, but before doing so it will be well to remind our readers that they are not all of equal importance. Some are fundamental and essential, while others are merely adjunctive and desirable. In other words, some are absolutely essential, while others are necessary only for certain special kinds of work. Definition, for example, is an indispensable quality up to a certain point, failing which the objective is a bad one. The magnifying power, on the other hand, may vary according to the substances to be examined, and is not *per se* a quality in any given lens. The definition given by an objective is therefore the first thing to look to. There are no means of determining this by the aid of a mathematical formula, as may be done in calculating the magnifying power of a lens from its focal distance, or the resolving power from the numerical opening. We are, therefore, obliged to test the objective directly by analysing the image given through an eye-piece of medium strength. If the first examination does not enable the operator to arrive at a satisfactory conclusion respecting the merits of the objective in this respect a much stronger eye-piece should be substituted and attention directed to noticing whether the finer outlines become confused and "pasty." If they do, it is an indication of a want of defining power in the objective. The eye-piece indeed exaggerates the defects of the objective, and the stronger the eye-piece the more conspicuous will be any want of definition in the primary image. The so-called apochromatic lenses manufactured during the last few years are remarkable for the ease with which they support the strongest eye-pieces. These lenses are made with special kinds of glass (borates or phosphates), which allows of a more perfect correction of the two aberrations, and they are, therefore, virtually irreproachable, so far as the definition is concerned. An empirical method of the same kind is also the best available means of ascertaining the resolving power of an objective. Some familiar object is placed under the microscope, such as the diatom *pleurosigma angulatum*, the siliceous envelopes of which are arranged in geometrical lines and combinations of lines eminently suitable for this particular purpose. In this specimen there are three sets of lines, one perpendicular, and two conversely oblique. With an objective of medium strength, and with the illumination in the centre all these lines ought to be plainly visible. In testing stronger objectives, such as the 1-12 or the 1-15, we must make use of the finer diatoms, such as the *navicula affinis*, and the *grammatophora subtillissima*, on to the crucial test with the pearls of the *surirella gemma*.

The penetrating power of a lens is easily ascertained by examining a comparatively thick section. If the lens possesses good penetrating power, several planes will be distinctly visible at the same time without the observer having to alter the focal distance. Otherwise the subjacent layers will only come into view by working the fine adjustment "like a succession of subjacent sections."

Passing on to the consideration of the magnifying power, it would be manifestly imprudent to attempt to calculate this from the focal distance given by the makers. Moreover, what we want to know is less the abstract quantity calculated inversely to the focal distance, but the actual enlargement obtained through a given length of tube with a given eye-piece. This may be ascertained by any of the micrometric procedures described in detail in every work on optics.

Two or three objectives, ranging from one inch to one-sixth of an inch for example, are quite sufficient for all ordinary purposes. Bacteriological study does not necessitate the use of such immense magnifying powers as one has been led to suppose. No doubt an oil immersion of say a 1-12 or a 1-15 may be required to distinguish the morphological characters of certain micro-organisms, but a 1-6 or even 1-8 will enable us readily to ascertain their presence in a stained specimen, as, for instance, with the gonococcus or the tubercle bacillus.

The Eyepiece.—This part of the microscope is of vastly less importance than the objective. Its function is to enlarge, like an ordinary magnifying glass, the inverted image furnished by the latter. Speaking generally, we may say that all eye-pieces are good enough. The only thing to bear in mind is that with the use of eye-pieces of high magnifying power the loss of definition and clearness of outline is out of all proportion to the gain in magnifying power. Nos. 2 and 3, the focal distance of which varies according to the maker from 30 to 40 millimetres, are those most useful for general purposes.

In order to remove the last traces of colour due to chromatic aberration the use of "compensating eye-pieces" has come into use of late years. These eye-pieces correct the faults inherent in all objectives precisely because they themselves are incorrect in respect of the chromatic aberration, but in the opposite direction to the objectives.

The Condenser.—Microscopes intended to be used with high powers require to be provided with a condenser. This adjunct consists of a combination of lenses of comparatively large diameter, which throw upon the object to be examined a cone of light. This may either be utilized in its entirety or the marginal portions may be cut off by interposing diaphragms with small apertures. Instead of this system of diaphragms of different apertural dimensions an ingenious little apparatus has been invented by means of which the diameter of the focal aperture is enlarged or diminished by a screw movement, like the pupil of the eye; this is the so-called "Iris diaphragm."

The frame of the microscope is the matter calling for last and least consideration. If there be a rack movement for rapid adjustment (coarse adjustment), and if the fine adjustment works smoothly, we have all that is necessary. The rest is merely a question of taste and means. It is doubtless of advantage to have a microscope of which the tube can be inclined at any angle, and this is so generally recognised that even the commoner microscopes are at present provided with a joint. It is only necessary to see that the "grip" is sufficient to prevent the tube slipping away by its own weight.

OLEATE OF COPPER.*

BY BISMCK. WM. PETSCHE, PH.G.

Since the introduction of oleates quite a number of formulæ have been proposed by different persons for the preparation of these galenicals.

It seems, however, that for the oleate of copper the favourite process has always been that of double decomposition, using either solution of castile soap or oleic acid, freshly saponified by sodium hydrate, with solution of sulphate of copper.

My object in undertaking experiments with oleate of copper was to find out whether the product obtained by the various processes was a definite compound or a mixture of the oleate with free oleic acid.

The first experiment was the preparation of an oleate from the solution of castile soap.

After preparing the liquor sodi-oleatis N. F., this was precipitated by the addition of a slight excess of copper sulphate solution, the floating pp. was filtered out, washed repeatedly on the water-bath with water till free from copper sulphate, treated likewise on the water-bath with benzine, and the resulting deep green solution set aside.

On cooling, a light coloured pp. was thrown down, and after permitting the solution to rest for twenty-four hours, so that complete precipitation could take place, the residue was transferred to a filter and washed with cold benzine till the latter passed free from colour and left a dirty white semi-solid mass on the filter, which gave a decidedly acid reaction with blue litmus paper, imparted a permanent greasy stain to white note paper, and was oleic or more probably oleo-palmitic acid liberated by the acid action of the copper sulphate.

I now precipitated another amount of soap solution by copper sulphate solution, and after washing and drying the precipitate, it was first treated with cold alcohol, but as this had but slight solvent effect, it was placed on the water-bath, washed repeatedly with alcohol, and the different washings having a light green colour, were mixed and permitted to evaporate spontaneously on a shallow dish. The result was a mixture of a soft green mass with a number of light yellow globules swimming on top. These latter were evidently liberated oleic acid, as they gave a very decidedly acid reaction with blue litmus paper. My plan to separate the oleic acid from the oleate by continuing the washings with alcohol proved to be unpractical and had to be given up. Having thus convinced myself that oleate of copper, when prepared by double decomposition between oleate soda and copper sulphate would always contain free oleic acid, and as all the other soluble salts of copper have also acid reaction and would therefore likewise liberate this free oleic acid if employed instead of the sulphate, I used the following process for obtaining the true oleate of copper.

A convenient quantity of oleic acid was heated on a water-bath to about 50° C., an excess of freshly precipitated moist carbonate of copper added, the mixture immediately giving off carbonic acid-gas, and after raising the temperature of the water-bath to the boiling point, and keeping it at that temperature for some time to complete the chemical reaction, the resulting mass was freed from water, then treated with cold benzine and the resulting deep green solution, separated by filtration from the excess of copper carbonate, left on evaporation a dark green mass, becoming hard and brittle on cooling.

On treating this product with alcohol on the water-bath and evaporating the resulting solution, no free oleic acid could be detected, not even with the microscope, for while the alcoholic solution as obtained from the oleate of the double decomposition process, when placed on a glass slide, showed under the microscope the round globules of oleic acid gradually running together, this latter alcoholic solution left on evaporation on a slide, one homogeneous mass not only free from globules, but also free from crystals.

It is for this reason, too, that I considered the oleate of copper as obtained by the above process to be the true oleate, free from an admixture of palmitate or stearate, as Dr. L. Wolf, to whom we are indebted for several valuable papers on oleates, states that petroleum benzine will separate the oleates of the metals from the palmitates which are insoluble in that menstruum, and also that the oleates are amorphous, while the palmitates are of a crystalline nature.

Oleate of copper as thus prepared by the direct action of the oleic acid on copper carbonate is a dark green mass, brittle at the ordinary temperature, becoming gradually soft when heated, and rapidly soluble in ether, chloroform, benzine, turpentine and oleic acid, but only slowly soluble in alcohol. On heating, it gradually melts, is decomposed by a still higher temperature, under evolution of white fumes of a disagreeable odour, and on igniting burns with a bright flame, leaving a residue of cuprous oxide.

Mr. G. M. Beringer, who prepared the oleate of copper by double decomposition between copper sulphate and oleate of soda, freshly formed by saponifying oleic acid

* Paper read before the Alumni Association of the Louisville College of Pharmacy, and reprinted from the *Pharmaceutical Era*.

with soda, gives the melting point of the oleate of copper thus obtained as 49° C.

To obtain the exact melting point of the oleate of copper as prepared by direct action of the oleic acid on the carbonate as well as by double decomposition between solution of soap and copper sulphate, I made three separate trials with each of the two samples, and obtained for the latter the average melting point of 54° C.

For determining the melting point of oleate of copper as prepared by the other process, I had to substitute a glycerine bath for the water-bath, and obtained as average of the three trials 167° C.

This high melting point is in my opinion also a proof that oleate of copper when thus obtained is free from oleic acid, for it is evident that the presence of even small quantities of oleic acid will cause the melting point to be considerably lower, as oleic acid is not only liquid at the ordinary temperature, but is also the best solvent for the oleate of copper.

As free oleic acid is, however, gradually changed, and becomes rancid by the action of the air, I am satisfied that the true oleate as prepared by my process will keep far better as a stock preparation, from which the usual oleate, that is the solution in oleic acid, can be readily prepared of any desired strength when wanted for use.

In regard to dispensing the oleate, while oleic acid is regarded generally as the best medium on account of the rapidity with which it is absorbed by the skin, yet lanoline, petrolatum, albolene, lard, etc., make also nice ointments. In cases where the physician shall order any of these mediums, it is best to first melt part of the ointment and dissolve the oleate of copper in this, then on adding the rest of the menstruum, perfect satisfaction will be obtained.

WEIGHTS AND MEASURES.*

BY GEORGE C. HUPP.

One of the numerous obstacles under which the pharmacist labours is a confusion of weights and measures. In compounding, three systems are used in weighing and two in measuring. In selling two systems are used in weighing and two in measuring.

With one exception these systems are irregularly built up and have no relation between the units of weight and those of measure, making it very unsatisfactory to convert from one standard to another.

Our present standards of weight and measure are the outgrowth of ancient systems which were far from being based upon scientific methods. Weighing and measuring as a science have not existed more than a hundred years.

Weighing in a modern sense is the measuring of the force of gravity upon a substance or matter, under certain conditions in relation to a standard. The ancient idea was entirely the relation of one substance compared with another, gravitation and other conditions not being thought of.

Accurate and scientific weighing and measuring were only possible after gravitation, temperature, and atmospheric pressure were understood, as they have such an important effect upon the results.

The first systems or standards were based upon natural proportions of the human body and permanent fixtures in different countries. The attempts to modify these various systems to suit the recent discoveries in science gives us our present numerous standards.

The cubit, one of the oldest known measures of length, being the length from the point of the elbow to the extremity of the middle finger, has been entirely done away with. Also have the other units based upon the proportions of the human body, except the foot, being the length of the human foot, and the fathom, length of the extended arms from finger tips. The yard, bushel, and pound come down to us from the Saxons with but little modification. The grain is an English unit of weight, and was the weight of a well-dried grain of wheat from the middle of the ear.

The oldest standard we use to-day is the troy, which came into use by law about 1266. It is based upon the grain, and is composed of the following weights. Twenty-four grains make one pennyweight; twenty pennyweights make one ounce; twelve ounces make one pound. The disadvantages of this system are the irregular divisions, and not enough subdivisions.

In compounding drugs the system most used is the apothecaries weight, consisting of the following weights: Twenty grains make one scruple (℈); three scruples make one drachm (ʒ): eight drachms make one ounce (℥); twelve ounces make one pound (lb.). This is a better table than the troy but is also too irregular. The only units bearing relationship between these two are the grain, ounce and pound. They compose the legal English weights for compounding drugs. The metric system is also legal. For capacity the United States fluid measure is used. It is based upon the minim, which equals about one drop of water. The following are the measures:—Sixty minims make one fluid drachm; eight fluid drachms make one fluid ounce, sixteen fluid ounces make one pint; eight pints make one gallon. This table serves the purpose very well, but for the little irregularities which make the metric system preferable.

Of the two standards by which medicines are sold, the avoirdupois and United States fluid, the same disadvantages are apparent as in the preceding ones.

These tables are all in every day use, and their peculiarities have to be kept in mind by the pharmacist.

There is but one good reason why all these tables could not be done away with, and that reason is the unfamiliarity of the public with troy and apothecaries weight, avoirdupois weight being in general use. This is easily overcome by a special set of symbols for medical and pharmaceutical use.

In striking contrast to the above-mentioned system of weights and measures is the metric system, arranged and first used by the French about 1799. Since that time it has been legalized by nearly every civilized country in the world, and in all probability will become the international standard of weight and measure.

The United States Pharmacopœia for 1892 is based upon the metric system. If the medical profession will lead on from this point, the time is not far distant when the pharmacist will do all measuring and weighing of medicine, both compounding and selling, by one standard.

The unit of the metric system, the metre, was intended to be one ten-millionth part of the earth's meridian-quadrant, but has been discovered not to be exact. There is no practical disadvantage in an arbitrary unit, and the metric system is the most scientific, and at the same time simple and uniform, system now in use. It is built upon the decimal notation and has definite relations between the units of weight and measure.

The English unit of measure is based upon the movement of the pendulum at the sea level under certain conditions of temperature and atmospheric pressure. This has been found to be more liable to inaccuracy than the sub-divisions of the meridian.

As a whole, the English weights and measures retain too much of the old irregularities, which can be eliminated only by an entire change, and the metric system can take their place to complete satisfaction.

---

* Graduating thesis, Department of Pharmacy, Detroit College of Medicine, reprinted from the *Pharmaceutical Era*.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, JUNE 4, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE BRITISH PHARMACOPŒIA REPORT FOR 1891.

THE system that has now been adopted for several years by the General Medical Council of having a periodical report upon the progress of Pharmacy presented to the Pharmacopœia Committee of that body is in various ways a useful one. In connection with the revision of the Pharmacopœia, that will be requisite at some future time, the annual report serves to place on record, in a compact form, the observations made by pharmacists and others as to the official preparations and any suggestions that appear desirable for their improvement. That an incentive is thus provided for the investigation of matters of practical detail and for the communication of the result thus arrived at may also be inferred from the frequency of the references made in these reports to papers contributed to this Journal on pharmaceutical subjects. During the past week the sixth of these annual reports has been presented by Professor Attfield to the General Medical Council, and we have much pleasure in availing ourselves of the opportunity that has been afforded for placing before our readers some account of its contents.

The subjects dealt with in a general prefatory manner are those of nomenclature, official synonyms and new galenical preparations. In reference to the first of these, the opinion is expressed that there will be no necessity for making any general alterations in the next British Pharmacopœia, such as those made, in the Pharmacopœia of 1867, in the names of salts. It is pointed out that although such alternative names as, for instance, potassium nitrate and potassic nitrate are at the present time as much in use as the names corresponding to nitrate of potassium, which are officially adopted, these different sets of names are not inconsistent with each other. But so long as the Latin names are officially retained and made use of in writing prescriptions, it would be inconvenient to adopt the more modern names by which salts are designated by chemists, since their conversion into Latin would in some instances involve changes which would not be tolerated by medical practitioners. It is, however, suggested that some modification of the mode of expression made use of in stating the solubility of certain salts and other substances might well be adopted, for the sake of securing greater conformity with the chemical views of the present day in regard to solutions. Thus, for instance, instead of describing such substances as oxides, hydrates and carbonates, phosphates or oxalates as being "soluble in acids," it would be more appropriate to say that they are dissolved by acids with effervescence or some other form of decomposition, as the case may be. A more correct distinction would thus be made between such instances of solution and those in which substances are dissolved, as sugar is in water, without chemical alteration. Alterations of this kind, in the mode of expressing the characters of substances, would not practically affect the work of medical men or of pharmacists, while they would have the advantage of conducing to the formation of ideas consistent with strict scientific views.

The subject of official synonyms was made such a prominent feature of last year's report that it is not surprising to find that the opinions then put forward are still advocated in the present report. That is done, however, more from the point of view of general principle than in regard to matters of detail, as in the previous instance. On that ground of principle we are thoroughly in accord with Professor ATTFIELD in thinking that for the sake of promoting uniformity in the potency and general qualities of raw drugs or their preparations official recognition of synonyms is desirable. We think, too, that Professor ATTFIELD has not unfairly interpreted the published expressions of opinion on this subject, by stating, on that basis, that all pharmacists or even, as he actually puts it, all druggists are agreed as to the principle that the official recognition of synonyms is desirable. But there is an important qualification of that principle to be considered, by which its general acceptation for practical purposes will be regulated. It is only in regard to drugs and preparations in which potency and particular qualities are of essential importance, that the desirability of securing uniformity constitutes a reasonable ground for the official recognition of synonyms. That view of the matter no doubt underlies whatever approval has been given to the suggestion that synonyms should be made official, and since it is only in regard to the medicinal use of such articles that official recognition of synonyms can be contended for, the application of the principle must be subject to very considerable limitation. It seems unfortunate, therefore, that so much stress should still be laid upon the unhappy question relating to milk of sulphur in Professor ATTFIELD'S report. Is this question intrinsically worth the discussion that has been expended upon it? Are not the things in question altogether outside the range of considera-

tion as articles whose potency or special characters are of much account from the medicinal or pharmaceutical point of view? Admitting that calcareous "milk of sulphur" was the issue of a blunder, and as Professor ATTFIELD declares, "not worthy of a place as a medicine at the close of the nineteenth century," as much may be said of the name by which it has been known. Hence it seems scarcely worth while that either an article or a term so insignificant should be taken cognizance of by our national Pharmacopœia, even out of consideration for any foreigner who may have occasion to purchase "milk of sulphur" in Great Britain. Moreover, since the manufacture and sale of this article are being rapidly relinquished, it, as well as its name, might well be left to the fate thus prepared for it. But what is of much greater importance is the difficulty created by introducing such a triviality into the consideration of a matter so weighty as the official recognition of synonyms of potent drugs and preparations. The trouble caused by over-zealous officials under the Food and Drugs Act would be increased rather than done away with by any extended application of this principle to the articles of ordinary trade. We trust, therefore, that in the future revision of the British Pharmacopœia the chief object of that work may be kept in view, and that, as Professor ATTFIELD anticipates, its compilers, thus guided, will have no practical difficulty in so employing both chief names and synonyms as to support that object without hardship to pharmacists or, we may add, to others engaged in trade

In reference to the unofficial formulæ which have been issued by the Committee of the British Pharmaceutical Conference in response to the demand of medical practitioners, mention is made of the fact that seven of them have already been adopted, with some slight modifications, as official formulæ in the 'Additions' to the British Pharmacopœia, published in 1890. The other formulæ which have been issued from the same source in 1891 are also enumerated.

The subjects specially dealt with in the report are arranged in the order in which they are placed in the British Pharmacopœia, and the following is a summary of the chief points referred to.

In reference to LEYS' observation that there is great variation in the strength of dilute hydrocyanic acid it is suggested that greater attention should be given to the directions of the Pharmacopœia as to the keeping of this preparation, and makers of it are recommended to label every bottle with a copy of those directions. If the practice of ordering, in place of hydrocyanic acid, a solution of the potassium salt should increase, the crystallized cyanide will have to be used, and corresponding alterations must be made in the official description of the salt, together with a statement of the dose.

The use of ordinary glacial phosphoric acid of commerce for making the diluted acid is shown to be open to objection by reason of the fact pointed out by HODGKIN that the commercial article is rarely pure. Although the application of the quantitative tests of the B.P. would provide against this objection, it is proposed that further qualitative tests should be added, which would admit of the detection of salts of ammonium and sodium, often present to the extent of 8 to 14 per cent. It is not thought necessary to take any action in regard to the possible presence of nitric acid and arsenic in phosphoric acid, to which attention has been directed by ROTHER as being likely to occur in America.

The better definition of the characters by which the purity of salicylic acid is to be judged of is mentioned as requiring to be adopted in the B.P. in accordance with the observations of CHARTERIS, FISCHER, DUNSTAN, and BLOCK. In the German Pharmacopœia the melting point of 157° C. has been adopted. It appears that if the artificial acid has this character and is in large crystals it will be sufficiently pure for medicinal use.

In consequence of the observations made by CRIPPS, FLETCHER, MILLARD, and MABEN it is recommended that the specific gravity of aromatic sulphuric acid should be defined as 0·925 instead of 0·911, and that corresponding alterations should be made in the statements as to the percentage amount of real acid and the neutralizing power.

In partial and cautious compliance with Ince's criticism of the exceptional British practice of treating Latinized English names ending in *as*, *atis* and *is*, *itis* as feminine, the question is propounded whether classical authorities would sanction the future substitution of a suggested alteration of such names, which would bring British practice into conformity with that of other countries. For instance would *calcii carbonas precipitatus* be more desirable than *calcii carbonas precipitata*.

The disadvantages attendant upon the attempt to produce galenical preparations of definite and constant strength, and resulting from variation in the amount of active ingredients in certain drugs are a great obstacle to the standardizing of those preparations. In the report the question how this matter is to be dealt with is left an open one, as requiring further attention from pharmacists.

Without accepting or disputing the opinions expressed by Moss in regard to the preparation of the extracts of *cascara sagrada* it is pointed out that the methods of the B.P. are more or less the reverse of those recommended by Moss.

In regard to the difficulties experienced from the aggregation of the dry extract of euonymus when kept, SQUIRE has suggested addition of magnesia, and CONROY of milk sugar. Neither plan, however, is fully approved by the reporter, and the subject is thought one requiring further experimental study.

In regard to the defects of the official test for reduced iron, the test recommended by FUGE is mentioned.

It is suggested that the specific gravity of glycerin might in future be fixed at 1·260, as sufficient for medicinal purposes, and that the description in the report for 1889 would necessarily exclude glycerine containing any trace of arsenic.

The test suggested by AWENG for ascertaining the power of pomegranate root bark as an anthelmintic, is mentioned as being likely to be suitable for the purpose, if AWENG's pharmacological conclusions be confirmed, and if the test could be made more definite. It is, however, pointed out that there is reason for supposing pomegranate root bark varies not only according to its age, but also according to the variety of the plant from which it is derived.

Attention is directed to the possible necessity of modifying the official description of henbane leaves should the deterioration of the leaves by age, indicated by the observations of GERRARD and others, be confirmed. Moreover it is thought that the equality in regard to contents of alkaloid between the first and second year's leaves and tops of the biennial plant, and the leaves and tops of the annual plant as shown by GERRARD'S experiments, would seem to show the present official restriction to biennial plants to be unnecessary. Upon the strength of RANSOME'S statement that English henbane seed contains 0·06 per cent. of bases, and is therefore not more potent than the leaves, if as potent, it is suggested that the use of the seed in the production of the ordinary preparation has no pharmaceutical advantage, but that the large amount of fixed oil contained in the seed would necessarily prove troublesome. The desirability of introducing alterations of the present official descriptions and methods is not, however, more definitely indicated.

From the point of view of pharmacopœia requirement it is difficult to imagine that the definition of linseed meal given in the B.P. can be understood as meaning anything else than the product obtained by crushing the normal seed as it is produced by the plant. No doubt there are persons who prefer to use crushed linseed cake for poultices; but in the face of the simple and precise official definition of linseed meal, such a preference cannot be a reason for extending that precise definition to a different thing. Crushed linseed cake is only part of linseed reduced to powder. However, feeble as the argument is that the meaning of the official definition is not limited, Professor ATTFIELD suggests that it would be desirable to add the words "not deprived of oil," and to insert the Latin synonym *Semina Lini Contrita*. This would certainly be a help over the stile for individuals of feeble understanding.

In referring to the suggestions of BOA, GORRIE and SAUL as to the formula and directions for the preparation of solution of citrate of bismuth and ammonium, it is remarked that the required proportion of ammonia might be indicated as "solution of ammonia two-and-a-half fluid ounces, or a sufficiency;" but that the ready solubility of citrate of bismuth appears to be affected by slight variations in the condition of the salt. The use of perfectly clean vessels and of white paper for filtering are specified as being likely to increase the chance of obtaining a colourless preparation. For the prevention of fungoid growths it is suggested that the object might be sufficiently secured by the direction that the distilled water should be "recently boiled."

To obviate the decomposition of cocaine, taking place in the preparation of the solution of hydrochlorate of cocaine, as noticed by DUNCAN and LOTHIAN, it is recommended that an alteration of the official direction, as suggested by the latter, should be introduced in the next edition of the B.P.

The necessity for the presence of ammonia in order to obtain the dichroic reaction indicative of physostigmine, as pointed out by UMNEY, is recognised by the statement that the words "with ammonia" should be inserted in the official directions for applying that test.

The addition of glycerin or its entire substitution in place of treacle in making the compound pill of asafœtida, as recommended by SMITH and others, is merely mentioned as a proposed means of preventing the hardening of the pill mass.

The statements of DYMOCK and HOOPER that the Indian *Podophyllum Emodi* yields 10 per cent. of a resin apparently identical with the official resin, and THOMPSON'S statement that the resin of the Indian plant contains 50 per cent. of podophyllotoxin are mentioned as showing that, subject to their confirmation, it may be desirable to add *Podophyllum Emodi* to the official materia medica as an additional source of the resin of podophyllum.

The undesirable variation in the size of the morphine suppositories with soap observed by DAVIS is attributed to the circumstance that some pharmacists add more starch than others, and it is proposed this source of variation should be removed by directing that the prescribed quantity of hydrochlorate of morphine should be mixed with a specific quantity of the previously prepared paste "of suitable consistence."

In reference to the regret expressed that the term syrup of subchloride of iron has been adopted instead of the term syrup of protochloride of iron, sometimes applied in one part of Great Britain to a weaker preparation, it is remarked that besides the difference in strength of the two preparations, the term protochloride applied to a ferrous salt suggests views which chemists do not now entertain, and that consequently the name syrup of protochloride of iron had better be forgotten than perpetuated.

To provide against the formation of sediment in ammoniated tincture of quinine, owing to the frequent occurrence of cinchonidine in sulphate of quinine, as pointed out by LOTHIAN, it is admitted that the official directions for making this preparation might well be slightly altered and extended as he has suggested. In reference to LUNAN's observation that this preparation is more permanent and otherwise preferable when carbonate of ammonium is substituted for solution of ammonia, a tentative formula is given with the suggestion that it should be submitted to trial by pharmacists, and the conclusions thus arrived at published. It is further suggested that the greater solubility of carbonate of quinine may admit of a less alcoholic menstruum being used, and that the desire of some physicians to have a preparation stronger in quinine, but less ammoniacal, may also be met.

The voluminous publications by FARR and WRIGHT on the subject of tinctures are but briefly mentioned, as the authors have requested that comment should be withheld until their work is completed.

On the subject of lozenges attention is directed to the observations of DAVIS, showing that official medicated lozenges are not prepared with due regard to uniformity in the weight and size of each lozenge as well as the proportion of active ingredients they ought to contain. A hope is expressed that the attention of the special manufacturers of these articles will be attracted by the published observations, and that they may be induced to remedy the defects pointed out.

In reply to a question raised as to which of the two official forms of oxide of zinc should be used in making ointment of zinc, it is stated that the oxide prepared by calcining the carbonate should be employed. In order to prevent any possible confusion, it is also suggested that in the next edition of the B.P. the oxide prepared by combustion of zinc should be described as white oxide of zinc. If a medical practitioner desires a more purely white ointment to be prepared, the use of the name "white ointment of zinc" would sufficiently indicate that the oxide prepared by combustion of zinc was to be used; but the ointment should never be made with carbonate of zinc.

As the observations of FORRET and others have confirmed the opinion expressed in the report for 1888 that the official wine of iron is only a weak chalybeate, wanting in permanence and liable to vary much in strength, it is thought that this wine should be omitted from the next B.P., and that the name should be applied to the preparation now official as wine of citrate of iron.

It will be seen from the foregoing *resumé* of the report that the suggestions submitted to the General Medical Council in relation to the revision of the British Pharmacopœia are mainly the outcome of observations and experimental work by pharmacists engaged in the practice of their calling. A more satisfactory mode of providing for the revision of the national pharmacopœia could not well be devised, and those who have taken part in this work are entitled to the thanks of their brethren for having not only contributed to the improvement of the standard authority by which pharmaceutical practice is regulated, but also on having done work which will serve to establish for the body to which they belong a fair claim to consideration for scientific and technical qualifications. It will be noticed that our Scotch brethren, and especially the younger members of the craft, figure prominently in this work, and we offer them our hearty congratulations that such is the case. Without desiring to make any invidious comparison, we may, however, express the wish that they had been more numerously supported by English pharmacists.

COPPER IN FRUIT, VEGETABLES, ETC.

A recent report of the Department of Agriculture at Washington gives an account of some investigations that have been carried out there in relation to the use of copper compounds as insecticides and fungicides, and the question whether their application for those purposes involves the deposition of copper on vegetable products to such an extent as to be injurious to the health of the consumers. In the course of this inquiry some interesting facts have been ascertained as to the presence of copper in various kinds of edible fruit, etc., under normal conditions of growth. It is stated that grapes which have never been treated with any fungicide may naturally contain as much as two milligrams of copper per kilogram—equivalent to two parts per 1,000,000, or practically the same as the average amount found in apples, plums, and other fruits that have been sprayed with Paris green or similar applications. It is further claimed that numerous analyses have served to show that wheat may contain from 4 to 10 milligrams of copper per kilogram, the average being 7·2. Applying this number in the case of the 54,387,767 bushels of wheat sent by the United States to Europe in 1890, it is calculable that during the year named the Americans sent away 23,495lb. of copper in wheat alone. Moreover, the liver of sheep contains 35 to 41 milligrams of metallic copper per kilogram, the liver of oxen 56 to 58 milligrams, and chocolate the enormous amount of 125 milligrams per kilogram.

INTERNATIONAL BOTANICAL CONGRESS.

AT the International Botanical Congress of Genoa anyone occupied in botanical study or cultivating any special branch of the science will be entitled to take part in the proceedings. The reception of foreign botanists will take place on Sunday, September 4. On the following day the Congress will be inaugurated and the first scientific meeting held. The Hanbury Institute will be formally inaugurated on the 6th, and on the subsequent days the scientific meetings will be interspersed with excursions by sea or otherwise to Portofino, St. Margheritus Rapallo, Ruta, Recco, Ventimiglia, Mortola, and the Col di Tenda. Amongst the places of interest visited, not the least interesting will be the garden belonging to Mr. THOMAS HANBURY. The Secretary of the Organizing Committee is Professor O. PENZIG, R. Università, Genoa.

We have to announce the death of Samuel Robinson, which took place at Tottenham on May 29. Mr. Robinson had entered his eighty-fifth year and had been an annuitant on the Benevolent Fund since 1881.

Proceedings of Societies in London.

SOCIETY OF CHEMICAL INDUSTRY.

London Section.

A meeting of the section was held on May 30, when a resolution of condolence to the family of the late Professor Hofmann was passed. This was made the occasion of some remarks by those who had been his students when he was in England, upon his powers as a teacher, and the loss which they as well as the rest of the chemical world had sustained by his decease. Commemorative photographs and a bust gave those who had not had the privilege of knowing him personally an acquaintance with the features of one of the most famous chemists of our time.

The ordinary business of the meeting then began with a paper by Mr. J. A. Nettleton on "The Manufacture of Vinegar," in which the author gave an account of the usual method of preparing the wort, and of subsequently acetifying it. He said that the usual acetifier consisted of a wooden vat fifteen or twenty feet high, in the upper part of which was a revolving sparger of ebonite or wood, and below were stages of crossed lathes or wicker work upon which were packed bundles of birch or beech twigs over which the liquid trickled. The flow of air through the vat was controlled by a series of holes at the upper and lower part, which could be closed if necessary by wooden plugs. Much attention had to be paid to the temperature as well as to the amount of aeration in order to obtain the maximum yield. Many disputes had arisen on the question of the genuine or spurious character of vinegars sold as being produced from malt. In a natural vinegar, phosphates and albuminous matter would be present, and upon the determination of these constituents analytical methods had been based, but the variation of genuine samples was so considerable that much reliance could not be placed upon them.

In the discussion which followed the paper, Mr. Salomon contended that a reliable judgment could be passed on a sample of vinegar of unknown origin from the analytical results it gave, in spite of the difficulties mentioned by Mr. Nettleton.

Mr. T. S. Davis pointed out that adulteration of vinegar by mere dilution was particularly rife in London, some samples sold containing only 2–2·5 per cent. of acetic acid. The white vinegar distilled from genuine malt vinegar and used chiefly in Scotland, must not be confounded with the ordinary white vinegar, which was practically nothing but dilute acetic acid.

Dr. Alder Wright read a note on "Certain Alloys of Aluminium," which presented some striking and interesting features. They served among other things to show with what reserve many statements current in the text-books must be received. The author first drew attention to the fact that most metals in the molten state mix in all proportions, but that there were exceptions to this rule, notably that afforded by lead and zinc, whose immiscibility was turned to industrial account in the Parkes process for the desilverising of lead. At a temperature of 650° C. a saturated solution of zinc in lead contained 1·24 per cent. of zinc, while at 800° C. the solubility was slightly greater, amounting to 1·30 per cent. On the other hand, a saturated solution of lead in zinc contained 1·14 per cent. of the former metal at the lower temperature mentioned above, and 1·57 per cent. at the higher. Bismuth and zinc were another pair of metals which behaved similarly, though bismuth was rather more soluble than lead in zinc. Aluminium behaved towards lead in the same manner as zinc, a fact first recorded by Deville. The exact figures were 0·07 per cent. of aluminium dissolved in lead, and 1·92 per cent. of lead taken up by aluminium at a temperature of 900° C. With regard to bismuth and aluminium, Tissier had stated that they would alloy, whereas the truth was that they failed entirely to do so, although a peculiar phenomenon occurred when an attempt was made to induce them to unite; for on whisking up the molten metals a froth was formed, resembling the emulsion of ether and water that frequently persists when shaking out the unsaponifiable portion of a mixture of oils in the course of an ordinary analysis. When once formed, this froth would not settle for hours, again recalling the persistency of some organic emulsions. Another curious assertion concerning the alleged alloy of bismuth and aluminium had obtained currency, namely that it could be used for boiling down caustic soda solution—an application which, considering the behaviour of aluminium towards that liquid, was scarcely to be expected. The authors' own experiments had been conducted in clay test-tubes, immersed in a bath of molten lead, heated by a gas burner, with suitable means of regulation to keep the temperature approximately constant, the temperature inside the tube being taken by means of a platinum pyrometer. Antimony and aluminium, which were stated by the text-books not to mix, were experimented on with this apparatus. It was found that they would mix in all proportions, and showed no tendency to separate by liquation. The earlier experiments had been carried out in a fire-clay or iron crucible, in which one of the metals had been fused and the other poured into it; but when this was done, it was noticed that on a certain proportion being added, the whole mass solidified, in spite of the fact that the temperature was well above the fusing point of both metals. This pointed to the existence of a definite alloy, and eventually one was isolated, having the composition expressed by the formula AlSb, and containing therefore 18·5 per cent. of aluminium. So strong was the tendency to form this alloy, that homogeneous mixtures of the two metals in different proportions deposited the less fusible body on being allowed to cool; it was therefore feasible to drain off the more fusible portion, and obtain a mass having the composition indicated above. With the exception of the gold-aluminium alloy discovered by Professor Robert Austen, and some amalgams, no alloy was known of which the fusing point was higher than that of any of its constituents; a fact which enhanced the interest attaching to the new substance. On keeping the aluminium-antimony alloy in air it disintegrated spontaneously, at the same time becoming oxidized; apparently the oxidation was the cause of the disintegration, as it did not occur under dry petroleum. Specimens of alloys of antimony and aluminium containing 12 per cent., 18·5 per cent. and 33 per cent. of aluminium were exhibited.

SOCIETY OF ARTS.

Composite Heliochromy.*

BY F. E. IVES.

Most people look to original discovery for the solution of photographic problems, and most photographical problems are solved by original discovery. There have been a few important exceptions to the rule. The production of the so-called half-tone photographic block—the latest substitute for wood engraving—now grown to a very important industry, is one example. The first practical solution of this problem—a process which I patented in America, in 1881—was a purely mechanical invention, utilizing photographic processes already known. The so-called Woodbury-type process is another purely mechanical invention, based upon well-known photographic processes. The method of colour photography, which I have named composite heliochromy, and which the French prefer to call photochromy or composite photochromy, is also an invention, utilizing

* From the *Journal of the Society of Arts*, May 27.

comparatively old and well-known photographic processes. It is not a simple invention, but comprises several inventions by different men. The original suggestion was made twenty-seven years ago by Her Majesty the Queen's painting master, Henry Collen.* Briefly stated, Collen's idea was to make three negatives of an object, one by red light, one by yellow, one by blue—the so-called primary colours of Brewster—to print from each pair of these negatives (superposed as one) a transparent positive, having the colour (in the shadows) of the light that produced the third negative, and to superpose these coloured positives on a white surface. A Baron Ransonnet, of Austria, is credited with the same suggestion in the same year, but I have not the reference.

It was not possible to carry out Collen's suggestion at that time, because there was no known process by which photographic plates could be made sensitive to the separate single colours only; and no photographic plates were sensitive enough to red and yellow to admit of the production of such negatives by exposure through selective colour screens. Had it been possible to carry it out, the results must have been very imperfect, not only because the entire procedure is based upon a false and misleading theory of colour, but also because superposing two negatives to act as one would double the intensity of such parts as represented white, grey, or pale coloured objects, with the result that if the colour prints were made to show all the details of the negatives, the finished heliochromes would show all bright colours as if mixed with equal parts of black pigment.

On November 23, 1868, Ducos Duhauron, of Paris, applied for a patent† for a process which differed from Collen's only in the manner of carrying out the same idea. Like Collen, he assumed that the spectrum is made up of three primary colour rays and mixtures thereof. He said, "My procedure rests on the principle that the simple colours are limited to three—the red, the yellow, and the blue—the combination of which, in divers proportions, produces the infinite variety of shades in nature." Like Collen, he expected to solve the problem by superposing red, yellow and blue prints from negatives made by yellow and blue, red and blue, and yellow and red light. But instead of using plates sensitive to simple colours only, he proposed to use plates sensitive to all colours, and to prevent the action of colour rays not wanted by filtering them out with coloured glasses placed in front of the sensitive plates; and, instead of superposing two negatives to act as one to make a colour print from, he proposed to make two colours (that is, two-thirds of the spectrum) act to produce each negative, which amounts to the same thing. He proposed to make one negative through an "orange" screen, calculated to absorb the blue light and transmit the red and yellow; one through a "violet" screen, calculated to absorb the yellow light and transmit the red and blue; one through a "green" screen, calculated to absorb the red light and transmit the yellow and blue.

It was no more possible to carry out this idea in Duhauron's way in 1868 than to carry it out in Collen's way in 1865, although Duhauron, having succeeded in making photographs by exposing ordinary photographic sensitive plates through glasses that were orange, green, and violet to the eye, imagined that he had succeeded in carrying it out. In reality, the photograph made through an "orange" screen must have been made chiefly by either the green, the yellow-green, or the ultra-violet spectrum rays, as can readily be proved by photographing the spectrum itself through a bright orange screen (not an orange-red one), on such a plate as he used. The photograph made through a "green" screen, that transmitted freely both the yellow and the blue rays, must have been made chiefly by the blue rays, and the photograph made through a "violet" screen must have been made without any action by the red rays, and with a great deal by the invisible ultra-violet rays.

Soon after Duhauron published the details of his process, Charles Cros, of Paris, published another modification of Collen's idea.* Like Collen, Cros proposed to make one negative by the action of red light, one by yellow, and one by blue; but by exposing the sensitive plates through red, yellow, and blue glasses, instead of employing plates sensitive to the single colours only. Instead of superposing the respective pairs of these negatives to make each colour print, he proposed to make a green print from the negative made by red light, a violet print from the negative made by yellow light, and an orange print from the negative made by blue light. Cros's plan was free from the defect of doubling intensity on those parts of the negatives representing pale or uncoloured objects; but the advantage gained in this way would be lost again in the production of green, violet, and orange-coloured prints.

The principle of colour selection advocated by Duhauron is identical with that distinctly proposed by Collen, to whom alone the credit of the original invention appears to belong; but Duhauron and Cros, besides proposing a more reasonable plan for obtaining the negatives, further suggested that optical superposition of positive images from the three negatives might be substituted for the superposition of transparent coloured prints.

On December 3, 1869, M. Poirée, of Paris, in a communication to the Photographic Society of France,† suggested that better results might be had by making a greater number of negatives—a separate negative for each spectrum region.

In 1873, Dr. H. W. Vogel, of Berlin, discovered that bromide of silver can be made sensitive to the less refrangible spectrum rays by treatment with certain dyes; and this, with the discovery of other and better colour sensitisers, supplied the means for carrying out either Collen's or Poirée's idea. Duhauron, one of the first to avail himself of these discoveries, made some practical progress; and, in 1876, abandoned Brewster's colour theory and patented a modified process,‡ based upon the observation that, while there appeared to be "seven" principal spectrum colours, three colouring substances would "serve to express them." The colouring substances he named for this purpose are blue, carmine and yellow; and he decided that, in order to make such a process reproduce the colours of nature, the negatives should still be made through orange, green and violet glasses.

(*To be continued.*)

* *British Journal of Photography*, October 27, 1865, p. 547.

† Class xviii., sec. 3, serial No. 83,061.

* Described in *Photographic News*, October 8, 1869, p. 483.

† *British Journal of Photography*, 1870, p. 26.

‡ British patent, July 22, 1876, No. 2973.

Provincial Transactions.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The annual meeting of this association was held at the Masonic Hall on Wednesday, May 25. His Worship the Mayor (Mr. Councillor Fitzhugh, J.P.) presided, and among those present were Messrs. W. H. Parker, J. Wilford, Bolton, Beverley, Bielby, Dennis, Middleton, R. Jackson, Savage, W. Widdowson, R. Widdowson, Rayson, Sergeant and Gill.

The Secretary presented the annual report, which showed that the educational work of the association

had been well sustained, and included a course of lectures and laboratory work on pharmaceutical chemistry, conducted by Professor Clowes at University College; a course of lectures and demonstrations on materia medica by Dr. C. Haydon White; and a course of lectures and demonstrations on physics by Professor Heaton. The attendance at these lectures had been very good, and at the chemistry examination H. Dyson and E. E. Turton had obtained prizes. During the year four students have passed the Minor examination of the Pharmaceutical Society of Great Britain, viz., E. G. Cox, A. Whitaker, H. A. Wilkinson and R. Patchitt. Numerically, the Society had remained unchanged.

The Treasurer's report was presented and passed. The election of officers for the ensuing year resulted as follows:—President, Mr. R. Fitzhugh; Vice-President, Mr. W. H. Parker; Treasurer, Mr. J. Wilford; Hon. Secretary, Mr. W. Gill; Council, Messrs. Bolton, Beverley, Bielby, Dennis, Rayson, R. Widdowson, Sergeant and Middleton; Auditors, Messrs. Savage and Lumby.

A vote of thanks was passed to the President and Secretary for their services, and suitably acknowledged.

A vote of thanks was also passed to the Pharmaceutical Society for the *Pharmaceutical Journal*, and to the British Pharmaceutical Conference for the 'Year-Book of Pharmacy.'

A discussion on the Medicine Stamp Acts was then introduced by the President and continued by Messrs. Bolton, Parker, Beverley, Bielby, Wilford and Middleton. It was pointed out that owing to the comprehensive wording of the Acts it was absolutely impossible for a chemist to carry on his business without at some time or other unconsciously infringing the Acts. The uncertainty as to what preparations were liable to stamp duty and what were not liable was so great, that even the Commissioners of Stamps had at one time marked a label liable, and a short time afterwards marked the same label not liable. This vagueness as to the meaning of the Acts, coupled with the fact that a premium was offered to persons giving information of any breach of the Acts which led to a fine or modified penalty being imposed, constituted a very grave injustice, and subjected chemists to an underhanded surveillance which was abhorrent to every law-abiding citizen. In addition to these minor points it was felt that the medicine stamp itself was a gross injustice, for it not only imposed a tax on the medicines of sick persons and threw on chemists the responsibility of collecting the same, but it also taxed the chemist's name and brains, a tax that no other class of tradesmen was subjected to.

The unanimous opinion of the meeting was that some steps ought to be taken to alter this state of affairs, but in view of the approaching dissolution of Parliament the present time did not seem opportune for doing so. It was hoped, however, that at the first favourable opportunity the matter would be brought forward.

BRIGHTON ASSOCIATION OF PHARMACY.

The annual business meeting was held in the Committee Room of the Town Hall on May 26, when Mr. W. D. Savage, President, occupied the chair. There was a good attendance of members.

The minutes of former meetings were read and confirmed, and the Secretary (Mr. Marshall Leigh) presented the financial statement as between Secretary and Treasurer, which showed an expenditure of £13 10*s.* 6*d.* and receipts £12 17*s.* 6*d.*, leaving a balance due to the Secretary of 13*s.*

Later on in the evening the Treasurer (Mr. J. R. Gwatkin) presented his report, which showed a balance in the saving's bank of £16 5*s.* 3*d.*, with £1 4*s.* 8*d.* in the hands of the Treasurer.

The School of Science and Art, in which the library of the association is placed, having recently been handed over to the town authorities, Mr. W. D. Savage proposed, and Mr. Marshall Leigh seconded, that a letter to the following effect be sent to the Town Council:—"The local Chemists' and Druggists' Association has for several years enjoyed the privilege of having a bookcase, containing the weekly issue of the *Pharmaceutical Journal* and other books which are of advantage to the pupils in the science classes; and now that the School of Science and Art has been transferred to the borough council of Brighton, the Association asks that the Technical Education Committee will allow it to exercise the same privileges hitherto enjoyed."

The election of officers for the ensuing year next took place and resulted as follows:—President, Mr. W. D. Savage, J.P.; Treasurer, Mr. J. R. Gwatkin; Hon. Sec., Mr. Marshall Leigh. The Committee to include these officers with Messrs. Costerton, Histed, Williamson, and the President of the Junior Association. It was decided to hold the annual dinner at Booth's Restaurant on Thursday, June 2, at 8.30, the menu and price to be the same as last year. Next came a discussion as to whether the prizes which the Association has given to the members of the Junior Association should be continued, and it was decided on the motion of Mr. Williamson, seconded by Mr. Padwick, that the competition for prizes next year shall be open to all assistants and apprentices residing in the town. A vote of thanks to the Chairman brought the meeting to a close.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

The annual meeting of the Midland Counties Chemists' Association was held at the Mason College, Birmingham, on Thursday, May 26, Mr. A. Southall (President) in the chair. There was a good attendance. The annual report was submitted, and showed that the Association now numbers 180 members and associates (an increase of 10 over the past year). The session was opened by a conversazione at the Grand Hotel, where Sir James Sawyer, M.D., delivered an inaugural address, which was printed in full in the *Pharmaceutical Journal* of the following week, as also in the public press. The twenty-first annual ball was held at the Edgbaston Assembly Rooms, and proved to be a most enjoyable meeting. There were not so many present as on former occasions, owing to causes over which the committee had no control. Five other meetings were held, reports of which have been published. At the annual meeting a resolution was unanimously agreed to that a congratulatory address be prepared and presented to the parent society on the occasion of its jubilee. Five Council and Committee meetings have also been held during the year. There is an increasing use by members of the books in the library. Upwards of sixty volumes have been in circulation in the course of the year. A new catalogue has been printed, and a copy sent to each member. Several volumes have been added during the year. The calls for relief from the Benevolent Fund have been few in number, and some have been refused on the ground that they were found, on inquiry, not to be deserving of relief. All deserving cases were, however, relieved. The Cricket and Lawn Tennis Section met at the Small Heath Langley Cricket Field every Wednesday afternoon during the summer months, and some most enjoyable games were indulged in. The visit to Sheffield was a great success, thanks to the admirable arrangements made by Sheffield friends. No cricket could be played on the return match, owing to continued rain during the day. A recreation section for the present season (1892), consisting of cricket, tennis and cycling, has been commenced, and fixture

cards will be forwarded on application. The financial statement showed that, starting with a balance in hand of £9 18*s.* 8*d.*, the receipts during the year had been £20 4*s.* 9*d.* and the expenditure £29 18*s.* 11*d.*, leaving a balance of 4*s.* 6*d.*

The Chairman moved the adoption of the report and remarked that the year had been about as successful as usual. In the course of his observations he referred to the legal questions which had affected the profession during the year. It was now incumbent upon traders to label all patent medicines which contained poison with the word "poison," together with the name of the seller. That would be to the advantage of the qualified chemist, as, up to now, patent medicines had been sold by those who knew little or nothing about chemicals or drugs.

Mr. Barrett, in seconding, said they now learned, perhaps for the first time, that the poisons bill had been of considerable benefit to pharmacists.

Councillor Barclay expressed regret that there were no classes in connection with the association, but he supposed students would not attend until they were forced. He was pleased that patent medicines containing poison would now only be permitted to be sold by qualified chemists.

The report was adopted.

It was resolved, on the motion of Mr. Thompson and seconded by Mr. Barrett, that it should be an instruction to the incoming Council to increase the number of its representatives to the sixteen principal cities and towns within a radius of thirty miles of Birmingham, and that the local secretaries in those towns be ex-officio members of the Council.

Thanks were accorded to the retiring officers and the Council of the previous year was re-elected.

Subsequently a supper was held at the Colonnade Hotel, at which there was a large attendance, presided over by Mr. A. Southall. After the loyal toasts had been honoured, Mr. Perry said that he rose to propose a toast which he thought would receive the cordial acceptance of the members of that association, the toast of "The Pharmaceutical Society of Great Britain." Time was, he said, when the toast got a good deal of "cold shoulder" from some of the members even of that association, when a good deal of indifference and in some cases even open hostility was manifested towards the society. But all that he was glad to know was surely if but slowly passing away. That was as it should be; for they had only to ask themselves the question, Where, as a pharmaceutical body, they would have been without the society? and the further question, What now, as a body of pharmacists, they were able to do without the Pharmaceutical Society? He said it was only necessary to ask these questions for every sensible pharmacist to see that it was not only his duty but distinctly to his interest to belong to the society and to do his level best to make it a strong and vigorous organization. What they as pharmacists wanted was more union. If they could only have a better, a more professional feeling existing amongst them—more *esprit de corps*—if every pharmacist scorned to do anything derogatory to his calling for the sake of a mean advantage over a brother pharmacist, the result would, without doubt, be this, that they would gain in the estimation of the public, and they would receive a more just and a more generous remuneration for their services. Mr. Perry said that it was because the Pharmaceutical Society had always had these ends in view—it was because the society had always made for a better condition of things for pharmacy—that he asked them to drink, and to drink with enthusiasm, the toast which he had the privilege of proposing to them.

The toast was responded to by Messrs. A. Southall and C. Thompson.

The other toasts proposed were "The Midland Counties Chemists' Association," "The Honorary Secretary," and "The Visitors."

At a meeting of local secretaries, residing at towns within thirty miles of Birmingham, held the same day, the following resolution was proposed by Mr. J. S. Barrett, of Leamington, and seconded by Mr. J. Hinds, of Coventry, and unanimously carried:—"That we approve the action of the Pharmaceutical Council in increasing the amount of the annuities of the Benevolent Fund, and give it our earnest support."

EXETER ASSOCIATION OF CHEMISTS AND DRUGGISTS.

The annual dinner of the Exeter Association of Chemists and Druggists was held on Wednesday, the 25th ult., at the Victoria Restaurant. Mr. Henry Gadd, J.P., presided. The vice-chair was occupied by the Local Secretary, Mr. Lake. The company included Mr. Rowsell (Holman, Ham and Co.), Hon. Sec. of the Association, Messrs. Harris, Lemmon, Milton, Stocker, Bibbings (Newton Abbott), Webber, Reid, Bartlett, Ham, Guest.

After the usual "loyal" toast was given by the Chairman and enthusiastically received, Mr. Lemmon proposed the "Success of the Association," and complimented its members on the progress it had made.

Mr. Rowsell, in supporting the toast, spoke of the work done by the association, and alluded to the classes in materia medica and pharmacy held by Messrs. Harris and Lake; these classes were well attended and much appreciated.

Mr. Harris said he believed the association was doing much good; already, earlier closing and other reforms had been brought about through its agency.

Mr. Webber, who spoke in strong terms of the benefits of association, noted that all those present were connected with the parent society; this, he said, was a proof of the loyalty of the Exeter chemists. He pointed out that it was only by the united efforts of the whole body of chemists supporting the Pharmaceutical Society that it was possible to obtain suitable legislation, and enable the members of the profession to exercise the influence which rightly belonged to them.

Mr. Bibbings, in reply to "The Visitors," given by the Vice-Chairman, expressed the pleasure it had given him to meet his Exeter friends. He spoke of the possible effect the prosecution of the proprietors of chlorodyne would have, and thought it was an important move in the right direction. He hoped his friends would carry out, to the letter, the labelling of proprietary medicines containing poison, and suggested that grocers and proprietors of stores should be cautioned against selling any articles which had been judicially proclaimed.

The proceedings were varied by some capital songs, and votes of thanks to the Chairman, Vice-Chairman, and Hon. Sec. concluded a very agreeable evening.

Obituary.

Notice has been received of the death of the following:—

On the 10th of May, C. J. Burnham, Chemist and Druggist, Leyton. (Aged 76 years.)

On the 15th of May, Wm. Sidebottom, Chemist and Druggist, New Mills. (Aged 66 years.)

On the 19th of May, Francis Swift, Pharmaceutical Chemist, Clapton. (Aged 68 years.)

On the 25th of May, Wm. Smith, Pharmaceutical Chemist, Nailsworth. (Aged 65 years.)

On the 26th of May, John Adam, Chemist and Druggist, Paisley. (Aged 83 years.)

On the 29th of May, Samuel Robinson, Chemist and Druggist, Pentonville. (Aged 85 years.)

Reviews and Notices of Books.

METHODS AND FORMULÆ USED IN THE PREPARATION OF ANIMAL AND VEGETABLE TISSUES FOR MICROSCOPICAL EXAMINATION, INCLUDING THE STAINING OF BACTERIA. By PETER WYATT SQUIRE, F.L.S.*

Reference to the older works dealing with the microscopical examination of vegetable and animal tissues shows how the manifold improvements and multiplicity of aids called into existence by scientific workers, in connection with a single instrument, exemplify on a small scale the wondrous development in the methods of scientific research that has taken place in quite recent times. In the classical treatises on the use of the microscope in biological investigations, the methods indicated for the preparation of tissues prior to examination were comparatively limited in number and, from the modern standpoint, often inexact. Injection of the vessels with coloured fluids before cutting sections was the favourite method of treatment adopted in zoological work, whilst any special treatment of botanical specimens was deemed superfluous. In a book devoted to descriptions of practical methods, published so recently as fourteen years ago, crude preparations of logwood and carmine, together with a solution of what is indefinitely termed aniline blue, are the only preparations specified for dyeing tissues. The staining too that depended upon the application of mineral substances, which reacted chemically upon the cell contents, was likely to yield far from definite results. Perhaps this very unsatisfactory nature of the products obtained is sufficient to account for the paucity of the means employed. Be this as it may, it is certain that, in proportion as more precise methods have been adopted, the number and variety of useful reagents and staining materials have been increased.

Since it may be reasonable to suppose that some of our readers may have but vague notions of the processes utilized by histologists in pursuing their investigations, it may be well to explain their *rationale* in brief. It is in their application in the study of vegetable structures that they chiefly interest pharmacists, and, as thus limited, the subject will now be considered. It is fairly well known that the natural substances are rarely fit to be cut into sections straightway, but need to be hardened or softened by appropriate media until they become of the desired consistence, special treatment being essential when the position and relations of the cell contents are to be investigated. During the examination itself, various chemical reagents are applied to the sections, to assist the observer in forming an accurate opinion as to the nature of these contents. This part of the subject is simply a branch of general qualitative analysis, and the results obtained are of value in proportion as the manner in which the tests are applied is in strict harmony with the principles upon which chemical analysis is based. It is, however, the staining or coloration of the tissues or their separate constituents that chiefly requires elucidation. The general idea with regard to stained sections is that the design is simply to add to the beauty of the specimens or roughly to distinguish the different tissues, so enabling students to identify them more readily. This impression is more particularly given by such as are stained in two or three distinct colours. But the real intention of the modern histologist in making use of such aids is to carefully and exactly differentiate tissues of complex structure, rendering evident delicate features that otherwise might escape notice, and particularly marking out the nuclear from the extranuclear parts of the intimate structures of cells. It was on discovering in 1871 the power of carmine to colour bacteria, which had previously by their minuteness and transparency been practically indistinguishable, that Weigert was first led to experiment with aniline salts in this direction. Ehrlich, Koch, and others were soon in the field, and means and methods multiplied to such an extent that a separate literature became necessary to deal with the subject. 'Lee's Microtomist's Vade-Mecum,' first published in 1885, was an attempt to deal with the vast mass of matter by threshing out the chaff from what was really valuable or useful, and collecting all the recognized methods into one volume. Five years later, however, it became necessary to re-issue this as a practically new work, so great had been the advance in the interval. Its great defect was the scant attention given to vegetable histology, which had not progressed at anything like the rate at which the sister science had advanced, mainly because of neglect of the more exact methods and appliances.

It is, therefore, with particular pleasure that we greet the publication of Mr. Squire's book, which deals impartially with both branches of the subject and should of necessity become the constant companion of everyone interested in the minute structure of plants. In the brief space of ninety pages the author embodies descriptions of all the methods and formulæ of general utility to the practical microscopist. These are systematically arranged in sections, each of which is prefaced by a general outline of the class of processes with which the section deals. The descriptions are evidently written by one who has experienced the numerous difficulties to be guarded against, and the recipes given are eminently practical ones. An attempt is made to enable even beginners to arrive at average results, without loss of time in experimenting, by employing solutions of *definite* strength for *definite* times, and for the first time, we find exact figures specified for *every* formula. We have often been struck by the fact that the divergencies in results obtained by different workers on similar material were not greater than they really have been, seeing how variously the amounts of the ingredients in important reagents are stated in different text-books. It is to be hoped now that Mr. Squire's book may take the place of a pharmacopœia amongst histologists, as greater uniformity in processes must add to the value of distinct researches, and to the conclusions of those who conduct them. We note a great deal of matter in the book that by careful arrangement assumes a new value, beyond what it possessed in other books, and as much or more special information now appearing in book form for the first time. In fact, the work is far from being a mere digest or compilation. The author has performed much sound, useful work and here embodies the results in a readily assimilable form. The comprehensive manner in which the staining of bacteria is treated will render the book invaluable to pharmacists who are consulted by physicians about their work, as well as to those who are realising the importance of applying a thorough and practical knowledge of microscopical botany in their everyday dealings with drugs. It would have been a further advantage to pharmacists dealing in research material had the names of the makers of the aniline colours employed been given, since it is well known that articles by different makers may differ in effect though named alike, and, unfortunately, this is more appreciable with preparations of English manufacture. At the same time we cannot speak too highly of this much-needed and useful little book, and, to adopt American phraseology, would suggest that our readers cannot afford to be without it.

* London: J. and A. Churchill. Price 3*s.* 6*d.*

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Leigh, Gill, Wilkie, Taplin, Bennett, Hill, Thomson, Thompson, Herrod, Lake.

Correspondence.

*** No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith. Matter intended for publication should be written on one side of the paper only.*

Origin of Coloured Show Bottles.

Sir,—In answer to your correspondent's query, I recollect when I went as an apprentice nearly seventy years ago I was puzzled to know the meaning of the symbols on the old globes in the window. On searching an old work on chemistry I found their original use was supposed to indicate the base of the contents, whether copper, iron, zinc, marine acid, nitric acid, etc., etc. At the end of vol. i., of Macquer's 'Chemistry,' 1764—translated from the French—I find a complete table, "Geoffrey's Table of Comparative Affinities observed between Sundry Substances," which may interest your inquirer.

Brighton. W. D. Savage.

Sir,—The correspondent whose note in your last issue is headed "A Query" re-opens a question which has from time to time aroused passing interest and desultory discussion, with little or no conclusive result. Such a matter as the origin and meaning of the cabalistic signs used every day in prescriptions is worth a little investigation. To begin with, the ℞ always found at the top of a Latin prescription does not mean "*Recipe*," but is an invocation of Jupiter. The Roman physicians prefixed their prescriptions with a prayer to the cloud-compelling Jove to be propitious towards their patient's stomach-ache. The Latin verb for "to take," in the sense of "to take up and use," is not *recipere*, but *capere*. *Recipere*, when met with in standard Latin works, means, in almost every instance, to receive, to take at the hands of someone, which is not at all the meaning we require. As for the origin of the ounce, drachm, and scruple signs, they would seem to defy research, and are doubtless, like those of the Arabic numerals, lost in the mists of antiquity. ℥ would seem to be an augmentative of ℥ and *drachma* is on the face of it a Greek word. It is probable that both signs come from that language. The origin of the carboys of coloured water, nowadays a *sine quâ non* for a chemist's window, is not far to seek. The apothecary, like other tradesmen, displayed his wares in his window, the more showy for choice. These great bottles of spirits and essences he labelled with the same curious signs he used in his prescriptions. A great many of these figures are met with on show-bottles to the present day.

Whilst writing, it occurs to me that the Shrewsbury chemist mentioned in your last issue, who was fined for being in possession of some lin. iodi. meth., seemed totally to ignore the danger, by no means to be despised, of the iodine and methyl in such a preparation entering into combination with explosive violence.

13, *Baker Street, W.* H. M. Spoor.

Chemists' Assistants' Association.

Sir,—I find that it was at another association and not the "Chemists' Assistants," that the proposition was made to omit the reading of papers at the meetings. I must, therefore, apologize for attributing it to them; the more so as I attended the inaugural meeting, and have ever felt the greatest sympathy with that and every association connected with pharmacy.

I am very glad to see Mr. Schmidt's article from the *Pharmaceutical Review*; it reiterates and emphasizes the opinions of all who have given the subject their attention.

London. Henry Long.

Labelling of Preparations Containing Poison.

Sir,—The recent prosecution under the Pharmacy Act has awakened the lethargy of some members of the trade as regards the sale of poisons under schedule A, part 2. But what, I ask, about compounds containing any preparation under part 1? Can preparations of strychnine, ergot of rye, cantharides, etc., be legally sold without the usual entry in the poison book? I think not, but should be glad to have the opinion of others.

Cardiff. R. Prust.

[*** Obviously, preparations of the kind above mentioned can only be sold in accordance with the provisions of the Pharmacy Act as poisons in the first part of Schedule A. The recent prosecution by the Treasury had reference to the sale of secret preparations containing poison within the meaning of the Act, and they were declared to be subject to the same restrictions as preparations avowedly containing poison.—Ed. Pharm. Journ.]

Sir,—As it appears that no persons other than qualified chemists can legally sell proprietary medicines containing a scheduled poison may I suggest that the Pharmaceutical Society should, through its local secretaries (by letters to the press and otherwise), make this fact generally known, so that subsequent prosecutions may be free from anything in the nature of a surprise.

Would it be possible also for the society to publish a list of such preparations, in order that members and associates when appealed to on the subject may be able to give an authoritative reply. The proprietors of at least one popular medicine containing a scheduled poison have issued a circular announcing their intention of complying with the law as recently interpreted, and probably others will do the same, but it would be as well to have a reliable list.

Harborne, Birmingham. T. Edward Barrass.

NOTICES OF MEETINGS.

Newcastle-on-Tyne Chemists' Assistants' and Apprentices' Association.—Whit Monday. Botanical excursion to Norfolk and district.

School of Pharmacy Students' Association.—Thursday, June 9th. Papers: "Granilla," an inferior cochineal, G. A. Shaw, and "Parasites," by A. J. B. Cooper.

ANSWERS TO CORRESPONDENTS.

John P. O'Leary.—If you can furnish satisfactory evidence of having been employed for three years as an apprentice and have passed the First examination or its equivalent you will be entitled to present yourself for the qualifying examination. Apply to the Registrar of the Pharmaceutical Society, 16, Bloomsbury Square, for particulars. The *Pharmaceutical Journal* may be obtained from the publishers for an annual subscription of twenty shillings, post free.

Pulv. Cretæ Co.—A correspondent dissents from the opinion expressed last week that pulv. cretæ aromat. B.P. is usually dispensed for the above. He says that so far as he knows the compound chalk powder of the London Pharmacopœia, 1851, is always dispensed in such cases. This simply proves, however, that a uniform practice does not hold. It certainly would seem desirable as far as possible to adhere to formulæ in the present Pharmacopœia unless others be specifically mentioned.

Pharmacists.—Your question involves some consideration of the circumstances of the case referred to. If you will send fuller details we shall be glad to assist you in deciding the point.

J. R.—The wisest course to adopt in such cases is to communicate direct with the authorities, stating the whole facts, and asking for permission to do as you wish. See editorial remarks in volume xxi., pp. 30 and 1157.

Scientia.—According to part 1 of the list of poisons within the meaning of the Act, entry of the sale must be made in the poison-book in the case of strychnine and its preparations, and the preparation you name as a preparation of strychnine, would appear to come under this heading.

J. H. Thomson.—There would appear to be some special circumstances connected with your case which you do not specify. We shall make inquiries on the subject and communicate with you again.

Thomas Powell.—We are obliged by the information that you intend labelling all your goods for Great Britain in accordance with the requirements of the Pharmacy Act, 1868.

SCOPOLAMINE (HYOSCINE).*

BY PROFESSOR ERNST SCHMIDT.

The investigation of the constituents of the root of *Scopolia atropoides*, carried out by me together with C. Siebert, showed that the mydriatic action of that drug was to be attributed mainly to the presence in it of hyoscyamine. In the paper published in the *Archiv* for 1890, it was mentioned that I had received from C. J. Bender under the names of hyoscine hydrobromide and hyoscine some large crystals which he had obtained in working up 100 kilos. of *Scopolia atropoides*. A close examination of these substances, which were of interest from the circumstance that hyoscine had not previously been obtained in a crystalline condition, showed that they did not consist of the base which Ladenburg† had named hyoscine, but of another base differing from it in composition. The subsequent examination of the hyoscine salts of commerce showed that they consisted essentially of a base, having the composition $C_{17}H_{21}NO_4$, and not as had hitherto been assumed, of an isomer of atropine and hyoscyamine $C_{17}H_{23}NO_3$. In like manner the base which Ladenburg had obtained from henbane seed as hyoscine, together with hyoscyamine and atropine, is, for the most part, not an isomer of the latter bases, but is to be identified with the base now to be described as having the composition $C_{17}H_{21}NO_4$. Under these conditions it seemed desirable to transfer the name hyoscine to the base having the composition $C_{17}H_{21}NO_4$, more especially since the hyoscine salts of commerce are for the most part salts of this base. I have, however, hitherto hesitated to adopt such a transfer, since it has been customary to understand under the name hyoscine an isomer of atropine and hyoscyamine, and further because there was still a possibility of such an isomer being present in the hyoscyamus plant or in some other solanaceous plant, to which the name of hyoscine might be appropriately applied.

In consideration of these circumstances and of the fact that in the past literature yet another substance had been designated hyoscine by Reichardt and Höhn,‡ I have endeavoured to avoid confusion by adopting the name scopolamine for the base, hitherto known as hyoscine and having the composition $C_{17}H_{21}NO_4$, which I obtained from the roots of *Scopolia atropoides*. It may, however, be stated that this base occurs not only in the root of *Scopolia atropoides*, but also in sensible amount in henbane seed and in some kinds of duboisia leaves, as well as in small amount in stramonium seed, belladonna root, and perhaps also in other plants having a mydriatic action.

This base forms large transparent crystals containing one molecule of water $C_{17}H_{21}N_4+H_2O$; it is but slightly soluble in water, readily in alcohol, ether or chloroform. The alcoholic solution has an alkaline reaction. The general characters of this base resemble those of atropine and hyoscyamine so much that no difference between them is to be recognized by the ordinary reactions. In the air-dry condition the crystals melt at 59° C. to a clear liquid, which does not again become crystalline on solidification when kept for a long time. When kept over sulphuric acid the crystals are gradually converted with loss of weight into a colourless, amorphous, transparent, and almost vitreous mass, which can not be made to crystallize again. The data obtained by analysis lead to the formula $C_{17}H_{21}NO_4+H_2O$. If from the same data the base were represented as an isomer of atropine and hyoscyamine it would be necessary to adopt the formula $C_{17}H_{23}NO_3+2H_2O$. But in doing so there would be but a slender agreement between the observed results of analysis and the calculated composition, apart from the necessity of adopting the improbable assumption that out of two molecules of water of crystallization only one is given off at 100° C.

For the further definition of scopolamine the double gold salt $C_{17}H_{21}NO_4HCl+AuCl_3$ has been studied. It crystallizes from hot water containing hydrochloric acid, in brilliant needles often two centimetres long, broad, having a characteristic serrated form at the edges, and generally a distinct striation. The salt is but little soluble in cold water. On cooling the hot saturated solution no turbidity is caused as in the case of a solution of the double salt of atropine. The melting-point of this salt is 212°–214° C. (uncor.). According to Ladenburg hyoscine aurochloride melts at 198° C. At the moment of fusion the mass froths up considerably. Analysis gave results agreeing well with the formula stated above.

The crystals received from C. J. Bender as hyoscine hydrobromide corresponded in form so far as that could be ascertained without crystallographic measurement with the descriptions of hyoscine hydrobromide given by Ladenburg and Fock.* The solubility, the behaviour when dried, as well as the percentage amounts of bromine and of water were also very nearly the same as Ladenburg stated in respect to the hyoscine salt to which he gave the formula $C_{17}H_{23}NO_3HBr+3\frac{1}{2}H_2O$. The aurochloride obtained after converting Bender's salt into chloride with silver chloride, agreed in form, solubility, melting point, and composition perfectly with the scopolamine salt above described. The hydrobromide was, therefore, a salt of scopolamine and not of hyoscine.

In my previous investigation of the constituents of the root of *Scopolia atropoides*† I obtained by repeated crystallization of the first portions of the precipitate produced by auric chloride in the hydrochloric solution of the bases, a very small quantity of a gold salt, which corresponded in its character with that described by Ladenburg as hyoscine aurochloride. It was in fine yellow, small needles, which melted with copious frothing at 198°–199° C. According to the knowledge of the mydriatic bases at that time I concluded that the base in that salt was hyoscine. However, since it turns out that the base obtained by Bender is, in fact, scopolamine, I am disposed to think that the gold salt then analysed by me was, for the most part, a salt of scopolamine, more especially since the analytical data obtained were intermediate between those appertaining to the double salts of scopolamine and to those of hyoscine. Whether that was also the case in regard to the gold salt obtained in conjunction with Henschke‡ in very small quantity

* *Archiv der Pharmacie*, 230, p. 207.
† *Ann. Chem.*, 206, p. 299, and *Berichte*, 14, p. 1870.
‡ *Ann. Chem.*, 157, p. 107.

* *Berichte*, 14, p. 1872.
† *Archiv*, 1890, p. 436.
‡ *Archiv*, 1888, p. 199.

from the root of *Scopolia japonica*, I cannot at present determine, though the analytical data obtained appear to have pointed to hyoscine rather than to scopolamine.

In connection with the foregoing observations it was of interest to examine the commercial hyoscine hydrobromide, which is prepared partly from scopola root and partly from henbane seed. The hyoscine hydrobromide obtained for that purpose from E. Merck was in the form of distinct transparent crystalline fragments though without recognizable definite form. The salt was analysed as received and after conversion into chloride a gold salt was made from it. After two recrystallizations from water containing hydrochloric acid it could not be distinguished from the scopolamine salt either in outward appearance, in solubility or in the mode of separation. The melting point was rather lower than that of the scopolamine salt 210°–212° C., and analysis gave results approximating to the formula of this salt. From the mother liquors a salt was obtained in more laminar crystals, melting at 204° C. with frothing, and the composition of it approached that of the hyoscine salt. From the mother liquors of this salt there was again obtained a small quantity of yellow needles, which melted at 198°–200° C., and corresponded in the amount of gold with the double salt which I had previously obtained from *Scopolia japonica* and from *Scopolia atropoides*, and had, in conformity with Ladenburg, regarded as the hyoscine salt. But since the quantity of this salt obtained from ten grammes of commercial hyoscine hydrobromide was so small that its purification by repeated crystallization was impracticable, I am unable now to decide whether it was merely impure scopolamine salt or actually the hyoscine salt.

It follows, however, from the preceding observations that the material passing in commerce as hyoscine hydrobromide is not an individual substance. For the most part it consists of a salt which is scopolamine hydrobromide, and not the hydrobromide of the base to which Ladenburg applied the name of hyoscine. In the further investigation of scopolamine the material operated upon was carefully purified by recrystallization of the commercial salt. The great facility with which scopolamine hydrobromide crystallizes, when a water solution is slowly evaporated, admits of the salt being obtained in crystals 2 or 3 centimetres in length, 1 or 2 centimetres broad, and half a centimetre thick. These crystals corresponded perfectly in their outward characters with the illustration of hyoscine hydrobromide given by Ladenburg. In other respects also my observations are quite in accordance with his. By the crystallographic examination of the crystals Professor O. Ludecke established the fact that the crystalline form is the same as that of the hyoscine hydrobromide examined crystallographically by A. Fock.

It has already been stated that scopolamine hydrobromide, when crystallized from water, contains three molecules of water of crystallization the whole of which is separated by exposure over sulphuric acid. By subsequent exposure to a temperature of 100° C., there is consequently no further loss of weight. When long kept in a dry atmosphere the crystals lose their tranparency as a result of superficial efflorescence. When the salt is crystallized from hot alcohol smaller crystals are formed which contain less water of crystallization. The specific rotation of scopolamine hydrobromide was determined by Dr. A. Partheil with a Laurent's polarimeter, for a solution of 2·502 grammes of the anhydrous salt in 35·6514 grammes of water (1·02107 sp. gr.), to be $[\alpha]_D = 25°·43$.

The statements as to the physiological action of commercial hyoscine salts, being to some extent discordant, I requested Professor Kobert of Dorpat to submit the pure scopolamine salt to a further examination in regard to its physiological action. The results obtained by him showed that scopolamine possesses all the characters which are common to hyoscine and atropine, *i.e.*, it dilates the pupil, paralyses the secretion of saliva and of perspiration, as well as the motor ganglia of the intestine. There is no pharmacological difference between hyoscyamine and atropine. Wherever there is a difference between atropine and hyoscine the distinction is unquestionable. Thus for instance—

1. Atropine produces in frogs, even when administered in very small doses, the so-called retarded tetanus. Neither hyoscine nor scopolamine produces that effect even in very large doses.

2. The frequency of the pulse in the human subject is rapidly augmented, even by small doses of atropine with paralysis of the vagus; but this effect is not generally produced by the maximum dose—(0·5 m.g.) of hyoscine or of scopolamine.

3. Atropin in the maximum dose of 1 m.g. does not act upon the brain at all; but in larger doses it produces violent delirium and even attacks of mania. Hyoscine and scopolamine, even in doses of half a milligramme, certainly produce no increase of excitement in cases of mental disorder (mania), but operate generally in an opposite manner.

Pharmacologically, therefore, after making experiments with frog, cats, dogs, rabbits and human subjects suffering from disease, Professor Kobert has been unable to detect any essential difference between the action of scopolamine and that of hyoscine. In both cases their elimination takes place like that of atropine by the urine in a physiologically active form, which is evidently that of an unaltered base. Animals support doses of 20 milligrammes of hyoscine or scopolamine better than equal doses of atropine, without being put to sleep. For healthy animals or human subjects neither hyoscine nor scopolamine is a narcotic. The action of scopolamine has also been found to reduce very considerably the electric excitability of the brain, while atropine increases it very much. A commercial salt, supplied as a hyoscine salt, acted very much in the same way, but not quite so powerfully as scopolamine.

For the purpose of further identification of scopolamine with the base which is the essential part of commercial hyoscine hydrobromide, it was thought desirable first to isolate that base and compare it with Bender's scopolamine. The purified hydrobromide was therefore dissolved in water and excess of potassium carbonate solution added, the viscid mass thus separated being dissolved by shaking with ether. After evaporating the ether a colourless syrupy residue was obtained, which showed no disposition to crystallize. The characters of the base were not altered by repeated solution in ether and evaporation. Nor did the addition of fragments of Bender's crystallized scopolamine produce any alteration. Equally

fruitless were the attempts to obtain the base in a crystalline state from a variety of solvents, although attention was given to Bender's observations. But the results obtained by analysis of this colourless amorphous mass showed that it really consisted of a base having the formula $C_{17}H_{21}NO_4$. For the analysis the base was dried, at first by exposure over caustic lime and then by gradually heating up to 100° C. until the weight became constant. Under these conditions there was no alteration of colour or other characters.

Scopolamine Hydrochloride—$C_{17}H_{21}NO_4 \cdot HCl + 2H_2O$. This salt has the form of colourless transparent prismatic crystals readily soluble in water and also in alcohol, especially when warm.

Scopolamine Hydriodide $C_{17}H_{21}NO_4 \cdot HI$. Crystallizes from water in compact prisms moderately soluble in water, less so in alcohol. The salt crystallized from alcohol appears to be anhydrous.

Scopolamine Sulphate $(C_{17}H_{21}NO_4)_2H_2SO_4$. The commercial salt known as hyoscine sulphate is a white crystalline powder consisting of fine needles. The sample I had was readily soluble in water and lost very little at 100° C.

Scopolamine Aurochloride—$C_{17}H_{21}NO_4 \cdot HCl + AuCl_3$.—The salt prepared from purified scopolamine hydrobromide (from the commercial hyoscine salt) agreed in external appearance, melting point, and composition with the salt described in the earlier part of this paper. The results of its analysis differed but little from those which Ladenburg obtained in the analysis of his double salt of hyoscine. But when it is remembered that the greatest difference in the percentage composition of the salts represented by these two formulæ would be in the amount of gold, the determination of which can be effected by careful ignition with scarcely any perceptible source of error, it will be admitted that the data obtained by Ladenburg in the analysis of hyoscine aurochloride also lead to the formula $C_{17}H_{21}NO_4 \cdot HCl + AuCl_3$.

A platinum salt of scopolamine could not be prepared in a condition suitable for analysis.

Since scopolamine contains one atom of oxygen more than atropine and hyoscyamine, with which it is certainly very closely related, it appeared of interest to ascertain in what state of combination that atom of oxygen was introduced into the molecule. To decide whether this oxygen was present in the form of a hydroxyl group, the dehydrated base was heated with acetyl chloride in excess for several hours under a reflux condenser. A reaction commenced upon mixing the two substances, as appeared from the rather considerable evolution of heat and formation of hydrochloric acid. After several hours heating the residual product was heated on a water-bath to drive off acetyl chloride, and the syrupy residue thus obtained was then converted into aurochloride. This salt separated as a yellow coherent viscid mass without any resemblance, in external appearance or otherwise, to the aurochloride of unaltered scopolamine. By recrystallization from hot water containing hydrochloric acid, this salt could not be obtained in a state fit for analysis. But by the free evaporation of a dilute alcoholic solution in the dark, the salt separated as pale yellow warty masses scarcely soluble in cold water, more soluble in boiling water, and readily soluble in alcohol. When heated with very dilute hydrochloric acid this salt melted to an oily liquid which then slowly dissolved. On cooling a saturated solution, so prepared, it first became turbid and then deposited the salt in amorphous masses. The melting point of this gold salt could not be observed with accuracy; it began to aggregate below 100° C. and gradually melted as the heat was increased. Analysis of the salt dried over sulphuric acid gave results indicating a composition corresponding with the formula—

$$C_{17}H_{20}(C_2H_3O)NO_4 \cdot HCl + AuCl_3.$$

Hence it appears that a monoacetyl scopolamine is formed by the action of acetyl chloride upon scopolamine, and since this base, like the other mydriatic bases, has the character of a tertiary base, as is shown by its behaviour towards nitrous acid (see below), it may be assumed that the oxygen atom in question is present in the form of an hydroxyl group.

To ascertain whether scopolamine, like the majority of natural bases, is to be regarded as a tertiary base, the hydrochloric solution was treated with potassium nitrite at the ordinary temperature. After removing the excess of nitrous acid by means of a current of carbonic anhydride the liquid was made strongly alkaline with potassium carbonate, and then shaken out with chloroform. By evaporating the chloroform a colourless syrupy residue was obtained which could not be made to crystallize. For its identification it was converted into aurochloride, and after recrystallization from boiling water, containing hydrochloric acid, the salt agreed in all its characters with unaltered scopolamine aurochloride. No nitro compound had been formed by the action of nitrous acid, so that scopolamine is to be classed as a tertiary base, and, at the same time, it was apparent that in the acetylation of the base the hydrogen replaced is that of a hydroxyl group and not that of an imid group.

From the mother liquor of the above-mentioned gold salt another aurochloride was obtained, which proved by its greater solubility and also by the form—orange yellow tables—the melting point—224°–225° C.—and, lastly, by the amount of gold to be scopolin aurochloride, $C_8H_{13}NO_2 \cdot HCl + AuCl_3$. By the action of the nitrous acid part of the scopolamine operated upon had, therefore, apparently undergone a transformation similar to that caused by baryta solution.

Some preliminary experiments had shown that scopolamine, like the rest of the mydriatic bases, is readily altered by the action of baryta water. For the examination of the products of this alteration, purified scopolamine hydrobromide was heated for ten hours with baryta water under a reflux condenser, and after cooling the liquid was shaken out with a large quantity of ether. The same operation was then repeated after mixing the liquid with hydrochloric acid. By distilling off the ether from the first solution a base was obtained which I will for the present name scopoline, and from the second ether extract an acid was obtained which proved to be tropic acid.

Scopoline $C_8H_{13}NO_2$.—This base had the form of a pale yellow coloured liquid, which gradually solidified in a crystalline condition. For its purification it was subjected to distillation, and was found to pass over at a constant temperature of 241°—243° (uncor.) without decomposition, and to

solidify in a crystalline form. By recrystallization from petroleum spirit the substance was obtained in the form of colourless, acicular crystals, which, after being dried over caustic lime, melted at 110° C.

Scopoline Aurochloride—$2[C_8H_3NO_2 \cdot HCl + AuCl_3] + H_2O$.—This salt separates according to the concentration of the solution either in feathery groups of small crystals or, by spontaneous evaporation, in deep yellow transparent crystals, apparently of a rhombic form. The salt is moderately soluble in water, and its melting point is 223°—225° C. Ladenburg gives 198° C. as the melting point of the aurochloride he obtained with the product of the alteration of "hyoscine" boiling at 241°—243°, and named by him pseudotropine.

Scopoline Platinochloride—$[C_8H_{13}NO_2 \cdot HCl]_2 + PtCl_4 + H_2O$.—This salt has the form of reddish-brown transparent crystals, readily soluble in water. The melting point is 228°–230° C. The results obtained by its analysis agreed very closely with those obtained by E. Merck in the investigation of the pseudotropine platinochloride prepared from "hyoscine."* Merck gives 211°—213° C. as the melting point of that salt.

It is possible that scopoline may also be identical with the oxytropine $C_8H_{15}NO_2$ (?) isolated both by Ladenburg and Roth† and by Merling‡ from belladonnine or the residue from the preparation of atropine from belladonna root. Ladenburg and Roth give 242° C. as the boiling point of oxytropine, while I found that of scopoline 241°-243° C. Moreover, the analytical data obtained by Ladenburg and Roth for the platinochloride are not inconsistent with this conjecture.

Scopoline also presents, in its melting point and boiling point as well as in the melting point of its aurochloride, some degree of resemblance to the ψ-tropine $C_8H_{15}NO$, which Liebermann§ isolated from benzoyl ψ-tropine, one of the bases in Java coca leaves. He gives 106–107° C. as the melting point of ψ-tropine 240°–241° as its boiling point, and 225° C. as the melting point of its aurochloride. The melting point of scopoline is 110° C., its boiling point 241°–243° (uncor.), and the melting point of its aurochloride is 223°–225° C. According to Liebermann ψ-tropine has the formula $C_8H_{15}NO$, while, on the contrary, the composition of scopoline is represented by the formula $C_8H_{13}NO_2$; therefore it is not remarkable that the tropyl ψ-tropine $C_{17}H_{23}NO_3$ synthetically prepared by Liebermann|| is not identical with either hyoscine or scopolamine $C_{17}H_{21}NO_4$.

Atropic Acid $C_9H_8O_2$.—The acid product of the transformation of scopolamine by the action of baryta water forms after repeated recrystallization from hot water or from very dilute alcohol, brilliant colourless needles corresponding in all respects with atropic acid obtained from other sources. Since scopoline and atropic acid are the only products of the change, it may be represented by the equation :—

$$\underset{\text{Scopolamine.}}{C_{17}H_{21}NO_4} = \underset{\text{Scopoline.}}{C_8H_{13}NO_2} + \underset{\text{Atropic Acid.}}{C_9H_8O_2}$$

* *Archiv*, 1892, p. 140.
† *Berichte*, 17, p. 152.
‡ *Ibid.*, 17, p. 384.
§ *Ibid.*, 24, p. 2339.
|| *Berichte*, 25, p. 933.

The alteration is therefore analogous to that of atropine or of hyoscyamine under similar conditions :—

$$\underset{\text{Atropine.}}{C_{17}H_{23}NO_3} = \underset{\text{Tropine.}}{C_8H_{15}NO} + \underset{\text{Atropic Acid.}}{C_9H_8O_2}$$

The construction of a constitutional formula for scopolamine and also for scopoline by the aid of Merling's investigation,* will be possible only when the further study of scopoline with which I am now engaged, is brought to a satisfactory conclusion. The difficulty of obtaining sufficient supplies of this costly material is naturally a great obstacle, for overcoming which time is necessary. But in the meanwhile I may point to the isomerism of scopolamine and cocaine as being remarkable, in so far that, by the investigations of Einhorn and his coworkers, it is shown how intimate are the relations which exist between ecgonine and tropine, the products of transformation respectively of cocaine and of atropine or hyoscyamine.

Scopolamine salts were prepared from a salt obtained from the seeds of *Hyoscyamus niger*, and they agreed in all respects with those above described. Larger quantities of hyoscyamus bases are now being prepared in my laboratory.

In regard to the existence of scopolamine in the seeds of *Datura stramonium*, I refer to the investigation which W. Schutte carried out under my direction some time ago.† Respecting the occurrence of scopolamine in the root of *Atropa belladonna* I must for the present confine myself to mentioning that in converting the bases extracted from this drug into aurochlorides I have observed the presence of an aurochloride which is very sparingly soluble in water and, in its form as well as melting point, corresponds completely with scopolamine aurochloride. The quantity of material, however, was insufficient for further examination.

Leaving out of consideration the earlier statements concerning the mydriatic base present in the leaves of *Duboisia myoporoides*, there are only two which require notice, one by Ladenburg‡ and the other by Ladenburg and Petersen.§ In Ladenburg's first paper he identified duboisine with hyoscyamine, while in the second he declared it to be identical with hyoscine. This discrepancy does not, as Ladenburg and Petersen assume, arise from difference in the mode of preparation of the base, but is much rather due to the circumstance that the duboisia leaves of commerce sometimes contain the one and sometimes the other base. Some long time since Bender sent me two small samples of duboisia leaves for examination, one of which he described as containing hyoscyamine and the other as containing hyoscine. These samples did not present any external differences. A minute botanical examination of them did not lead to the recognition of any essential points of differentiation. But chemical examination showed that, in accordance with Bender's statement, one of the samples contained hyoscyamine, while the other contained scopolamine or the base which has hitherto been known by the name of hyoscine.

Although the amounts of alkaloid obtained from these materials by Schütte were not sufficiently

* *Berichte*, 24, p. 3108.
† *Archiv*, 1891, p. 518.
‡ *Berichte*, 13, p. 257.
§ *Berichte*, 20, p. 1661.

large to admit of analyses of the respective aurochlorides being made, still the physical characters of those salts were such as to leave no doubt that one sample yielded hyoscyamine aurochloride—melting point 159°-160° C.—while the other yielded scopolamine aurochloride—melting point 208°–219° C. In order to obtain one or other of these bases in larger quantity I operated upon a large quantity of duboisia leaves, obtained for that purpose from Schuchardt in Gorlitz. The bases obtained were converted into aurochloride and, after recrystallizing from hot water containing hydrochloric acid, almost the whole of the salt was obtained in the form of brilliant tolerably broad needles, having the serrated edges characteristic of the scopolamine salt. The presence of hyoscyamine or of atropine could not be detected by means of the aurochloride, but there was a small proportion of other bases, the aurochlorides of which could not be made to crystallize. The gold salt constituting the main product agreed in characters and in composition with scopolamine aurochloride. Its melting point was 208°–210° C.

During the printing of the foregoing paper there has appeared in the *Pharmaceutische Zeitung** a short notice by O. Hesse, relating to ψ-tropine. It is there mentioned that Ladenburg's pseudotropine (scopoline) has the formula $C_8H_{13}NO_2$, and that "hyoscine" (scopolamine) has therefore the formula $C_{17}H_{21}NO_4$, which I have assigned to it. Since the essential points of the present memoir were published, together with the analytical data relating to them, as far back as the year 1890, and further since it was communicated to the meeting in Halle last year that the hyoscine hydrobromide met with in commerce consists essentially of the scopolamine salt, $C_{17}H_{21}NO_4 \cdot HBr + 3H_2O$,† I cannot regard the above-mentioned remark of Hesse, or the further communications relating to the same subject put forward by him in that notice, otherwise than as a confirmation of the observations which I have made and had occasion to publish during recent years.

RECENT THEORIES OF THE SULPHURIC ACID PROCESS.‡

BY WILLIAM R. POTTER.

In preparing the notes which follow, my chief regret has been that I have little or nothing of an original character to communicate to the society upon this occasion. Having devoted the greater portion of my time and energy during the past six years to a few processes of technical chemistry, original work, other than that connected with that branch, has been almost impossible. From the time when the student receives his first introduction to test tubes and reagents until his chemical career is ended, sulphuric acid is his almost inseparable companion. As usually explained in the text-books on chemistry, one would very readily infer that the chemical phenomena taking place within the lead chamber in the manufacture of sulphuric acid were of the simplest kind; but upon further examination one soon reaches the conclusion that they are undoubtedly more complex. Many eminent chemists have spent years of research upon this process; its literature is enormous, and yet the lead chamber process remains an unsettled question. In the last few years, several chemists of the highest reputation have taken up anew the study of this process, and from two different points: First, the laws governing the reactions by which the manufacture may be brought to a successful working issue; and, secondly, the reactions themselves. It is, of course, almost needless for me to say that manufacturers are most interested in the first, and leave the latter field to those who cultivate pure science. As their results either confirm, modify, or disprove the conclusions formerly accepted, I trust that a brief *résumé* of the researches made and the theories proposed may not be entirely without interest at this time. As an enumeration and analysis of all the papers bearing upon this subject that have appeared from time to time in the various technical journals would carry us beyond the scope of this paper, I intend to take up only the theories of Hurter, Raschig, Lunge, Sorel and Schertel.

Dr. F. Hurter, consulting chemist to the United Alkali Co., Limited, of England, has proposed, in the *Journal of the Society of Chemical Industry*, vol. i., a new and novel theory of the chemical reactions of the lead chamber, which he chooses to call "The Dynamic Theory." Starting with the premise that the process in the lead chamber is completely stated in one of the following equations:—

1. $SO_2 + H_2O + O + NO_2 = H_2SO_4 + NO_2$, or
2. $SO_2 + H_2O + O + N_2O_3 = H_2SO_4 + N_2O_3$

for the normal or primary reactions, *i.e.*, those by which the greater amount of sulphuric acid is produced; and for the secondary reactions, *i.e.*, those which are regarded as explaining the inevitable loss of nitrogen compounds by either of the following equations:—

3. $2SO_2 + 2H_2O + NO_2 = 2H_2SO_4 + N$
4. $3SO_2 + 3H_2O + 2NO_2 = 3H_2SO_4\ N_2O$, or
5. $2SO_2 + 2H_2O + N_2O_3 = 2H_2SO_4 + N_2O$
6. $3SO_2 + 3H_2O + N_2O_3 = 3H_2SO_4 + N_2$.

Hurter attempts to show the connection that exists between the dimensions of the chambers and the composition of the gases, the intensity of the reaction and the consequent temperature in the chambers as depending upon the method of combining single chambers into sets by applying to the equation representing the primary reaction a new principle, which he borrows from the science of chemical dynamics. The particular principle which Hurter made use of in his investigation was the one referring to the velocity or rate of chemical change, which may be stated as follows: "The rate of chemical change depends upon, and is proportional to, the facility with which groups of molecules favourable to the particular change can form in the system in which the change occurs." This principle is deduced from, and proved by, the dynamic theory of gases as advanced by Kronig, Clausius and Clerk Maxwell.

Hurter's paper is largely of a mathematico-chemical nature, and being based on the differential and integral calculus, abounds in mathematical equations and expressions. These I will not weary you with by reproducing them here, but anyone interested in the subject will find them stated, and, in general, explained in the papers cited. The principal practical conclusions which he arrives at from his dynamic study of the process, based upon data derived from practice, are:—1. The work done by a given set of chambers depends principally on the nitrous products in action, and the strength of the acid condensed. 2. In a system composed of several chambers connected together, the energy of the action and the difference between the temperature inside and out of the chamber, decreases from one chamber to another in geometrical progression. 3. The temperature of the first chamber is a function of the relation between the

---

* April 9, No. 29.

† *Apotheker Zeitung*, 1891, p. 522.

‡ Paper read at a recent meeting of the Rhode Island Section of the American Chemical Society, Providence, R. I. From *Journ. Am. Chem. Soc.*, February.

capacity of this chamber and the total volume of the apparatus.

The two theories which are pushed to the front most at present by their respective adherents are the theories of Raschig and of Lunge. Raschig (*Ann. d. Chem.*, 241), while conducting an investigation in 1877 on the action of sulphites on nitrates, observed that sulphurous acid did not reduce nitrous acid, either in an acid or an alkaline solution. Condensation products were always formed, which, by their splitting up into simple compounds, made it appear as if a reduction had taken place.

From the data thus obtained Raschig evolved a new theory of the formation of sulphuric acid, which, to say the least, is a novel and ingenious one. According to this theory the formation is due to a process of condensation in which dihydroxylaminesulphonic acid plays the principal rôle.

Raschig divides the process into three stages:—

7. [a] $N(OH)_3 + H.SO_2.OH = (OH)_2N.SO_2.OH + H_2O$. That is, one molecule of normal nitrous acid [$N(OH)_3$, or $HNO_2 + H_2O$] combines with one molecule of sulphurous acid [$SO(OH)_2$] to form dihydroxy laminesulphonic acid.

8. [b] $(OH)_2.N.SO_2.OH + N(OH)_3 = H_2SO_4 + 2NO + 2H_2O$. That is, decomposition of this intermediate product by nitrous acid in excess. 9. [c] $2NO + O + 3H_2O = 2N(OH)_3$. That is, reoxidation of the nitric oxide formed into nitrous acid. This theory would seem to explain why sulphurous anhydride does not react upon anhydrous nitrogen trioxide. Finally, the author claims to find in this theory the explanation of the loss of nitrogen compounds which takes place in greater or less amount in the lead chambers. Thus, dihydroxylaminesulphonic acid can be decomposed by sulphuric acid and nitric oxide only when each molecule is in intimate contact, at the moment of decomposition, with one molecule of nitrous acid. If at this moment there is a deficiency of nitrous acid, the intermediate compound is split up into sulphuric acid and nitrous oxide (N_2O); or, in presence of sulphurous acid, it will give rise to hydroxylaminesulphonic acid, and finally to ammonia. Thus:

10. $2(OH)_2.N.SO_2.OH = 2H_2SO_4 + N_2O + H_2O$.

11. $(OH)_2.N.SO_2.OH + SO_2 + H_2O =$
$H{\cdot}OH.N.SO_2.OH + H_2SO_4$.

12. $(OH)_2.N.SO_2.OH + 2SO_2 + 3H_2O = NH_3 + 3H_2SO_4$.

To those who have not closely followed the recent advances made in the sulphuric acid industry, it may be somewhat of a surprise to learn that Raschig actually found in crude chamber acid ammonia varying from 0·0028 to 0·0138 per cent.; and he even goes so far as to say that ammonia is always present in chamber acid, when it is not nitrous. Raschig's statement of the presence of ammonia in chamber acid has recently been confirmed by Mr. R. Hasenclever, manager of the Rhenania Alkali Co., and by Dr. Haüssermann, of Griessheim, near Frankfort, Germany. This theory has been strongly opposed by Professor Geo. Lunge, who claims that it does not take into account the existence of nitrosyl sulphate (the so-called chamber crystals) and it does not harmonize with the facts of experience. Nitrous oxide especially, which according to the theory of Raschig, would be produced abundantly if the dihydroxylaminesulphonic acid did not meet a sufficient excess of nitrous acid, has never been found in any quantity in the gas of the lead chambers. And it is well, too, that such is the case, as otherwise there would be a great loss of nitrogen compounds, nitrous oxide being, as is well known, a very stable compound. Raschig finds, as a strong support of his theory, the fact that ammonia has been found to exist in crude chamber acid, and considers this substance the final product of his reactions; but Lunge thinks it is much more likely that the small quantities of ammonia found are formed more simply by the complete reduction of nitrogen compounds by the sulphur dioxide present. It applies then only to the secondary reactions.

According to Lunge, who has probably, in recent years, given more time to and thrown more light on this subject than any other investigator, nitrosyl sulphate, or nitroso-sulphonic acid, technically known as chamber crystals, plays the principal part in the chemical mechanism of the formation of acid in the chambers. This compound, produced by the combination of sulphurous anhydride, water vapour, nitrogen trioxide, and oxygen, according to the following equation: 13. $2SO_2 + N_2O_3 + O_2 + H_2O = 2(SO_2.OH.ONO)$, hovers as a mist in the atmosphere of the chamber and is immediately decomposed in the presence of an excess of steam, into sulphuric acid, which falls to the bottom of the chamber, and nitrogen trioxide which is free to act upon a second molecule of sulphur dioxide, as follows: 14. $2(SO_2.OH.ONO) + H_2O = 2SO_2(OH)_2 + N_2O_3$.

Nevertheless, in the front end of the first chamber, in presence of an excess of sulphurous vapours, the nitrosyl sulphate is denitrified, and the nitric oxide formed unites with the sulphur dioxide, steam and oxygen, to again form the chamber crystals:

15. $2SO_2.OH.ONO + SO_2 + 2H_2O = 3H_2SO_4 + 2NO$.

16. $2NO + 2SO_2 + 3O + H_2O = 2(SO_2.OH.ONO)$.

The same compound can also be produced by the reaction of sulphurous anhydride upon nitric acid.

17. $SO_2 + NO_2.OH = SO_2.OH.ONO$.

As to the direct conversion of sulphurous acid into sulphuric acid by the reduction of nitrogen tetroxide, or of nitrogen trioxide according to the old theories, it is certain that it takes place only to a very insignificant amount.

Lunge and Naef, in a paper in the German *Chemical Industry* for 1884, based upon a series of experiments carried out jointly by them, state that the composition of the nitrous gases in a chamber working under normal conditions is incompatible with the presence of nitrogen tetroxide. Up to within a short time it was quite generally held that nitric oxide itself was produced only at the end of the process, by a secondary reaction; but recently nitric oxide has been found in the thick white fumes of the first working chamber behind the Glover tower; and has been explained in two ways: (*a*) Sulphur dioxide, nitrogen compounds, oxygen, and water vapour meet here in the highest state of concentration, and here the highest temperature prevails; it is also here that the reactions proceed most actively, and the formation of sulphuric acid is most abundant. Under such conditions it is not unlikely that a portion of the sulphur dioxide is directly oxidized to sulphuric acid, according to the equation: 18. $SO_2 + NO_2 + H_2O = H_2SO_4 + NO$ or 19. $SO_2 + N_2O_3 + H_2O = H_2SO_4 + 2NO$. (*b*) The nitrososulphonic acid already formed may here, owing to the excess of sulphur dioxide, steam, and the relatively high temperature prevailing, be denitrated as follows:—

20. $2SO_2$, OH. $ONO + SO_2 + 2H_2O = 3H_2SO_4 + 2NO$.

This reaction is the same as that taking place in the Glover tower immediately before, where the nitrous vitriol from the Gay Lussac tower, which is simply sulphuric acid holding in solution nitrosulphonic acid, is subjected to the same conditions. Thus is the presence of nitric oxide in this part of the apparatus accounted for; and the nitric oxide so formed is undoubtedly afterwards oxidized, not simply by the oxygen of the air, to form nitrogen tetroxide, as in the old theories of Berzelius, Davy, Weber and others, which reaction has since been found to take place only in the presence of dry oxygen, which is quite different from the oxygen existing in the steam laden atmosphere of the lead chambers, but by oxygen in the presence of sulphur dioxide and steam to form nitrosulphonic acid; thus:—

21. $2SO_2+2NO+3O+H_2O=2SO_2$, OH·ONO.

It may be well, perhaps, to mention here that the gases of the second chamber have been found to contain only nitrogen trioxide, and not nitric oxide, showing that the formation of nitric oxide observed in the gases of the first chamber was merely local.

Lunge tersely sums up the results of his labours on this subject, which have appeared in full in the *Berichte* from time to time during the past five or six years, in these words:—"The formation of sulphuric acid is determined, not by a succession of reductions and oxidations of nitrous gases, but by a condensation of nitrogen trioxide (or nitric acid) with sulphurous acid and oxygen to nitrosyl sulphate, which is decomposed into sulphuric acid, with regeneration of nitrous acid (nitrogen trioxide)."

Theoretically, a small amount of certain nitrogen compounds, in the presence of an excess of oxygen, should be sufficient to oxidize an infinite amount of sulphurous acid to sulphuric acid. That this is not the case practically, acid manufacturers know only too well. This is the "bone of contention" of the technical chemist, at which many have gnawed; but only to find that their efforts have in a great measure been in vain. The cause of this variance between theory and practice may be attributed to two sources, namely, the mechanical loss of nitre and the chemical loss. The former is a variable quantity, depending upon the construction, distribution, and arrangement of the apparatus, is not the same in any two works, and need not concern us at this time. The chemical loss, which, in well constructed and properly managed works makes up about 75 per cent. of the total loss, must most assuredly be taken into account by any one promulgating a new theory of the chamber process. Lunge recognizes this fact, and in his theory accounts for the loss in somewhat the following way. In normal working nitrogen trioxide is found only in the gaseous mixture at the exit from the last chamber. Under certain conditions the formation of nitrous oxide can take place by the action of sulphur dioxide upon nitrogen trioxide; but this reduction can occur only in presence of an excess of steam, or when the sulphuric acid in the chamber is weaker than it ought to be in normal working. The excess of steam in a chamber being usually only local, and generally, only temporary, the reduction from this cause must occur very rarely. The formation of nitrogen tetroxide in the gas at the end of the system constitutes a much more important source of loss. It is formed by a condensation of nitric anhydride in the pan acid of the last chamber, but not in the nitrous acid of the condenser, for the coke packing, and, perhaps, also the traces of sulphurous acid which have escaped oxidation, reduce the nitrogen pentoxide. Lunge makes the paradoxical statement that the production of nitrogen tetroxide is entirely independent of the amount of oxygen present in the gaseous mixture at the time, and that it takes place equally as well in presence of a deficiency as of an excess of oxygen. It is caused solely by a very large excess of nitrous products in the gases. In this case, the oxidation of the sulphurous acid is completed long before it gets to the last chamber, so that condensation of sulphuric acid is altogether wanting here. The nitrogen trioxide no longer encountering gaseous molecules with which to combine to form nitrososulphonic acid, is itself oxidized finally to the state of tetroxide in presence of a large excess of oxygen. A portion of this then combines with the chamber acid to form nitrosyl sulphate and nitric anhydride; another portion escapes with the gases into the Gay Lussac absorbing tower, where it is incompletely condensed, owing to the latter's inability to do the extra work thus put upon it, and ultimately escapes into the atmosphere, thus becoming lost to the process.

E. Sorel, in a paper published in the *Bulletin de la Societe Industrielle, de Mulhouse* (April and May, 1889), formulates a theory a little different from that of Lunge's. While giving to nitrosulphonic acid an important part in the formation of sulphuric acid, he regards the chemical reactions as a series of successive oxidations and reductions of the nitrogen compounds, caused by variations of concentration and of temperature of the sulphuric acid condensed. In presence of concentrated acid, nitric oxide and sulphurous acid give rise to nitrosyl sulphate. On dilution of the sulphuric acid this intermediate product is decomposed into sulphuric acid and nitrogen trioxide, which oxidizes directly the sulphurous acid. The principal and secondary reactions which take place according to Sorel's theory, may be represented by the following equations:—

22. $2SO_2+2NO+3O+H_2O=2SO_2.OH.ONO$.
23. $2NO+O=N_2O_3$.
24. $2NO+O_2=N_2O_4$.
25. $2SO_2+N_2O_3+O_2+H_2O=2SO_2.OH.ONO$.
26. $2SO_2+2N_2O_3+O+H_2O=2SO_2.OH.ONO+2NO$.
27. $2SO_2+3N_2O_3+H_2O=2SO_2.OH.ONO+4NO$.
28. $2SO_2.OH.ONO+H_2O=2SO_2(OH)_2+N_2O_3$.
29. $SO_2+N_2O_3+H_2O=SO_2(OH)_2+2NO$.

to which may be added the following reactions, which take place under certain conditions:

30. $2SO_2+N_2O_4+2H_2O=2SO_2(OH)_2+2NO$,
31. $3N_2O_4+2H_2O=4HNO_3+2NO$.
32. $2HNO_3+SO_2=SO_2(OH)_2+N_2O_4$.

From experiments recently performed by A. Schertel (*Chemische Industrie*, 1889, p. 80) on the manufacture of sulphuric acid, the observations upon which Lunge's theory rests have been confirmed in every particular.

Schertel showed experimentally the presence of nitrosyl sulphate in the atmosphere of a lead chamber working normally. The gases at the exit of the first chamber of a series were led through a lead pipe filled with coke. This after having been carried down below the second chamber, made a turn into the leaden wall of the head of the second chamber. After allowing the gases to pass through this pipe for several weeks, nitrosyl sulphate (chamber crystals) was found upon opening the pipe. The crystals were distinctly formed, and were deposited upon the coke in the direction of the current of the gases, although the strength of the acid condensed in the pipe was kept much below that usually maintained in chambers.

From our present knowledge of the chemical reactions of the lead chamber, it would seem that of the many theories proposed, Lunge's harmonizes most closely with experience. And though exceptions may be, and have been, taken to some of his conclusion, and although the existence of nitrogen trioxide in the gaseous state is not proven beyond a doubt, yet I think I may say, without fear of contradiction, that Dr. Lunge has given us the clearest and most trustworthy explanation of the formation of sulphuric acid that has yet appeared, and one that is not likely to be soon displaced.

PERCENTAGE SOLUTIONS.*

A Few Practical Suggestions.

BY CHAS. CASPARI, JR.

Although this subject has been treated by several writers during the past fifteen months, some confusion seems still to exist in the minds of many pharmacists as to the proper plan for preparing small quantities of percentage solutions at the dispensing counter. The cause, apparently, lies in the fact that pharmacists imagine, when a physician orders 2 or 4 fluidrachms of a 4 per cent. cocaine solution or a 1 per cent. mercuric chloride solution, they must prepare exactly that quantity, neither more nor less, and at the same time forget

* From the *Pharmaceutical Review*, May.

that the percentage of medicinal agent present forms a part of the whole quantity of solution ordered. The writer has had occasion several times to correct physicians as well as pharmacists when they claimed that 4 grains of any salt dissolved in 100 grains of water would produce a 4 per cent. solution. (4 grains of the salt to 100 minims of water would be more nearly correct, as 100 minims of water weigh practically 95 grains). It is pretty well understood the world over that in the case of solutions of solids and gases in liquids the percentages are calculated invariably by weight of solvent and dissolved body, but in the case of solutions of liquids in other liquids the percentages may be calculated *either by weight or volume*, and it becomes necessary to specify which of the two is intended. As examples of the first class may be mentioned cocaine hydrochloride solution, mercuric chloride solution, oleate of quinine, oleate of veratrine, chlorine water, ammonia water, etc., whereas the official alcohol and diluted alcohol offer striking examples of the class of solutions of liquids in other liquids. The U.S. Ph. specifically states of official alcohol that it shall contain 91 per cent. by weight (94 per cent. by volume) of ethyl alcohol and 9 per cent. by weight (6 per cent. by volume) of water, showing that the percentage of absolute alcohol present may be reckoned either by weight or volume.

For the pharmacist it is surely the simplest and by far the safest plan to make percentage solutions of salts according to one fixed rule by weight, choosing the quantities nearest to the desired volume, even if the operation entail a slight loss, rather than aim at producing the exact volume wanted by using fractions almost unweighable on his prescription balance. For instance, we know that distilled water at 60° F. is assumed to weigh practically 456 grains (U.S. Ph. 455·7 grs.) per fluidounce, and this can be our guide in determining the proper proportions for a solution. As an example, take a 2 per cent. solution of any soluble chemical; to have 2 fluidrachms of this solution, we would take $2\frac{1}{2}$ grains of the chemical and $122\frac{1}{2}$ grains of dist. water, and to have 4 fluidrachms of a 4 per cent. solution, we would take ten grains of the chemical and 240 grains of dist. water; in either case our finished solution would be slightly more in volume than needed, and this trifling excess could be thrown away. If larger volumes are to be prepared, a closer calculation could be made so as to avoid possible waste of expensive material. For instance, if 8 fluidounces of a 5 per cent. solution of cocaine hydrochloride are wanted, we would say 8 fluid ounces of water will weigh 3648 grains; hence we shall make a quantity of solution nearest to it in weight and yet insure our volume. This we find to be 3850 grains, and of this weight 5 per cent. is $192\frac{1}{2}$ grains; we must therefore use $192\frac{1}{2}$ grains of the cocaine salt and $3657\frac{1}{2}$ grains of water, yielding a trifle over 8 fluidounces of solution. If two or three substances are to be present in a percentage solution, their combined weights must be subtracted from the desired weight of the finished product, in order to find the proper quantity by weight to be used of the solvent. For instance, a physician desires 1 fluidounce of a 4 per cent. cocaine solution containing 2 per cent. of boric acid: the quickest way to make it would be to dissolve 20 grains cocaine hydrochloride and 10 grains of boric acid in 470 grains distilled water, and of this solution measure 1 fluidounce; the excess of volume would be found very trifling.

If a percentage solution is to be reduced to a lower percentage strength, a very simple rule can be applied, namely, multiply the required quantity by the required percentage and divide the product by the given percentage; the quotient will be the quantity of the stronger solution necessary to yield the weaker solutio and the difference between the quantity thus found and the required quantity of weaker solution represents the necessary quantity of diluent to be used, which may be water or such other solvent as the stronger solution was made with. This rule can be used equally well for percentage solutions made by weight or volume, as the case may be. For instance, wanted 1 troy oz. (480 gr.) of $\frac{1}{2}$ per cent. mercuric chloride solution to be made from a 2 per cent. solution already on hand; then $480 \times \frac{1}{2} = 240$ and $240 \div 2 = 120$; hence we would take 120 grains of the 2 per cent. solution and add 360 grains of water. Again, wanted $\frac{1}{2}$ gallon (64 fluidounces) of dilute alcohol, U. S. Ph., to be made from alcohol on hand containing 92 per cent. by volume. Official dilute alcohol contains 53 per cent. by volume of absolute alcohol; then $64 \times 53 = 3392$, and $3392 \div 92 = 36{\cdot}87$; hence we must take 36·87 fluidounces of our 92 per cent. alcohol and add sufficient water to yield 64 fluidounces.

The fact that many solids increase the volume of the solvent when brought into solution by same may be left out of consideration entirely by the pharmacist in the preparation of percentage solutions, except when large quantities of strong solutions are to be made and the required quantity be expressed in volumes.

Above everything, let the pharmacist remember that percentage solutions of solids should always be calculated by weight, and that the percentage expresses the number of parts of the solid necessary to make 100 parts of the solution, and this number subtracted from 100 leaves the requisite number of parts by weight of the solvent to be used.

POISONOUS PROPERTIES OF MELAMPYRUM.

While investigating the cause of the sudden death of a valuable ram imported into Hungary from England, K. Czakó found in the stomach and intestines immense quantities of the seeds of *Melampyrum sylvaticum*, to which the death was apparently due. The seeds of this species and of *M. arvense* contain melampyrite $C_{12}H_{14}O_{12}$ and rhinanthine $C_{29}H_{52}O_{20}$. Experiments on mice and hares showed that the seeds of these, and of two other species of *Melampyrum*, produced toxic effects, and established that the poisonous principle is the rhinanthine. This substance is, however, formed only in the ripe seeds, and the plants furnish a valuable food for cattle up to the period of flowering. When, however, the seeds are ripe, or nearly so, they must be carefully avoided (Allategészségügyi Evkönyo, 1889; see *Bot. Centralblatt*, 1892, Beikefte, p. 65).

SILICA IN PLANTS.

The proportion of silica in plants at different stages in their development, and the mode in which it occurs, has been the subject of a series of experiments by MM. Berthelot and André. The observations were made on wheat, the grains of which contain scarcely a trace of silicic acid. Grains were sown on April 15. On April 30 the greater part of the silica contained in the stem was found to be in the insoluble condition, and must, therefore, have undergone a transformation since its absorption. On June 12, on the other hand, the chief part of the silica was soluble in alkalies. On June 30, at the commencement of the blossoming period, the proportion of silica present was largest in the leaves, smallest in the inflorescence; the former was chiefly in the insoluble, the latter in the soluble condition. Nearly the same results were obtained on July 23. An examination of dried plants on August 18 showed that the amount of silica had increased considerably in the stem and leaves, but only slightly in the ear (*Comptes Rendus*, cxiv., 257).

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, JUNE 11, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE COUNCIL MEETING.

IN the election of officers of the Society, which was the first business of the new Council at the meeting last Wednesday, Mr. MICHAEL CARTEIGHE was again elected President, Mr. W. G. CROSS was elected Vice-President, and Mr. R. HAMPSON was re-elected Treasurer. The other officers of the Society were then re-appointed and Messrs. BOWEN, DAVIS and PINCHES were appointed to conduct the examinations for the JACOB BELL and REDWOOD Scholarships to be held in July. Four persons were elected chemist and druggist members of the Society; twenty-three persons were elected associates, and thirty-five persons were elected as students.

After the appointment of the several committees of the Council, the PRESIDENT expressed his wish to offer, on behalf of the members of the Council, hearty thanks to Mr. BOTTLE in acknowledgment of his long and valuable services. Mention was then made of the services rendered by the three members of Council who have retired, and a resolution was passed for the purpose of placing officially on record the sense of obligation to, and the esteem entertained for the late Mr. SANDFORD. A similar resolution was passed in reference to the late Professor von HOFMANN and Brigade-Surgeon DYMOCK, who were both honorary members of the Society, the latter having also been a holder of the HANBURY Medal. In proposing the resolution, and expressing a sense of the loss the Society has sustained by their death, the PRESIDENT referred to the great benefits resulting from the labours in which Professor HOFMANN was engaged for many years in this country, and in seconding the motion of the PRESIDENT, Mr. HILLS bore testimony to the useful influence he had exercised as a teacher and by the chemical work he had done. The value of the work carried out by Brigade-Surgeon DYMOCK in connection with materia medica was also acknowledged by both the PRESIDENT and Mr. HILLS.

In reference to the proposed improvements of the Society's House in Edinburgh, as suggested by the Board of Examiners for Scotland, the PRESIDENT stated that he had discussed this matter with Mr. EWING, the Chairman of the Scottish Executive and, on his proposal, it was agreed that plans and estimates for the requisite alterations should be prepared.

The report of the Finance Committee stated that, in addition to the usual receipts, rent was now being received for No. 15, Bloomsbury Square, a portion of the Society's new premises, and that there has been some extra expenditure for apparatus required for developing the teaching of practical pharmacy. On the Benevolent Fund account the receipt of subscriptions has been supplemented by the receipt of income from ground rents.

On the recommendation of the Benevolent Fund Committee several grants were made: one of fifteen pounds, three of ten pounds, one of seven pounds, and two of five pounds each. The SECRETARY reported the death of SAMUEL ROBINSON, an annuitant, aged 85.

In addition to the usual statistics relating to the Library and Museum the report of the Library, etc., Committee mentioned that it had been impossible to arrive at a definite conclusion in regard to increasing the number of local secretaries in Scotland and, at the suggestion of the PRESIDENT, it was decided that the Executive of the North British Branch should be requested to advise the Council further upon that subject.

On the recommendation of the General Purposes Committee it was decided that proceedings should be taken in a number of cases of alleged infringement of the Pharmacy Acts which had been considered and, that in view of the onerous work which has to be performed by the Registrar and Secretary, his salary should be increased by £150, as an appropriate recognition of the fact that he has now held the position for many years and has fully mastered every detail of the work.

THE SALE OF PROPRIETARY MEDICINES CONTAINING POISON.

WE are authorised by the PRESIDENT to announce that the Council has ordered the necessary preliminary steps to be taken for instituting legal proceedings under section 15 of the Pharmacy Act, 1868, against certain traders who, not being registered chemists and druggists, are selling these preparations. This is a necessary sequel to the prosecution instituted by the Treasury in regard to the labelling of chlorodyne (see *Pharm. Journ.*, p. 928), the public prosecutor having called the attention of the Council to the evidence and judgment in that important case.

POISON LAW.

It has now been decided that, in the sale of poison, there are practically no conditions under which the provisions of the seventeenth section of the Pharmacy Act do not apply. The practice of the last twenty-four years, in regard to the sale of certain proprietary medicines, is thus declared to have been at variance with the purport of the statute, and that practice must now be discontinued. So far as relates to chlorodyne this result has been brought about by a magisterial decision. The proprietors of that preparation have decided not to contest the decision, but to acquiesce in the opinion that the sale of chlorodyne is subject to the provision that, as a preparation of a scheduled poison, it must bear the poison label. It is satisfactory to find that the proprietors of other preparations, which are of a similar nature in so far as they are preparations of poisons within the meaning of the Pharmacy Act, are following the example thus set, by adopting the use of the poison label and that they are specially notifying this fact to their customers. Clearly it is the duty of the proprietors of secret preparations to adopt that course and to bring the future sale of their articles into conformity with the law. It may be hoped that this will be done generally, and that there will be no further occasion for the public prosecutor to be set in motion by the Treasury for the purpose of enforcing the law.

We may remind our readers that in the action taken by the Treasury in regard to this matter there has been very proper consideration shown for retail vendors of secret preparations. In consequence of the past practice of the trade, they have not been aware of the facts that such preparations contained poison, and that their sale was unlawful unless the provisions of the statute were complied with. Although such vendors would be actually breaking the law, and although, as the counsel for the prosecution remarked, the *mens rea* is not necessary for the purpose of constituting the offence for which they would be liable, it was thought that it would be unfair to take steps against ordinary retail vendors. For that reason the prosecution intended to serve as a test case for deciding the question was directed against the actual proprietor of the article. In like manner similar consideration must be shown in regard to the further consequences of the decision. In the case referred to, the counsel for the defence unreservedly expressed his opinion that, if the use of the poison label was held to be necessary in the sale of chlorodyne, it could only be sold by persons legally qualified to sell poisons. That indeed was the main plea put forward by the defence in support of the argument that the sale of chlorodyne was not subject to the provisions of the statute, and that the preparation did not require to be labelled poison. There can be no question that this opinion is a sound one. No better evidence of its soundness could be desired than the use made of it by Mr. Poland.

It is not therefore remarkable that this view is being adopted by the proprietors of other preparations of the same class. That such is the case is shown by a circular issued by the proprietors of Mrs. Winslow's soothing syrup, pointing out that it can only be sold by properly qualified chemists, and recommending them in all instances to attach a label containing their name and address.

AMENDMENT OF A BYE-LAW.

At the Council meeting on Wednesday the President pointed out that it has been found desirable that longer notice should be given by candidates intending to present themselves for the qualifying examination. He explained that this is necessary in order to facilitate the arrangements for conducting that examination and, in pursuance of notice that had been given, he moved that Clause 20 of Section X of the Bye-laws be amended by verbal alterations, which would make the latest time of giving notice the fifteenth day of the month immediately preceding that in which the examination is to take place. The motion was seconded by the Vice-President and adopted. The proposed alteration of the bye-law was thereupon read; it will be read a second time at a special meeting of the Council to be held next week, and for the third time at the meeting in July, after which a special general meeting will be called to confirm it.

We have received from Messrs. A. P. Towle and Son, of Manchester, a letter, in which they deal with several points more or less indirectly connected with the sale of proprietary medicines, and the consequences of the construction which has now been put upon the provisions of the Pharmacy Act, 1868, in that respect. It appears to us premature to consider some of the matters referred to, and that, at the present moment, the point of most importance in Messrs. Towle's communication is the recognition by them of the magisterial decision that it is necessary to label their preparation in conformity with the requirements of the Pharmacy Act. We quite appreciate the justice of Messrs. Towle's argument, that neither the requirement as to labelling, nor any of the consequent effects of Mr. Lushington's decision, should be made to press harshly upon any of those who have been misled by the previous incorrect interpretation of the law. For arriving at a correct position, after such a prolonged misconception, time will be necessary on every hand. But since the question at issue has been decided, and since the settlement of it is being generally accepted, there is every reason for anticipating that with patience and mutual forbearance all requirements may be fully satisfied. We may add that, in addition to Messrs. Towle, several other proprietors of secret remedies coming within the scope of the Act have decided to adapt their practice to its requirements. Among others we may mention the proprietors of Mrs. Winslow's Soothing Syrup and the proprietors of Powell's Balsam of Aniseed, who have informed us of their intention to adopt that course.

* * *

The annual meeting of the members of the Pharmaceutical Society and associates in business, resident in Scotland, will take place on Wednesday, the 15th inst., in the Society's House, 36, York Place, Edinburgh, at 12 noon, precisely.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, June 8, 1892.

Present—

Messrs. Allen, Atkins, Bottle, Carteighe, Cross, Greenish, Grose, Harrison, Hills, Johnston, Leigh, Martin, Martindale, Newsholme, Richardson, Schacht, Southall, Storrar and Warren.

Mr. MICHAEL CARTEIGHE took the chair.

The minutes of the last monthly meeting and of the special meeting on May 18 were read and confirmed.

ELECTION OF PRESIDENT.

On the ballot being taken in the usual way

MR. MICHAEL CARTEIGHE

was re-elected President.

The PRESIDENT said he was very much obliged for the very great compliment paid him in re-electing him to the important office of President. He gathered that it was the wish of the Council for special reasons that he should continue in office for another year, and he would therefore accept the compliment in the spirit in which it was intended, and thanked his colleagues for their kindness. As President he had the privilege, on the part of the Council, of welcoming Mr. Grose, Mr. Johnston, and Mr. Martin, the new members. He also had to report that he had received a letter from Mr. Hampson, from Eastbourne, regretting that he was unable to be present that day, but expressing the hope that he should be there at the next meeting fully restored to his usual health.

ELECTION OF VICE-PRESIDENT.

On a ballot being taken,

MR. W. G. CROSS

was elected Vice-President.

The VICE-PRESIDENT, in returning thanks for his election, said it had been his good fortune to have been elected to many positions of honour, but nothing had ever given him greater pleasure or a greater sense of responsibility than the office now conferred upon him. From his earliest introduction to the business he had always looked upon the Pharmaceutical Society with the greatest veneration, and to think that he had now been elected to the Vice-Chairmanship of that great Society almost overwhelmed him. He felt not only the honour, but the responsibility, especially considering the illustrious list of gentlemen who had preceded him in that position. He felt that he should have a hard task to come up to anything like their standard, but any shortcomings which might be noticed would, he hoped, be put down to him as a misfortune rather than a fault.

ELECTION OF TREASURER.

On the ballot being taken,

MR. ROBERT HAMPSON

was re-elected Treasurer for the ensuing year.

The PRESIDENT said he wished to claim the indulgence of the Council for a minute to say a few words of heartfelt thanks to Mr. Bottle, who had just left the Vice-Presidential chair. He did not propose to move a formal resolution, but he would remind his colleagues that Mr. Bottle was the father of the Council, and had served as Vice-President two terms, one of three and the other of four years, and in every capacity he had earned the affection of every one who knew him. He thought it only right on this occasion to express, on behalf of the Council, the appreciation which every one must feel of his long and valuable services.

Mr. BOTTLE said he had only to thank the Council once more for this renewed mark of the kindness which he had always received at the hands of members of the Society since he had been associated with it, now more than fifty years. For thirty-five years he had had a seat at the Council table, and during all that time he had received nothing but kindness from everyone with whom he came in contact.

STANDING ORDERS.

The standing orders of the Council were re-enacted for the ensuing year.

SECRETARY AND REGISTRAR.

Mr. RICHARD BREMRIDGE was re-appointed Secretary and Registrar for the ensuing year.

EDITOR AND SUB-EDITOR OF THE JOURNAL.

Dr. B. H. PAUL was re-appointed Editor, and Mr. J. T. HUMPHREY Sub-Editor, of the Journal for the ensuing year.

CURATOR.

Mr. E. M. HOLMES was re-appointed Curator of the Society's Museum for the ensuing year.

ASSISTANT-SECRETARY.

Mr. J. R. HILL was re-appointed an Assistant-Secretary of the Society for the ensuing year.

EXAMINERS FOR THE JACOB BELL AND REDWOOD SCHOLARSHIPS.

Messrs. BOWEN, DAVIES and PINCHES were appointed to conduct the examinations for these Scholarships in July next.

ELECTIONS.

MEMBERS.

Chemists and Druggists.

The following, who were in business on their own account before August 1, 1868, having tendered their subscriptions for the current year, were elected "Members" of the Society:—

Allenby, Henry .....St. Albans.
Nichols, Frederick Roberts....Walthamstow.
Pearson, George .....Brierley Hill.
Wallace, William ....Aberdeen.

ASSOCIATES IN BUSINESS.

The following, having passed their respective examinations, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Minor.

Asten, Walter .....Birmingham.
Brigham, George.....Pocklington.
Earle, Ernest Haworth .....Hull.
Foot, Wm. Rolstone Whiteway.Totnes.
Galloway, William Hearfield...Yeadon.
Harrison, William Arthur.....Cardiff.
Holmes, Charles Matthew.....Upper Clapton.
Kershaw, Arthur Noble.....Keighley.
Lewis, David John.....Cardiff.
Rae, Alexander David .....London.

Modified.

Booth, Edwin .....Crewe.

ASSOCIATES.

The following, having passed the Minor examination, and tendered (or paid as Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Atkinson, Leonard Joseph.....Greenwich.
Ford, Betsy .....Kirriemuir.

German, Charles Mackenzie...Kendal.
Graham, Gilbert.....Girvan.
Guyer, Richard Glode.....Torquay.
Ison, Charles Edward .....Atherstone.
Rosie, George .....Edinburgh.
Smith, Gilbert.....Bayswater.
Taylor, Frederick Hayden ...London.
Templeton, John Gow .....Kilmarnock.
Towers, Wm. Londesborough..Barrow-on-Humber.
Young, Robert .....Dunfermline.

STUDENTS.

The following, having passed the First examination, and tendered their subscriptions for the current year, were elected "Students" of the Society:—

Andrews, Martha .....Leamington.
Ashfield, Percy John .....Stratford-on-Avon.
Baker, Thomas .....Oldham.
Bryan, Robert George .....Deptford.
Coupe, Douglas Henry .....Douglas.
Coverdale, Henry .....Howden.
Cowley, Harry James .....Nottingham.
Cranch, William John Beck...Barnstaple.
Davies, Daniel Edward.....Llanon.
Davis, William Orton .....Malvern Link.
Duffus, John .....Aberdeen.
Flooks, George Hayward .....Sherborne.
Freeman, Andrew John.....Newbury.
Gibson, William Robert .....London.
Hall, James Ralph .....Bath.
Harris, John Flinton .....Bournemouth.
Hatrick, Osbourne Ronald ...Pollokshields.
Hellens, George .....Totnes.
Hodgson, John George .....York.
Hogwood, Haley Percival.....Rotherhithe.
Hovenden, Sydney Churcher..Croydon.
Hughson, Alexander Sinclair.Bath.
Jones, Alfred Morgan... .....Cefn Coed.
Mac Ewan, Archibald .....Glasgow.
McLaren, Arthur.....Dunkeld.
Martindale, William Harrison.London.
Mitchell, William .....Glasgow.
Oliver, Gwilym Emvys .....London.
Potts, Albert Edward.....Sheffield.
Quénet, George Alfred .....North Shields.
Scanlon, Frederick William...Macclesfield.
Smith, Charles Edward.....Lower Tooting.
Smith, William .....Edinburgh.
Stead, Samuel Blower .....Widnes.
Steel, Cecil Thomas .....Titchfield.
Thomson, Peter .....Aberfeldy.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and a nominal restoration fee of one shilling.

RESTORATIONS TO THE REGISTER.

The names of the following persons, who have severally made the required declarations and paid a fine of one guinea, were restored to the Register of Chemists and Druggists:—

John Jones Conway, 112, Deane Road, Bolton.
Thomas Benjamin Langridge, 21, Mount Pleasant Road, Hastings.

APPOINTMENT OF COMMITTEES.

The Council went into Committee to consider the arrangement of the different Committees, as the result of which the following arrangements were made:—

General Purposes.—The whole Council. To meet on the evening before the meeting of the Council, and at such other times as may be necessary.

Finance.—The President (Mr. Carteighe), Vice-President (Mr. Cross), and Messrs. Abraham, Allen, Grose, Harrison, Hills, Leigh, Martindale, Newsholme and Schacht.

Benevolent Fund.—The President (Mr. Carteighe), Vice-President (Mr. Cross), and Messrs. Atkins, Bottle, Greenish, Hampson, Johnston, Martin, Richardson, Southall, Storrar and Warren.

Library, Museum, School, and House.—The President (Mr. Carteighe), Vice-President (Mr. Cross), and Messrs. Allen, Atkins, Bottle, Greenish, Hampson, Hills, Martindale, Newsholme, Richardson, Schacht and Warren.

Law and Parliamentary.—The President (Mr. Carteighe), Vice-President (Mr. Cross), and Messrs. Abraham, Allen, Atkins, Bottle, Grose, Hampson, Harrison, Hills, Martin, Martindale, Newsholme, Richardson, Storrar and Warren.

Research.—The President (Mr. Carteighe), Vice-President (Mr. Cross), and Messrs. Greenish and Schacht, with Mr. Ekin, Professor Lauder Brunton, Professor Michael Foster and Professor Frankland.

Evening Meetings.—The staff of the Society's School, the Editor and Curator were requested to assist the President and Vice-President in making arrangements for the Society's Evening Meetings in London.

RETIRING MEMBERS OF COUNCIL.

The PRESIDENT said the three new members replaced three who had retired, and it was only to mention their names and place on the minutes some recognition of their services. Mr. Watt, who came from the other side of the Tweed, had rendered valuable services in various ways, and had probably gained a wider insight into the affairs of the Society than he could have done in any other way. Not being a very young man, it was not to be wondered at that he should not desire to continue for a length of time duties which involved frequent and long journeys. He was very much respected in his own town, where he had been Provost, and it was only his due to offer him an official recognition of his loyalty and services to the Society. Mr. Evans was a very able and energetic man, whose neighbours had asked him to take the position of Chairman of the County Council, which of course entailed very arduous duties, and it was not surprising that he had found it desirable to retire, on assuming these more general and public duties. They would all hope that in his new sphere he would be able to advance the cause of education, in which he had always taken a very warm interest. Lastly, there was Mr. Gostling, who had retired, at all events for a time, but who might possibly see his way to come back again later on. He was an excellent worker, and though he did not talk much, he always spoke to the point, and was very clear in his ideas of what was right to do. His code of ethics was as high as that of any man he ever knew, and he looked at the duties which the Council had to carry out, from a proper point of view, having regard to the public interest, and often combated propositions which savoured of trade unionism.

THE LATE MR. SANDFORD.

The PRESIDENT said he had referred at the annual meeting to the death of Mr. Sandford, many years President of the Society, but it was desirable that a formal resolution should be passed and entered on the minutes. He would therefore move:—

"That this Council records with regret the death of George Webb Sandford, who for twenty-six years was a member of Council, and for eight years President of the Society. To his sagacity and firmness at a most critical period in the history of pharmacy, all registered chemists and druggists are deeply indebted; and the services he rendered, more especially in connection with the passing of the Pharmacy Act, 1868, will always be remembered with gratitude. The Council feels that it is only echoing the sentiment of the whole Society in expressing admiration for his character, regret at his loss, and reverence for his memory."

He had already said something about him, but it was quite inadequate to express the esteem in which he was held, not only amongst the trade but outside the craft entirely. It was a great pleasure to him to know that Mr. Sandford was very highly respected by men in every walk of life.

The VICE-PRESIDENT seconded the motion and the resolution was carried unanimously.

THE LATE PROFESSOR VON HOFMANN AND BRIGADE-SURGEON DYMOCK.

The PRESIDENT said the Society had recently lost two honorary members by death—Professor von Hofmann and Brigade-Surgeon Dymock, and he had to move the following resolution in connection therewith :—

"That this Council desires to express its sense of the loss sustained by chemical science in the death of Professor August Wilhelm von Hofmann, an honorary member of the Society.

"It also regrets the death of another eminent honorary member, who was a holder of the Hanbury Gold Medal, Brigade-Surgeon General William Dymock, whose contributions to the knowledge of Indian materia medica are of universal repute, and especially appreciated by English pharmacists."

With regard to Professor von Hofmann, the most remarkable thing about him was the magic influence he had over all his pupils. He remembered when a student at University College going to hear him lecture at what was considered a rival establishment, and how the enthusiasm of his class was so aroused by his lecture and experiments, that at the close every one got up on the benches and cheered him again and again. He knew of no one who could so affect his listeners and so touch their emotions when lecturing on a scientific subject. To him more than any one else was due the immense strides made by chemical science, especially as applied to industry, in this country. The mere fact that he was nominated to the position he occupied by the Prince Consort led to the great movement in favour of the promotion of chemistry as a distinct science, and which, in conjunction with the efforts of the Pharmaceutical Society to develop chemistry in connection with pharmacy, led to the enormous strides which it was able to make in recent years. Hofmann was highly appreciated by his countrymen, and was raised to the nobility by the Emperor, and it was not necessary to refer to his scientific attainments. He might, however, mention the fact that the whole of the colour industry of this country in connection with what were called aniline dyes originated in his laboratory, though his name was not always associated with it, and much of the pecuniary benefit went in other directions. The work of Brigade-Surgeon Dymock was in a wholly different direction ; he was a correspondent and friend of the late Daniel Hanbury, and he had rendered very great services to the science of materia medica. In the position he filled in connection with the Indian Medical Staff, his name was not brought before the public in the same way as if he had been a lecturing professor, but he was not only an extremely able man in his special subject but was possessed of wide experience and culture. He would ask Mr. Hills, who was a pupil of Dr. Hofmann, to second the resolution and to convey it to Mrs. von Hofmann.

Mr. HILLS said he was very glad of the opportunity of saying a word or two about his old master and friend, and also of referring to the many contributions which Brigade Surgeon Dymock had made to the Museum. With regard to Dr. von Hofmann, he had had the privilege of knowing him for about twenty years, and he was a great friend of his late uncle. He need not refer to his great work in chemical science, or to his remarkable capacity and influence as a teacher, of which the President had made mention. The one special feature of his character which he would allude to was his cosmopolitanism ; he seemed to belong to no country in particular ; he always spoke of this country as dear old England, and seemed almost as much an Englishman as a German. He was a very great traveller, a splendid linguist, and had a wonderful sympathy with his fellow workers wherever they were to be found. He had, moreover, that poetic kind of genius which enabled him to write those wonderful obituary notices of the great workers in science which had become quite classical. He seemed to bridge over the difficulties of nationality and temperament, and made one feel that there was a real republic of science, one and indivisable, of which he was one of the leaders.

The resolution was carried unanimously.

IMPROVEMENTS IN THE SOCIETY'S HOUSE IN EDINBURGH.

The PRESIDENT said he had had the opportunity recently of discussing with Mr. Ewing the suggestions of the Board of Examiners for Scotland, for affording additional accommodation, and as it appeared that nothing could be done until next year, he would propose that the Executive should prepare detailed plans, and obtain estimates for the alterations required. He hoped to have the opportunity of consulting with the Executive on the subject.

This was unanimously agreed to.

REPORT OF THE FINANCE COMMITTEE.

The report of this Committee was of the usual character and recommended sundry accounts for payment.

The PRESIDENT (as Chairman of the Committee), in moving the adoption of the report, said the receipts were about as usual at this time of the year, and included a cheque from the publishers, and a quarter's rent for No. 15, Bloomsbury Square. There was a little extra expenditure in connection with apparatus, etc., rendered necessary by the development of the teaching in practical pharmacy. On the Benevolent Fund account there had been no very large receipts ; but £91 had been received from subscriptions and £115 from ground rents.

The report and recommendations were unanimously adopted.

REPORT OF THE BENEVOLENT FUND COMMITTEE.

The report of this Committee included a recommendation of the following grants :—

£5 to a former associate and member (aged 65) who has had four previous grants, the last a year ago. (London).

£10 to the widow (age 48) of a registered chemist and druggist, who has had two previous grants. She has three children dependent on her. (Sydenham).

£10 to the widow (aged 56) of a registered chemist and druggist. Has three children who are unable to assist her. (Carlisle).

£15 to the widow (aged 68) of a member who died in February last, his business only fetching a trifling sum, insufficient to pay his debts. Applicant is partially paralysed. (Manchester).

£10 to the widow (aged 46) of a member who has had four previous grants of like amount. (Goole).

£5 to a registered chemist and druggist (aged 51) who recently failed in business and is now in a situation. Has four children partially dependent on him. (Brighton).

£7 to a registered chemist and druggist (aged 76) and former subscriber to the Fund. Has had two previous grants. (Lynn).

Two applications had not been entertained.

The Secretary had reported the death of Samuel Robinson, an annuitant aged 85.

Mr. BOTTLE, in moving the adoption of the report, said the cases relieved were of the average character, and the two applications which were rejected were so dealt with on very sufficient grounds.

The report and recommendations were adopted.

REPORT OF THE LIBRARY, MUSEUM, SCHOOL AND HOUSE COMMITTEE.

Library.

The report of the Librarian had been received, including the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
April	Day . .	432	30	10	19
	Evening .	135	17	2	7

Circulation of books.	Total.	Town.	Country.	Carriage paid.
April . . .	207	98	109	£1 13*s.* 0½*d.*

Donations to the Library had been announced (*Ph. J.*, May 14, p. 951), and the Committee had directed that the usual letter of thanks be sent to the respective donors.

The Committee recommended that the undermentioned works be purchased:—

For the Library in London—

Moeller (J.), Pharmakognostischer Atlas, 1892.
Behrens (W.), Tabellen zum Gebrauch bei mikroskopischen Arbeiten, 2 Aufl., 1892.
Cooke (M. C.), Handbook of Australian Fungi, 1892.
Helbing (H.), Modern Materia Medica, 1892.

Museum.

The Curator's report had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
April	Day . .	453	46	7	19
	Evening	54	8	1	2

Donations to the Museum had been announced (*Ph. J.*, May 14, p. 951), and the Committee had directed that a letter of thanks be sent to each of the donors.

The School staff had attended and reported on their respective classes.

The question of the augmentation in the number of local secretaries in Scotland was discussed, and further adjourned.

The PRESIDENT moved the adoption of the report and recommendations. With regard to the question of increasing the number of local secretaries in Scotland the Committee had been unable to come to a definite conclusion for want of materials, but it was suggested that he might see the Executive of the North British Branch on the subject and request them to submit definite proposals. The great difficulty would be in outlying districts where there was a sparse population, but he gathered from Mr. Ewing that there was a certain number of enthusiastic Scotch members who would be willing to undertake the duties, even at personal inconvenience. Probably, therefore, the best way would be for the Executive to further consider the matter and report to the Council.

The report was adopted and a further resolution was carried requesting the Executive of the North British Branch to further advise the Council as to increasing the number of the local secretaries in Scotland.

THE SESSIONAL ADDRESS.

It was resolved that the Library, Museum, School and House Committee be requested to make the necessary arrangements for the delivery of the Sessional address in October next.

PROPOSED ALTERATION OF BYE-LAW.

The PRESIDENT moved the following resolution of which he had given notice, after explaining briefly the necessity for it:—

"That in order to facilitate the arrangements for conducting the qualifying examinations under the Pharmacy Acts, it is desirable that longer notice be given by intending candidates.

"That Clause 20 of Section X. of the Bye-laws be therefore amended in the following manner:—

"*Clause* 20, *Section X.*—For 'first' substitute '*fifteenth*;' and after the word 'month' insert '*immediately preceding that.*'"

The Clause as amended will stand as follows:—

"*Section X., Clause* 20.—All persons intending to present themselves for examination in the Major, the Minor, or the Modified Examination, shall give to the Registrar notice in writing of their intention in that behalf on or before the fifteenth day of the month immediately preceding that in which the Examination is to take place."

If now adopted the new Bye-law would be read a second time at a special meeting of the Council to be held next Wednesday; a third time at the July meeting, and then a special meeting of the Society would have to be called to confirm it.

The VICE-PRESIDENT seconded the motion, and the proposed new Bye-law was accordingly read a first time.

A letter was read from Mr. C. Thompson, of Birmingham, referring to a meeting of Local Secretaries residing within thirty miles of that city, at which a resolution approving the action of the Council in increasing the amount of the annuities, was unanimously adopted.

A letter from Mr. Leo Atkinson, of Brockley Road, was read, urging the desirability of legislation with a view to greater unity of action by all engaged in the trade.

It was resolved that the letter be referred to the Law and Parliamentary Committee.

A letter thanking the Council for the gift of the *Pharmaceutical Journal* was received from the Nottingham Chemists' Association.

REPORT OF THE GENERAL PURPOSES COMMITTEE.

The report of this Committee included the usual letter from the Solicitor stating the progress made with cases placed in his hands.

A number of cases of alleged infringement of the Pharmacy Acts were considered and proceedings recommended.

It was recommended that the salary of the Secretary and Registrar be increased by £150.

The Council, as usual, went into committee to consider the legal portion of the above. With regard to the latter paragraph, the President said that the Registrar and Secretary had a great deal of very onerous work to perform, and it had come to his knowledge that there was an impression in the minds of some of the members that he had been somewhat overlooked. He had therefore put the question down for the consideration of the Committee, and the recommendation above stated was unanimously made. He thought the Council would feel that a gentleman who had been in the service for a great many years, who had mastered every detail of the work, and who had to represent the Society in the absence of the President, should be adequately remunerated, and that the recommendation would be unanimously approved.

On resuming, the report and recommendations were adopted.

The SECRETARY thanked the Council for the very kind and substantial way in which it had shown that his services were appreciated. He had that day been re-elected an officer for the twenty-third time, and in a few weeks he should have completed his twenty-fourth year of service. During the whole of that time he had experienced the greatest kindness and consideration at the hands of the Council, and this generous vote would be an additional incentive to endeavour to justify the confidence placed in him.

Proceedings of Societies in London.

SOCIETY OF ARTS.

Composite Heliochromy.*

BY F. E. IVES.

(*Continued from page* 1016.)

At this period Duhauron's orange-screen negatives were made on chlorophyll plates, and must have been made chiefly by the red spectrum rays. In 1878,† he announced that he had substituted eosine for chlorophyll, so that he must finally have made them chiefly by the greenish-yellow spectrum rays. The significance of this fact has not been generally recognized. The production of three negatives, one through an "orange" screen, one through a "green" screen, and one through a "violet" screen, is a very indefinite procedure. A negative may be made through an "orange" screen chiefly by the action of red rays, or orange rays, or yellow rays, or yellow-green rays, or green rays, or ultra violet rays, according to the character and intensity of the "orange" colour of the screen and the method of sensitizing the photographic plate for colour. Duhauron, who never recognized the necessity of testing his process by photographing the spectrum itself, not only did not find out what it is necessary to do in order accurately to reproduce the natural colours, but at different times he did very different and inconsistent things, without himself knowing that he did so. The facts can very readily be demonstrated by first showing the spectrum absorption of various "orange," "green" and "violet" screens, and then photographs of the spectrum which have been made on plates differently sensitized for colour.

In 1879, Cros‡ also abandoned the idea that red, yellow, and blue are primary spectrum colours, but held that there are three primary spectrum colours and mixtures thereof, and that these primary colours are orange, green, and violet. Like Duhauron, he decided to make negatives through orange, green, and violet screens, and prints in blue, carmine, and yellow. Cros, like Duhauron, was apparently ignorant of the fact that very different negatives can be produced through one and the same screen, and he also allowed all of the invisible ultra-violet rays to act in producing the negative of the "violet" screen.

In 1885, Dr. H. W. Vogel§ proposed to make the colour-prints with dyes identical in spectrum absorption with the colour-sensitizers employed in making the negatives. This does not amount to a principle of colour selection, because the entire spectrum can be photographed on plates sensitized with dyes that cannot be combined to reproduce some colours, and even without any dye at all, by the use of suitable colour-screens.

Some time previous to 1889, I do not know the exact date, the Young-Helmholz theory of colour vision was first recognized in connection with this subject, by Dr. F. Stolze, of Berlin.‖ He said, "Although the colours correspond with certain external processes in nature, there is also no doubt that colour as such is nothing objective, but a subjective sensation, based upon the peculiar irritation of the visual nerves by those external proceedings. We can, therefore, only hope to produce a picture in natural colours, when we are enabled to reproduce upon the same the proceedings which furnish to us the colour impression." "Thomas Young . . . . assumes that there are three kinds of nerve fibres, sensible to red, green, and violet. Objective homogeneous light excites all three; but with red the first is excited strongly, the second and third weakly; with blue, the second and third moderately strong, the first weakly; with violet finally, the third strongly, and the first and second weakly. If all three kinds of nerves are equally strongly excited, the impression of white light will take place." Dr. Stolze suggested, but rather indefinitely, a procedure which, although not really representing the application of this theory, was more nearly consistent with it than were any of the older ones. The theory itself was defective as a basis of procedure, Clerk Maxwell having shown that the fundamental red sensation is not at all excited by the blue-green, blue and violet rays, the fundamental green sensation not at all by the red or violet rays, and the violet sensation not at all by the red, orange, or yellow rays.

It was at this stage that, after ten years of experiment along the same lines as Duhauron, Cros, and Stolze, I myself made certain improvements, and claimed the credit of bringing order out of chaos, by devising a procedure which not only recognizes the facts which support the modern colour theory, but which definitely represents the application of that theory.

This process, although in a general way somewhat similar to those which preceded it, really represents a distinctly new principle, which is that of making three photographs by the action of light rays as they excite the three fundamental colour sensations, and superposing these photographs by means of lights or in transparent pigments which suitably represent the corresponding fundamental colour sensations.

In February, 1888, I demonstrated, at the Franklin Institute, Philadelphia,* a process in which the colour selection was according to a definite plan, and proved by photographing the spectrum itself, adjusting the colour screens to obtain definite density curves in the spectrum negative. This was the first publication in which a really definite mode of procedure was indicated; but it was not until November of the same year† that I demonstrated the method so modified as to definitely represent the application of the Young-Helmholtz colour theory, in accordance with Maxwell's measurements of the relative power of different spectrum rays to excite the respective fundamental colour sensations.

A little study of Maxwell's diagram, showing the result of his measurements, will show that the application of this new principle involves very important departures from the older methods of procedure. In this diagram, which I reproduce, 1, 2, 3 are spectrum colours which represent fundamental colour sensations, because each excites one sensation only, and *a*, *b*, *c* are curves showing the relative power of different spectrum rays to excite the respective fundamental colour sensations.

The first remarkable fact to be gathered from the study of this diagram is, that the rays which represent a fundamental colour sensation are in no case the ones that most powerfully excite that sensation. The red sensation is excited by all the spectrum rays from red to green, but most powerfully by the orange; and the negative to represent the effect upon the fundamental red sensation must therefore be made, not through a red glass, or by the red rays, but by the joint action (in definite proportions) of the red, orange, yellow, and yellow-green spectrum rays. The negative to represent the effect upon the green sensation must

* From the *Journal of the Society of Arts*, May 27.

† "Traité Pratique de Photographie des Couleurs," Paris, 1878; *Photographic News*, 1878, p. 115.

‡ 'Bulletin of the French Photographic Society,' 1879, p. 23.

§ *Annalen der Physik* (N. S.) xxvii., p. 130; *Photo. News*, 1887, p. 568.

‖ *Anthony's Photographic Bulletin* (N.S.), 1888, pp. 516, 555, 588, 647, 678.

* *Journal of the Franklin Institute*, cxxv., 345.

† *Journal of the Franklin Institute*, Jan., 1889.

be made by the joint action of the orange, yellow, yellow-green, green and green-blue spectrum rays, in proportion to their power to excite that sensation. The negative to represent the effect upon the blue-violet sensation must be made by the joint action of the blue-green, blue and violet spectrum rays, in proportion to their power to excite that sensation.

By photometric measurement of the density curve of a spectrum negative, the relative amount of action by the different spectrum rays may be found. It is, therefore, only necessary, in order to secure action by different rays in any definite proportions, to use such a combination of sensitive plate and colour screen as will yield a spectrum negative having a density curve corresponding to the graphic curve representing such proportionate action.

Sensitive plates and colour screens that will yield three negatives of the spectrum, having intensity curves like the three graphic curves in Maxwell's diagram, will produce a permanent photographic record of the effect of light from any object upon the three fundamental colour sensations. This can most readily be accomplished (with separate plates) by exposing a cyanine-stained rapid gelatine-bromide plate through a double screen of aniline yellow and chrysoidine orange, of suitable intensity, for the red sensation; a commercial "orthochromatic" plate through a screen of "brilliant" (aniline) yellow, of suitable intensity, for the green sensation; and an ordinary gelatine bromide plate through a very thin piece of plane-polished green glass for the blue-violet sensation. The screens that will secure the same results all on one kind of plate are far more complicated and difficult of adjustment; but anyone who possesses a photospectrograph and a good assortment of coal-tar dyes can, by the exercise of some skill and ingenuity, make the adjustments for himself.

The set of three photographs of any object, made as I have indicated, of course show no colour whatever; but they contain, in a permanent form, such a graphic record of the natural colours that, in order to reproduce them to the eye, it is only necessary to superpose the three positive images, either upon a screen, or upon the retina of the eye—the one representing the red sensation with pure red light, the one representing the green sensation with pure green light, and the one representing the blue-violet sensation with blue-violet light. The blending of the three images will excite exactly the same sensations as the light coming directly to the eye from the object itself. The synthesis can also be made with superposed transparent colour-prints, and this is the plan which has received the most attention, although the simplicity of *optical* superposition commends it to scientists, and is really more convincing to everybody.

(*To be continued.*)

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting was held on Thursday, May 26, Mr. E. H. Gane occupying the chair.

A paper on "The Isolation of Fluorine" was read by Mr. R. H. Jones.

Isolation of Fluorine.

BY R. H. JONES.

For a long time the isolation of fluorine had been the subject of work amongst some of our earlier chemists; and many attempts were made to isolate it, but not until 1886, when Moissan published his results, were there any records of results at all successful. It is mainly a short account of Moissan's experiments that I am now about to place before you.

Before describing Moissan's experiments, however, I will give a short account of the work done previously. One of the first instances of work was that of Margraff in 1768, who studied the action of H_2SO_4 on CaF_2. Three years later Scheele gave the resulting acid the name hydrofluoric. In 1809 Gay Lussac and Thenard undertook the study of the acid, and succeeded in producing an acid which was pure, but far from being anhydrous; the action of HF on silicates, etc., was also demonstrated. About this time Ampère, in letters to Sir H. Davy, expressed his opinion that HF might be considered to be composed of hydrogen, united with an unknown element F. Davy shared this idea, and proved that HF contained no O; he then sought to isolate the radical, which he considered to be analogous to Cl. He proceeded first by electrolysis, conducting his experiments in platinum vessels, and using the battery of the Royal Society, he found that when an acid is used containing water, decomposition readily occurred, but soon the current proceeded with difficulty. By using some of the concentrated acid he several times obtained a small quantity of the gas, but owing to the diffusion of the vapour of HF and its injurious effects, Davy was forced to abandon these experiments. He next proceeded by trying to react on fluorides with chlorine, but with no success; nevertheless, his experiments were of importance and instruction to later workers. In his first experiments, when a small quantity of the gas was produced, the platinum or gold vessels in which the experiments were made were corroded, and glass was attacked with formation of SiF_4. In a memoir on these experiments Davy expressed his opinion that fluorine when isolated would be found to possess a greater activity than any known element.

Following Davy's work comes that of Aimée, the brothers Knox, and Louyet, who all worked on different metallic fluorides with chlorine, but without success, Louyet putting such an enthusiasm into his work that he omitted any of the necessary precautions against injurious gases, and paid with his life for his devotion to science.

M. Frémy next undertook the study of the compounds of fluorine; he carefully ascertained the properties and composition of metallic fluorides, and demonstrated the existence of some double fluorides, *e.g.*, KF·HF; he also proved conclusively that chlorine would not liberate fluorine from fluorides, and so gave his attention to electrolysis.

CaF_2, which is found naturally highly pure and anhydrous, was used in his first experiments. It is fused and maintained liquid in a platinum vessel, while a current of electricity is passed through the fused mass Ca goes to the negative pole, while a gaseous body liberating I from KI evolved from the positive pole, and undoubtedly fluorine; unfortunately the metal Ca set free pierces and so spoils the platinum vessel so that the method is of no value. M. Frémy varied his experiments and modified his apparatus but without attaining the desired result. However, his experiments, like Davy's, served to demonstrate the properties of the gas, and two very important facts were deduced from his work. The first has regard to the preparation of pure anhydrous HF, in a method I shall have to refer to later. The second is a fact which Moissan has been able to appreciate, the tendency of fluorine to combine with nearly any element or compound—thus, with chlorides to form fluochlorides, etc. Faraday showed that anhydrous HF was a non-conductor of electricity, and if water were added the water alone was electrolyzed; our countryman Gore verified Faraday's statements and did a great amount of unsuccessful work. Sometimes a small quantity of the gas was obtained, but the methods employed could not produce the gas in a state of purity sufficient to enable its properties to be studied.

Moissan's experiments covered a period of some three years, and in the whole history of chemistry rarely has such incredible perseverance and such wonderful pluck been shown. Four different times Moissan had to interrupt his experiments on account of injurious effects caused by the fumes, but he always returned again to his experiments, and in the year 1886 was able to publish a satisfactory method of isolation. All the experiments are characterised by the same elaborate precautions.

His first experiments were to try the effect of electric sparks on some gaseous fluorides :—

Fluoride of Silicon.—The gas was first dried, then left for five or six hours in contact with KHO : a known volume was placed in a vessel over Hg, and platinum wires were admitted in glass tubes filled with Hg ; the vessel and tubes being previously dried with great care. Sparks of ·04 mm. were passed through the gas for one hour, and on cooling the gas again examined. No deposit of silicon occurred, the volume and property of the gas remained constant. The same experiment conducted on a mixture of equal volumes SiF_4 and O gave identical results.

Trifluoride of Phosphorus.—When series of sparks were passed through a volume of absolutely dry PF_3, the volume diminished and a deposit of phosphorus occurred on the side of the vessel. The product was found to be a mixture PF_3 and PF_5. Some F was liberated and combined with more PF_3. If the gas previously contained a trace of H_2O the F liberated formed HF, which attacked the glass forming SiF_4. By mixing PF_3 4 vols. and oxygen 2 vols. and submitting to an electric spark, an explosion occurred, and a compound of the composition PO_2F_3 was obtained.

Pentafluoride of Phosphorus.—Series of sparks of ·04 m.m. failed to decompose the gas. Using sparks of ·2 mm. the glass was quickly corroded, the Hg attacked and its brilliancy lost. The sparks were passed for one hour, and on cooling the volume of the gas was found to be diminished. On analysis it was found to deposit silica in contact with water, indicating the formation of SiF_4, and the remaining gas gave all the reactions of PF_3.

Trifluoride of Arsenic (AsF_3) which is a liquid at ordinary temperatures and boils as 63°, so could easily be maintained in gaseous condition, seemed to Moissan a very suitable substance. He used the same apparatus as before, surrounding it with a steam cylinder. A little AsF_3 was introduced, which was soon converted into a gas, and a series of sparks passed for an hour. On examination of the gas after the experiment it was found to consist of SiF_4 a great part, and as it displaced I from KI a small quantity of F had escaped the action of the glass. The platinum wires were found to be covered with a black coating of arsenic.

It was therefore proved that the action of electric sparks on the gaseous fluorides was of no value for isolating this energetic element. Moissan now tried the effect of red hot platinum on the gaseous fluorides.

Action on PF_3.—Spongy platinum was first washed with HF, then with distilled water, dried, and then placed in a platinum tube 80 c.m. long and 1 c.m. in thickness. This apparatus which had to be maintained at a red heat was placed in a porcelain outer tube, through which a current of nitrogen was kept circulating to prevent access of furnace gases. The ends of the platinum tube were fitted by means of screws with platinum tubes for the admission and exit of the gas. A current of H was first passed through to remove air, then a current of N. The PF_3 was displaced by dry Hg from a cylinder into the red hot platinum tube. With a slow current the spongy platinum absorbs the gas and a partial vacuum occurs. If a rapid current of the gas were passed some PF_5 was produced and a little fluorine. A compound of phosphorus, platinum, and fluorine was formed also, which explained the formation of the vacuum, and which damaged the apparatus so much that a fresh platinum tube was required for each experiment.

Action on PF_5.—The apparatus used was the same as with PF_3, but the abducting tube kept cool by lead serpentine condenser. After clearing the tube with H and N, a rapid current of PF_5 was first passed, then the current moderated and five minutes later again the current increased, and the properties of the gas from the abducting tube studied. The properties showed that a fair quantity of fluorine was set free, and although far from solving the problem, served very much to encourage Moissan.

Action on SiF_4.—100 c.c. yield after passing through the tube about 2 c.c. of fluorine.

These results demonstrated to Moissan the impossibility of obtaining the desired result at high temperatures, and he now once more had recourse to electrolysis.

He commenced with AsF_3, and for a long time seemed persuaded that he would be able to obtain the desired result from this compound. AsF_3 being a liquid at ordinary temperatures, composed of the gas united to a solid, there was certainly ground for hope that the solid would be set free and the gas evolved without contamination. The experiment conducted in a platinum vessel on some very pure AsF_3 furnished very little of the gas, however, Moissan finding that the liquid was a very bad conductor. This defect was increased by the deposition of arsenic on the electrodes. Not discouraged, he added HF (anhydrous), KFHF, etc., to make the liquid a better conductor, and found the best results were given when KF.HF was used. With a very strong current he was able to effect more action, but the F set at liberty combined with AsF_3, to form AsF_5. The experiment with KF.HF led him to the decomposition of HF.

His first apparatus consisted of a platinum U tube, bearing at each arm an abducting tube for the escape of the gases ; the arms were closed by cork stoppers, through which the platinum wires connected with the battery passed, and the stoppers were imbedded in paraffin. As anhydrous HF boils at 19°·4 C., the apparatus was immersed in a bath of CH_3Cl, maintained in tranquil ebullition by a current of air ; this gives a temperature of from —23° to —50°, low enough to avoid all possibility of any gas evolved being contaminated with HF vapour. Some KF·HF was previously placed in the apparatus ; and, when ready, a certain volume of anhydrous HF. The current being started, the liquid was at once decomposed, and the current proceeded without diminution. At the negative pole a gas was evolved, easily recognized as H ; but the gas at the positive pole presented none of the properties of fluorine. On dismounting the apparatus it was seen that the cork and paraffin at the positive pole were charred, due unquestionably to removing the hydrogen, and the electrode was strongly corroded. Here then, after three years' intermittent work, Moissan had at length discovered a satisfactory means of liberating the gas. It was now only necessary to perfect the apparatus. He first substituted the stoppers of fluor spar, covering them with gutta percha ; which, however, was soon decomposed. Gum lac and other substances were found to be equally useless ; se he fitted the fluor spar stoppers into platinum cylinders, which could be screwed into the arms of the tube. He also used for the electrodes wires of platinum containing 10 per cent. of iridium, which were less affected by the gas than simple platinum The U tube was placed in a glass cylinder, containing CH_3Cl, in order to as much as possible escape the effect of that vapour. A commutator and ampère metre were connected with the platinum wires, in order to regulate and measure the force of the current

In the preparation of the anhydrous HF he first took a quantity of commercial acid, neutralized one-quarter of its bulk within an alcoholic solution of KHO, mixed the two solutions, and distilled about half. The residue contained any fluosilicate of potassium formed. Half of the distillate was exactly neutralized by K_2CO_3 and the neutral solution added to the other portion. KF·HF was thus formed. This was evaporated to dryness in a platinum dish, and the dish placed in a vacuum in presence of KHO and strong H_2SO_4. These were replaced every fifteen days. When quite anhydrous the KF·HF fell to powder. It was then introduced into a still, previously dried, and gently heated for an hour or so. Any HF evolved carried away all traces of moisture. A condenser was then attached and the acid slowly distilled. This acid was perfectly pure and anhydrous.

The details of the experiments were very minute, but the principal were these:—The platinum tube, during the preparation of the acid, and the electrodes were dried at a temperature of 120° C. After cooling 5 to 7 grams of KF·HF was introduced, the stopper screwed down and covered with gum lac, and the abducting tubes kept dry by tubes containing KHO. The apparatus was then introduced into the cylinder, filled with CH_3Cl, kept in tranquil ebullition, and the HF introduced by aspiration with dry Hg through the abducting tubes. A current of medium strength was found most convenient. If the HF in the tube was not sufficient to separate the two gases as formed they reunited with an explosion. The reaction occurring seemed to Moissan as follows:—(1) $KF = K + F$; (2) $K + HF = KF + H$.

Some time after the isolation Moissan again modified his apparatus in order that a sufficient quantity of the gas might be obtained for experiments. The modifications consisted in the enlargement of the U tube to a capacity of 160 c.c., the electrodes being again of platinum and the parts exposed to the gas club, shaped in order to withstand the action of the gas longer. New electrodes were required for each experiment, however. As the gas was required absolutely pure a spiral condenser of platinum was connected with the positive abducting tube, and this condenser was surrounded by CH_3Cl, maintained at as low a temperature as possible—50° C. As HF boils at 19°·4 C., the gas on leaving the tube ought to have been quite free from HF. Moissan, however, took a further precaution by connecting with the condenser two tubes of platinum containing fragments of fused NaF, which takes up HF with extreme avidity. The junctions at the various points were made by screw joints, between the nuts and flanges of which lead collars were compressed. The lead is converted during the experiment into lead fluoride, which is of greater bulk, and so hermetically seals the joint.

With this new apparatus a yield of from 3 to 4 litres of gas an hour was obtained. As the quantity of acid was more than could be decomposed in a day, arrangements were made to hermetically seal the apparatus, which could then be kept for any length of time in a vacuum ready for use.

In the experiments with the later apparatus the reaction was found to be more complicated than was before stated.

A compound was found as a deposit containing K, Pt, and F. The action is supposed to be as first stated, but F, instead of being liberated, combines and forms PtF_4. This unites with the alkaline fluoride KF, forming $2KF, PtF_4$, andt his gives off F gas.

The physical properties of fluorine are few; its odour is exceedingly penetrating and recalls that of HClO; diffused with air it is extremely irritating to the eyes and throat; it is not liquified at 95° C. The chemical properties are exceedingly interesting, showing a most wonderful activity. In contact with mercury it combines in the cold, forming protofluoride. It combines with all metals, except gold and platinum, with great energy, accompanied in some, *e.g.*, iron or warmed zinc, by burning. Phosphorus submitted to the gas burns with intense brilliancy. Crystalline silicon at once takes fire. Hydrogen combines even in the dark with explosive violence. Alcohol, ether and turpentine take fire on contact, and numerous other examples could be given of the avidity with which fluorine enters into combination.

A discussion followed, in which the Chairman, Messrs. Jowett, Fuge, and Browne took part.

A paper on "Electricity as Applied to the Production of Light," was then read by Mr. T. J. Hayton.

The paper was illustrated by specimens of lamps, switches, etc., and a dynamo of the author's own construction; it gave rise to a discussion in which the Chairman, Secretary, Messrs. Boucher, Jowett, Shaw, and Browne joined.

After a short discussion on miscellaneous topics the meeting adjourned.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of the Council on Tuesday, May 31, the following gentlemen were elected officers for the ensuing year:—President, Mr. F. A. Rogers; Vice-Presidents, Mr. W. A. Morris and Mr. J. C. Stead; Treasurer, Mr. C. J. Strother; Hon. Secs., Mr. E. F. Harrison (financial), and Mr. E. J. Pavy (literary).

Provincial Transactions.

BRIGHTON ASSOCIATION OF PHARMACY.

The above association celebrated its sixth annual dinner on Thursday, June 2, at Booth's Restaurant, East Street. Thirty-five persons were present.

Alderman A. H. Cox, J.P., took the chair in the absence of the esteemed President, Mr. W. D. Savage, J.P., through illness. The Mayor (Dr. Ewart, J.P.) and Dr. Newsholme (Medical Officer of Health) were also present.

After dinner the usual loyal toast was honoured, then Dr. Newsholme submitted the toast of "The Town Council," to which the Mayor (Dr. Ewart, J.P.) responded, and pointed out that the low death-rate in the town was due to efficient sanitation, promoted by the Town Council. Cases of infectious diseases were now rapidly isolated and were becoming extremely rare. The speaker related his experience in India, where he proved the existence of typhoid fever, which had previously been regarded as malarial fever. Before resuming his seat the Mayor referred in felicitous terms to the life-long services of Alderman Cox to the town.

Mr. Goode, in a few sentences, submitted "The Pharmaceutical Society," remarking upon its success in carrying out the Pharmacy Act.

Mr. Marshall Leigh, on rising to respond, expressed his deep concern at the illness of Mr. W. D. Savage, a gentleman who for twenty-six years had rendered efficient service as a member of the Pharmaceutical Council, and had helped forward those movements which had matured during the last few years. He (the speaker) had followed Mr. Savage on the Council, and every year he felt more and more the responsibility of the position. He was more than ever convinced that the Council deserved the respect of the public and the support of the trade. The Pharmaceutical Society was a trustee of public safety so far as the sale of poisons was concerned, and the Council

endeavoured to carry out the trust, (1) by the creation of a body of educated and competent men, (2) by preventing the sale of poisons by unqualified persons. In explaining the latter statement, he asserted that the recent legal decisions in the weed-killer, Wheeldon, and chlorodyne cases, had made it much easier to restrict the sale of scheduled poisons to chemists and to punish unqualified sellers—he called particular attention to the decision in respect to patent medicines containing poisons, and recommended those present to take up a position in harmony with that decision, not only in regard to the preparations of other makers but also their own, adding a label, explaining why the "poison" label was used. Alluding to the Benevolent Fund, the speaker made an earnest appeal for its support. Over £2000 was spent annually in relief of those who had been chemists or were chemists' relatives. It was felt that the present sum paid to annuitants (£30 and £35 a year) was most insufficient, and incompatible with the position and education of a chemist; so they were desirous of increasing the sum to £50 a year. The change would be made next October, and it was hoped that to meet an extra expenditure of £700, chemists would increase their subscriptions. In conclusion, the speaker spoke of the valuable services rendered by Mr. Michael Carteighe to the Society and trade.

The Chairman at this point invited those present to accompany him for a trip on the River Arun, in the steam-yacht *Sissie*, on Monday, June 20.

Mr. Padwick next proposed "The Brighton Association of Pharmacy," to which Mr. W. W. Savage responded, making feeling references to his father, who has been President of the local association since its formation.

The toast of "The Junior Association" was given by Mr. E. Histed; and Mr. A. E. Colman, the President, in responding, gave an interesting sketch of the work of the Association, and held out encouraging hopes for its future success.

EDINBURGH PHARMACY ATHLETIC CLUB.

A meeting of the Golf section was held in the Pharmaceutical Society's House, 36, York Place, on Tuesday, 7th inst., at 9 p.m., Mr. J. Laidlaw Ewing, Honorary President, in the chair. It was explained that the meeting had been called to appoint a committee to make arrangements for the monthly competitions for the Gold Challenge Medal presented by Robert Dick, Esq. It was agreed that the first meetings for play should be on Friday, 24th, and Saturday, 25th June. Messrs. Blake, Horsburgh, Traill and the Secretary were appointed a committee to make all the arrangements. Those wishing to compete should give in their names at once.

The first annual amateur athletic sports of the Club will be held at Powderhall Grounds, Beaver Bank, on Wednesday, 6th July, at 6.45 p.m. The various events are open to all amateurs connected with the profession of pharmacy in Edinburgh and district. The Swimming competition is to be decided in the Corporation Baths, Infirmary Street, on Wednesday, 29th June, at 6·30 a.m. Entries for the latter must be made with the Secretary, J. P. Gibb, 8, Buccleuch Place, or any member of Committee, on or before Saturday, 25th inst. All other entries to be made on or before Wednesday, 29th June.

BOOKS RECEIVED.

JAHRBUCH DER CHEMIE, 1891. By RICHARD MEYER. Frankfort: N. Bechhold.

INTERNATIONAL MEDICAL MAGAZINE. Edited by JUDSON DALAND, M.D. Philadelphia: J. P. Lippincott Company.

Reviews and Notices of Books.

PHARMAKOGNOSTISCHER ATLAS. By Dr. J. MOELLER. With 110 plates.*

That the pharmacist should possess the knowledge and skill necessary to enable him to ascertain the purity of the chemical preparations used and sold by him has long been admitted, and it has frequently been urged that such a control should be systematically exercised. Not the less desirable has it been considered that he should exercise a similar control over the quality of the crude drugs supplied to him in the ordinary course of business. Lectures and demonstrations in analytical chemistry and materia medica, recognized parts of the curriculum of every pharmaceutical school, enable him to comply with this requirement.

But a large proportion of the crude drugs must be reduced to a powder finer than it is possible for the retail pharmacist to produce with the apparatus usually at his disposal; these must be procured in that state from the wholesale drug house, or must be reduced to that state for him by the drug millers. In neither case can the pharmacist offer a personal guarantee of the purity of such drugs unless he is in a position to examine them with the aid of a microscope, and how meagre are the opportunities afforded to students of acquiring the ability necessary to enable them to conduct such an examination! Not until quite recently was it thought requisite that candidates for the Major examination should possess any practical knowledge whatever of the use of the microscope, whilst systematic instruction in so necessary a branch of their studies was unknown.

The importance of educating pharmaceutical students in the use of the microscope as the only means of detecting impurities in powdered drugs received official recognition two years ago in Austria, when a course of microscopical pharmacognosy was made an obligatory part of the pharmaceutical curriculum. The primary object of the atlas now being published is to assist the students during their studies; it is not, however, to this class alone that it appeals; pharmacist and public analyst will alike find it indispensable.

The drugs to be treated of number in all 120, some of which, however, are seldom, if ever, used in this country. The work is to be completed in June, and consists, as its title indicates, of a series of plates accompanied by descriptive letterpress. The first part deals with the principal starches (13 in number), lycopodium, kamala, lupulin, and tragacanth, drugs which are used in the form of powder, together with some of the leaves.

The illustrations of the starches are perhaps the most accurate that have ever been published, and as all the plates in the work are drawn to the same scale (250 diameters), the relative sizes are seen at a glance. The figures are not so diagrammatic as is usually the case, the endeavour having been made, as the experienced eye will at once perceive, to reproduce the exact appearance of the microscopic image. In the case of the leaves particular importance has been attached to the epidermis of both surfaces, stomata, hairs, glands, etc., as observable in the powdered drug, since it is in these that distinctive characters are to be sought. Sections of portions of the leaves are represented here and there when desirable. To each plate is attached a short description, in which particular attention is directed to characters possessing a diagnostic value; in this a special feature of the work is to be discerned, and one which will render it unique and invaluable.

Occasionally only is a hint given of special treat-

* Berlin: Julius Springer. Price 25*s*.

ment requisite for the examination of the drug; bearing in mind the fact that the atlas is intended for the use of students, an extension in this direction would, we venture to think, have been acceptable.

With the exception of Vogl's 'Atlas,' in which, however, more prominence is given to sections and less to powders, we know of no work approaching this of Professor Moeller's in scope or in execution. The author's wide reputation as a microscopist will be a sufficient guarantee that the standard reached in the first part will be maintained throughout the work. When complete the 'Atlas of Pharmacognosy' will be indispensable as a work of assistance and reference to every student, pharmacist, and public analyst.

A Short Text-Book of Inorganic Chemistry. By Dr. Hermann Kolbe, late Professor of Chemistry in the University of Leipzig. Third Edition. Revised by H. Lloyd Snape, Ph.D., D.Sc., Lond.*

Among the multitude of text-books offered to the student of chemistry, that of the late Professor Kolbe has long held a prominent position as one that is admirably adapted for communicating those general ideas which are essential as the basis of chemical knowledge. It is natural, therefore, that it should have been translated into the English language and made available for English students, as well as those for whose use it was originally written. The leading principle upon which Kolbe's text-book was designed was that of providing for the student who is a continuous and attentive attendant of systematic lectures a means of recalling to his mind what he has there heard and seen. The opinion that a knowledge of chemistry can be acquired from any book, though absurd enough to those who are capable of judging, is an opinion very commonly entertained by many who require to study chemistry to some limited extent. As pointed out in Professor Kolbe's preface, nothing can be more foolish, since a knowledge of chemistry has to be acquired by the special education of the faculty of observation; and can only be acquired by the cultivation of that faculty in every one of its forms. Both in lectures and in books, however, the mind of the student should be concentrated upon those facts and experimental demonstrations which best serve to give him correct ideas of the nature of chemical phenomena. For that reason chemistry cannot be taught as a descriptive science, but rather as a language is, by continued practice in the use of it. Since the majority of the students who have to attend lectures on chemistry have no occasion to make it a special study, attention to the principle above mentioned is very important; and as Kolbe's text-book has been written expressly to meet the wants of such students, it ought to be regarded as one of the most useful for the general student.

Watts' Dictionary of Chemistry. Revised and entirely re-written. By H. Forster Morley, M.A., D.Sc., and M. M. Pattison Muir, M.A. Assisted by eminent contributors, vol. iii.†

The volume of this excellent work which has just been published, carries on the alphabetical treatment of the subject matter to the commencement of the phenyl compounds. As compared with the previous volumes the articles on theoretical and general subjects occupy less space, the chief of these, relating to isomerism, isomorphism, metallurgical chemistry, the theories of molecular constitution, nomenclature, and the periodic law, occupying about 40 out of the 856 pages. The remainder of the volume is taken up with descriptive matter, the sections devoted to methyl compounds and to nitrogen compounds extending respectively to 150 and 120 pages. Throughout it is apparent that the authors have bestowed great care upon the references to original memoirs published in various English and foreign journals. In this respect alone the dictionary will be very serviceable to those who require to make a more minute study of particular investigations. As regards the information furnished under the several heads, as to matters of detail and as to theoretical views, this volume of the dictionary has been well brought up to the present time, and it fully sustains the character of the previous volumes. As a complete and trustworthy compendium of chemical science the dictionary may be regarded as an indispensable necessity for all persons engaged in occupations involving chemical knowledge.

* London: Longmans, Green and Co. Crown 8vo., with illustrations, pp. 616. Price 8*s.* 6*d.*

† London: Longmans, Green and Co. Large 8vo, vol. iii., pp. i-xii., 1-856. Price 50*s.*

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith. Matter intended for publication should be written on one side of the paper only.*

French Pharmaceutical Qualifications.

Sir,—There may be a few of our craft who would like to take the French qualification for practice in France, which has so many advantages over that at home. I therefore enclose the following letter from the Secretary of the Faculty at Marseilles, which is considered the easiest and cheapest place for foreigners to qualify from.

"Monsieur,—Un pharmacien anglais doit être pourvu d'un diplôme français de pharmacien. Pour obtenir ce diplôme, il doit demander 1°, l'équivalence de études qu'il a faite en Angleterre à celles qui sont exigeés en France, et 2°, l'autorisation de subir les trois examen probatoirer.

"Cette demande, que doit être écrite sur papier timbré à 0,60 c., doit être adresseé à M. le Ministre de l'Instruction Publique à Paris. Elle doit être accompagneé du diplôme de pharmacien anglais et d'une traduction française certifieé conforme de ce diplôme.

"Veuillez agréer, monsieur, l'assurance de ma parfaite considération. "Le Secrétairê, P. Vigneau."

Six months' study is usually considered sufficient, with the Minor or Major qualification, to pass the Final, which is divided into three portions of two days each. A bill has not long been passed compelling all foreign medicals to take a longer course of study in France, and the Pharmaceutical Faculty intend a similar Bill shall be passed in their favour, so it is advisable that intending candidates should not lose time.

Cannes, France. A. Westley Gedge.

NOTICES OF MEETINGS.

Society of Chemical Industry (London Section).—Monday, June 13. Papers on "Oil Gas," and "The Soluble Bituminous Constituents of Certain Japanese Coals," by Professor V. B. Lewes and Mr. Watson Smith.

Chemical Society.—Thursday, June 16. Ballot for the election of Fellows. "Contributions to an International System of Nomenclature." "The Nomenclature of Cycloids," by Dr. H. E. Armstrong. "The Production of Pyridine Derivatives from the Lactone of Triacetic Acid," by Dr. N. Collie.

Erratum.—Page 1006, column 2, line 7 from top, for "tropic" read "atropic," and, line 18 from top, for "platinum salts contain" read "platinum salt contains."

T. J.—The plant is apparently *Habenaria viridis*, but is not quite a typical specimen.

Communications, Letters, etc., have been received from Messrs. Kemp, Blount, Bennett, Hill, Leigh and Crooke.

CHLOROFORM.

The questions which have recently been raised as to the relative purity of different kinds of chloroform and their applicability for anæsthetic purposes have received considerable attention in Germany. At a meeting of the Berlin Pharmaceutical Society last February the subject was dealt with by Drs. Schacht and Biltz (see "The Month," li., 691). Since that time a monograph has been published by Dr. Biltz in which he reviews the work that has been done to add to the knowledge of chloroform since the time it was first employed for producing anæsthesia. Dr. Biltz attaches great importance to the decomposition effected in chloroform by the influence of light, as being one of the chief circumstances which contribute to make chloroform dangerous, and we take from a German contemporary a summary* of his remarks on this part of the subject. It may here be mentioned that while the German Arzneibuch orders chloroform to be kept protected from light there is no direction to that effect in the British Pharmacopæia.

Dr. Biltz regards it as an established fact that the decomposition to which chloroform is liable does not result from the presence of certain impurities as has been assumed; but that it is a natural characteristic of chloroform. Consequently whatever may be the source from which chloroform is obtained, by whatever method it is prepared, and however perfectly it is purified, it is in all cases equally indispensable to adopt fitting precautions against the decomposition of which it is naturally susceptible.

The purer chloroform is, and the greater its freedom from alcohol, the more readily and the more rapidly does it undergo decomposition when exposed to light in vessels of white glass containing air. It is to this decomposition that is to be ascribed the danger attending the use of chloroform for medicinal purposes. The decomposition is brought about by atmospheric oxygen displacing, under the influence of light, a portion of the chlorine while at the same time there is a formation of phosgene gas and water.

It is to the presence of free chlorine and phosgene gas in chloroform that Biltz attributes the danger attending the use of chloroform, and on that account he considers that it should be protected from light, and the decomposition prevented by a sufficient addition of alcohol.

The protection afforded by the presence of alcohol, however, is but limited. The joint action of air and light still causes decomposition, but while alcohol is present it takes up the prejudicial products of decomposition, forming with them products which are harmless and even suitable for producing anæsthesia. When the alcohol has been exhausted in this way the liberation of chlorine and the formation of phosgene gas are no longer counteracted. The time that may elapse before this decomposition commences is dependent upon the intensity of the light to which the chloroform is exposed, also to some extent upon the quantity of air with which it is in contact. Consequently in diffused daylight the alteration is more rapid in summer than in winter, and it is still more rapid in direct sunlight. In the latter case chloroform absolutely free from alcohol will be decomposed within one or two hours in summer time, and in diffused daylight within one day, while in winter it may take ten days, according to the clearness of the atmosphere.

In regard to the protection afforded by alcohol Biltz finds that with one part of alcohol in four hundred decomposition is prevented only for a few weeks or months. With double that proportion the preventive effect lasts for eleven months, and with one per cent. it continues much more than a year. He is of opinion that all the statements made as to the keeping quality of certain kinds of chloroform point only to the circumstance of failure to detect the presence of alcohol to which the permanence of the chloroform was due.

The method recommended by Biltz for that purpose is treatment with a chromic acid solution prepared by dissolving potassium dichromate in 2000 parts of water containing one-eighth its volume of sulphuric acid. The chloroform to be tested for alcohol is well shaken with half its volume of this solution and then allowed to rest. With one per cent. of alcohol the chromic solution soon becomes paler in colour and at last appears quite colourless, since the green colour of the chrome salt produced by the alcohol is not perceptible in that degree of dilution. With less than a quarter of one per cent. the reduction takes place much more slowly, and with a tenth of one per cent. an entire day is requisite. In such cases the reduction of the yellow tint must be determined by comparison with a portion of the test solution in a second tube of the same dimensions. When the chloroform is absolutely free from alcohol the tint of the solution is not altered after several days. Lieben's iodoform test may also be applied by shaking the chloroform with water and adding to the separated water a colourless solution of iodine in caustic potash.

As the result of a great number of observations, made by Schacht and Biltz with different kinds of chloroform, as to the action of concentrated sulphuric acid upon them the following conclusions have been arrived at:—

1. That chloroform prepared from alcohol and chloride of lime, when perfectly purified by concentrated sulphuric acid and completely freed from alcohol by copious washing with water, does not communicate any colour to concentrated sulphuric acid either before or after its decomposition by air and light.

2. When chloroform that does not colour sulphuric acid gives, after undergoing decomposition, a colour to sulphuric acid, that result can only be due to the action of a product of the decomposition —especially free chlorine—upon some foreign substance, *i.e.*, either ethyl chloride or alcohol. If therefore, in decomposing chloroform free from alcohol and in contact with a layer of sulphuric acid, a drop of alcohol be added, the free chlorine and the phosgene gas disappear immediately and the sulphuric acid is coloured brown owing to the alcohol having been converted into ethyl chloride.

3. When chloroform that is absolutely free from alcohol and that does not colour sulphuric acid is left to undergo decomposition and the acid after that becomes brown, this coloration indicates the presence of ethyl chloride that has been converted by the free chlorine into a higher chlorinated product.

* *Pharm. Centralhalle*, 33, p. 269.

Applying these results to Pictet's chloroform Biltz comes to the conclusion that it is in regard to purity one of the best, if not the best, to be met with. He thinks that this should have been the limit of its recommendation, and that it was a mistake to have attempted, on the basis of the antiquated belief that the susceptibility of chloroform to decomposition is simply due to its containing those impurities which are removed by Pictet's process, to recommend it still further as having been less susceptible of decomposition than ordinary chloroform. The demonstration by Schacht and Biltz, at the February meeting of the Berlin Pharmaceutical Society, that the Pictet chloroform undergoes decomposition precisely in the same way and at the same rate as ordinary chloroform, showed that in this respect there was no difference, and that the precautions of adding alcohol and keeping in the dark are as indispensable in the one case as in the other.

HINTS ON THE PRESERVATION OF MEDICINES.*

BY FERD. LASCAR, PH.G.

Everything on earth is perishable, inanimate as well as animate, and it is only within the province of few bodies to become better and stronger by old age. Drugs share this condition of things; they become stale, lose virtue, and finally in the course of time are rendered worthless, but it is within the province of the painstaking pharmacist to counteract the inroads time will make and to preserve even in long-kept medicines their specific value. The art of doing this is no less important than the pharmaceutical skill to select drugs and to prepare medicines correctly, but while text-books on pharmacy often are brimful with descriptions of the physiological properties of medicines and their preparation, it seems to me that often too little stress is laid upon describing the best and most practical means of preserving them. In the rapid progress of modern medicine with its continuous addenda of new therapeutic agents, with its eagerness to supply something new, and its army of more or less specific drugs, I find that frequently the importance of keeping medicines properly receives too little attention.

As every pharmacist learns to his sorrow, there are drugs contained in his stock which deteriorate and become unfit to dispense. The financial loss incurred, and the vexations attending such spoiling of goods, may, however, often be averted. In the first instance it is essential, of course, to limit the stock of perishable drugs to the necessity of a rational demand, but in the second instance it is well to throw around them all the safeguards against spoiling that we know of.

To keep medicines of a standard appearance, and strength in stock, and to dispense only such is also the road to pharmaceutical progress and prosperity, and is a further argument in favour of a thorough knowledge and study of how to preserve drugs. The forces at work which spoil them are not manifold but they are potent, for they are the same life-producing powers of nature which change continually the appearance of the earthcrust, which grind the granite to powder, which dissolve the rock and are instrumental in the creation of both. They are air, humidity, light, and the bacterial vegetation produced by their combined action.

Every pharmacist if he investigates his shelf bottles, will find some in which the stoppers are faulty and admit air to the contents. To remedy this should be the first step, while the next should be to pay attention to the fact that many medicines require imperatively to be kept in the dark.

But I have often seen that, even with both these safeguards, things have occurred which tended towards a deterioration of the contents of the bottle. I have seen some pharmacists, otherwise capable men, pour powders from shelf bottles, and put the bottles, after having used them, again on the shelf, with an utter disregard of the fact, that some of the powder might have remained between the stopper and the bottle. Here arises a double danger, for not alone are air and moisture admitted to the drug, but what is left on the rim of the bottle soon becomes contaminated by the dust, and may, when the bottle is used next time, enter into the quantity then taken from the same. Now, many of my readers will deem this overdrawn; they may themselves be scrupulously clean and exact, but all do not use spoon or spatula.

With bottles containing medicines in a liquid form it is of equal importance that the stopper fit well, as by evaporation and admission of air changes may be wrought. Also here the exterior of the bottle should receive attention; frequently it happens, as in solutions of salts, like sulphate of morphine or less toxic substances, some of the contents remains on the rim of the bottle and this will dry there, only to be washed down by the next quantity poured from the bottle, thereby increasing its strength. This same thing occurs with tinctures of aconite, digitalis, strophanthus and others, and should never be tolerated in a well regulated pharmacy where all shelf bottles should be kept scrupulously clean in and outside, and never as some syrup shelf bottles do, directly invite contamination by having ill-fitting and impractical stoppers.

To preserve medicinal syrups in our shelf bottles it is well to select that part of the pharmacy which the sun never gets at. The bottle before being refilled should always be washed with hot water and thoroughly drained out, and it should have a stopper excluding the air. The over stock of many syrups may be more advantageously kept in bottles of the same capacity as the shelf bottles, instead of being kept in larger receptacles; such bottles should be filled with freshly-made syrup while yet hot and then be tightly corked. Where admissible, 1 c.c. of alcohol may be poured on the syrup ere corking the receptacle, as this greatly aids in keeping the syrup. Syrups so prepared should be kept in a cool place, and where no cellar is available they may be kept in a box containing moist sand. Every syrup ought to be dispensed as clear and transparent as possible, as invariably there is less danger of a clear syrup becoming spoiled than of a cloudy one. In some instances in very unsightly syrups an improvement can be made by clearing them with the albumen of egg. This device answers often in cases of fruit syrups which have begun to ferment and have become turbid. By such treatment the syrup becomes crystal clear. In boiling simple syrup even, I would recommend this device, as so made it will prove vastly superior in preparing elixirs and kindred preparations. For preparing syrup of iodide of iron such a syrup is especially well adapted. A most elegant preparation can be obtained if the still hot iron iodide solution is filtered into a hot cleared simple syrup of a somewhat denser consistency than the officinal. Such syrup of the iodide filled in bottles of a suitable capacity, well-corked and sealed, placed in the cellar or in a box of moist sand will keep unchanged for two or three years. A syrup which in summer time often becomes troublesome notwithstanding an amount of officinally admitted glycerin is our ordinary syrup of wild cherry. In the case of this syrup it seems to me a minute addition of salicylic acid (1 or 2 milligrams to the ounce would be admissible. By such addition it will

---

* From the *Druggists' Circular*, June.

remain clear longer, while not losing taste. Syrup of ipecac I prefer to make with hot freshly prepared, and albumen cleared, simple syrup. It often occurs that pills, ready made ones, for dispensing and for sale over the counter, become moist, unsightly and unsaleable. This can in most cases easily be avoided. Such pills ought in all instances before being put in stock be sufficiently dried and then kept in an absolutely dry powder, lycopodium preferably to any other. The pills should, furthermore, never be so disposed that eight or ten layers rest upon the lowest one. It is but natural if this is done that the weight of the upper layers might crush the pills in the lower out of all shape if their consistency is not perfectly firm.

In a former paper I have drawn attention to how medicated waters and watery solutions could be made to keep for a very long time, and mentioned also the rôle bacterial life plays in deteriorating such preparations. But not here alone, and in the case of medicinal syrups is caution indicated, as there are many other instances daily encountered in pharmacy, where a little anti-bacterial practice can be well employed. Cleanliness is the first requisite in pharmaceutical life, and a good remedy is antisepsis. Both can be well employed under all conditions of pharmaceutical routine and, ere I close my paper, I wish to draw attention to how well they can be made use of in the domain of ointments.

The refilling of the shelf ointment jar should always be preceded by a thorough cleansing of it, as in some instances directly deleterious substances may form in an ointment jar; as, for example, in the case of cold cream. This can be verified by a microscopical examination. It has been recommended to add boracic acid or salicylic acid to cold cream, but both are objectionable; the former does not prevent the cream from becoming rancid while the latter is irritating in the quantity needed. I would recommend an addition of simple tincture of benzoin, which answers well. Strict adherence to the formulæ of the Pharmacopœia should of course be our aim, but there are points where these formulæ could be improved upon without impairing the efficacy of the medicines prepared by them. It frequently happens that the ointment base in pharmacopœial ointments is faulty; in fact that the "benzoinated lard" does not fulfil its mission to make an ointment which will keep well. Benzoinated lard, however, if properly prepared from leaf lard, instead of from what is frequently procured in stores put up for the market, is the best base when made according to the Pharmacopœia. For iodide of potassium ointment, however, benzoinated lard is unnecessary. A better lard for this purpose may be obtained by adding calcined magnesia to melted lard, which is then kept hot for some minutes, when the warm lard is carefully decanted into a glass jar or bottle, which is then tightly corked. When required for use, the jar containing such lard may be heated by placing it in warm water. The iodide of potassium should be dissolved first in water and then mixed with the lard so prepared. An ointment made in this way needs no addition of hyposulphite of sodium but remains white a long time.

That botanical drugs should be kept dry, and if possible in tin cans or boxes, is generally conceded, but there are instances where large tins are not available. If such drugs are to be kept in wooden drawers or boxes it is well first to line these with thick manilla paper, and in doing so to employ a flour paste to which a liberal quantity of alum has been added. Such prepared receptacles, after having been carefully dried, are very suitable and generally stand firm against the inroads of roaches and bugs.

The above advice may seem insignificant to many, but still it must be admitted that the neglect of just such small safeguards as I have tried to draw attention to in my paper, are only too frequently the cause of great annoyances in pharmaceutical life. Small matters are not to be overlooked, for if they are, they may in time become big and important enough to revenge themselves for the slight given them. "Many brooks make one river;" and if the pharmacist is often obliged to throw away goods that have become spoiled, the loss incurred, while it may be small in each instance, will be found at the end of the year to have reached a considerable amount.

VARNISH GUMS.*

BY JAS. STEVENSON.

The discovery of varnish is not attributed to anyone, nor does any particular nation lay claim to having been the first to produce this now most important commodity, that in so many forms is used to give brilliancy, finish and durability to the thousand and one objects that go to make up our modern surroundings, from the ponderous railroad palace car to the tiny shining button on the baby's shoe. There is little doubt, however, that its manufacture as understood to-day is of comparatively recent date, although a crude knowledge of certain varieties of varnish or lacquer is known to have existed at a very remote period.

In a paper to be found in the transactions of the Asiatic Society of Japan, published at Yokohama, a Mr. J. J. Quinn gives quite an interesting account of methods in use in China in the reign of Emperor Jimmu, B.C. 560; and that in the reign of Emperor Koan, B.C. 392, a person called Mitsu-ne-no-Iukune was the first who enjoyed the title of Chief of the Imperial Lacquer Department. He tells of lacquered articles being received by the government in lieu of taxes. Also, that a certain ceremonial headgear was stiffened with lacquer. It was law, too, that the joints of imperial coffins should be lacquered. The author further refers to the artistic furniture, which was beautifully lacquered.

These traditions, however, are about as obscure as the etymology of the word varnish itself. Some derive it from the Latin *vitrinere*, to glaze, and *vitrum*, glass; others again derive it from *vernus ros*, which means vernal dew, and from which the French *vernis* is probably derived.

Sir G. C. Lewis gives the following legend on the subject—

Upon the return of Ptolemy Euergetes, king of Egypt, from his Syrian expedition in B.C. 243, his queen, Berenice, dedicated a lock of her hair in the temple of Aphrodite, at Zephyrium. This lock, having disappeared from the temple, was translated by canon into the heavens as a constellation, which bears the name of Como Berenices, and its fame has been translated and perpetuated in the words Venice, Vernis, and Varnish, which allude to the queen's most beautiful tresses.

Many other beautiful legends and allegorical pictures abound, and much more on the antiquity of varnish could be produced that would doubtless prove very interesting, but to be acquainted with the modern fact that Detroit is the headquarters for every variety of first-class varnish is of vastly more interest to everyone to whom *good varnish* has any practical significance.

Before commencing to give a little description of a few of the gums used in making varnish, it might not be out of place to propose the question, What is good varnish? and answer it as we understand it. Good varnish is a composition of oil, gum and turpentine,

---

* Read before the Detroit Chemical Society. Reprinted from the *Pharmaceutical Era*, June 1.

so united as to produce a substance which, when applied to the surface of an object, leaves on that object a smooth, glossy and impervious coating. Its functions are to increase the lustre and polish of the surface, and render it more easily kept clean; further, by its high refractive power, to increase the transparency of substances that are by their porous nature rendered too opaque, thus bringing into view any grain or marking of natural growth that it may be desirable to show up; and, still further, by its absolute insolubility, to protect perishable objects from the effects of damp or decay, metals from rust or the corrosive action of acids, and to harden the surface of softer objects, thus protecting them from abrasion, etc.

It will be obvious to the most moderate thinker, however, that in order to arrive at these desirable results, varnish must be used in accordance with the constructive condition of the work; that is to say, the object must be in a proper condition to receive the varnish, it must be applied under proper conditions, and sufficient time must be allowed for drying after each successive layer or coat.

The qualities of a good varnish are well known to be reasonably rapid drying, brilliant gloss, transparent colour and a capacity to retain its lustre and transparent character on the work unimpaired for a long period of time.

In speaking of varnish gums, the fossil copals are generally understood. I will refer first to shellac gum, however, because it is the gum used in the making of shellac varnishes, this varnish being used first in the order of the application of the several layers or coats required to produce a piece of well "finished" work.

The features that make shellac varnish so suitable for this purpose are its quick drying properties, enabling it to dry on the surface of the work without sinking in, as a slower drying varnish necessarily would do, and thus be to a large extent lost; and next, its extraordinary tenacity to the surface below and its affinity for the oil varnish usually placed over it. These qualities render it the only economical and perfectly reliable first coating or priming varnish. Shellac is the generic name, popularly used, in speaking of the different forms of this gum. This is a mistake, however, as in the beginning it is known as lac or sticklac, and is the resinous exudation caused by the puncture of the *Coccus Lacca* upon the branches of certain trees—the *Ficus religiosa*, or pepel tree, the *Croton lacciferan* or bihar tree, the *Butea frondosa* and others which are found in several of the central and north-western provinces of India. This resinous exudation assumes the form of a crust encircling the twigs or extreme branches, sometimes to a thickness of upwards of half an inch. These twigs encircled with this substance constitute the sticklac of commerce. Certain localities produce finer grades of lac than others, and favourable or unfavourable seasons affect the crop as they would any other crop. There is a proper time for collecting this resinous incrustation also, a time when the colouring matter is at the minimum, and in order to get lac that will yield the finest grades of shellac this period must be carefully watched. As there are two evolutions of the insect annually, so there are two crops, one in March and the other in October. Occasionally, when the trees become exhausted, artificial propagation is resorted to. This is done by cutting twigs of the old trees and attaching them to fresh ones. Frequently, too, the insects are transferred by the feet of birds. The centre of the shellac industry is Calcutta, where the sticklac is taken and ground into small pieces about the size of rice; it is then winnowed to free it from bark and seed that have been detached by the process of grinding, and is now known as seed lac. The next operation is to remove the colouring matter or lac dye, which is done by adding water to the seed lac in earthen pans, the seed lac being kept agitated by women with their feet, much after the style of the old-fashioned Scotch washing. The colour is precipitated from the aqueous solution with lime and pressed into cakes, and is the lac dye of commerce. The gum is now dried, and again sifted and put into long, sausage-shaped bags, made of cloth. These are heated over a fire and the gum strained. Either by dexterous manipulation on the part of the natives or by modern machinery of the European manufacturers the strained gum, while hot, is formed at will into shellac, button lac or short lac. The different brands are known by letters, which are the marks of the respective factories or packers, the most popular mark or brand being "D. C.," which is the product of the pioneer European factory, operated by David Campbell.

The most valuable of all fossil gums is a variety exported from Zanzibar, and known as such. The finest quality of it is found on the Wawandi river, and is of a beautiful amber colour. The outside of the pieces as found has the appearance of "gooseflesh," and is so described. Some authorities have attributed this feature to the result of internal contraction, while others think, and more probably, that the sandy soil in which it is always found imbedded may have caused these impressions. Zanzibar has a sp. gr. of 1·068 and the melting point is higher than 450° F.

Other varieties come from Madagascar and Demerara and are conceded to be the yield of the same species of tree, a genus similar to the Hymenæa. The sp. gr. of these are lighter than Zanzibar, the Demerara having 1·030, with a melting point similar to Zanzibar.

The West Coast of Africa, too, furnishes valuable gums for varnish purposes, the principal varieties being known as Benguela and Angola. These are collected by the Bunda negroes, and are called by them "Ocota Cocoto," or "Mucocoto." They are collected in the Congo districts, and are then carried to the ports of shipment. The zone in which these copals occur is well defined, being a hilly, desolate tract between the mountains that run parallel with the west coast line and the low broad land extending to the Atlantic. Only one tree flourishes on this desolate tract, which is about 700 miles long and from 3 to 50 miles, more or less, wide, and this is the "Baobab," which thrives either singly or in groups. The botanical source of these copals is not known. Many travellers and scientists have given their views on the subject, but their several deductions do not point to the same conclusion, and the belief prevails that the trees that produced these gums may be extinct.

Manilla copals are so called from the fact of Manilla being the chief port of shipment in the Philippine Islands, although practically no gum really does come from there. The great bulk of it comes from the Dutch East Indies, and is consigned to Amsterdam, where the principal sales are held. These copals are mostly used on the European continent, and in this country do not find much favour, although some of the better grades very much resemble Kauri in appearance. The botanical source of the Manilla copal is unknown.

Fifty years ago the Kauri gum of New Zealand was unknown as a varnish gum. To-day it ranks amongst the most popular for certain varnishes. It is said that the first cargo imported into this country was unloaded at New Bedford, Mass., in 1849, and that it lay there for three years before anyone could be induced to try it. The entire cargo was said to have amounted to 800,000 lbs., and the first 100,000 lbs. sold realized 2½c. per lb. Four years elapsed before the last 8,000 lbs. was sold for 35 c. per lb. By this time its utility as a varnish gum was generally acknowledged, and the New Zealand gum industry established. Kauri gum

is conceded to have been the resinous exudation of the pine tree of New Zealand, the *Dammara Australis*, and is found in the province of Auckland in open bush land where no vestige of the original trees remains, being thus a convincing evidence of prehistoric forests. In other parts of the colony living forests exist, whose trees when tapped yield a resinous sap, quantities of which are found at the roots of trees in various stages of hardness, between sap and fossil gum. In former days, Kauri was collected by the natives, the Maoris. Whites are now, however, doing a large portion of the digging. There are summer gum fields and winter gum fields. In the winter months it is usual to work on the ridges, because the rains that fall then soften the hard clayey ground and make the digging comparatively easy, at the same time making the depressions inconvenient to get at, while in the summer, when the ridges become so hard and dry as to be difficult to work, the lower grounds become the fields of labour. Gum is found at a depth of several feet in the hollows, while on the ridges it is only a few inches below the surface, and sometimes protrudes. The sp. gr. of Kauri is about 1·080, and its melting-point about 400° F.

Gum Damar is the exudation of the *Dammara Orientalis*, the trees being periodically tapped for supplies. The principal varieties are Batavia, from Java, and Singapore and Padany, from Sumatra. Damar has a high sp. gr. and a low melting-point.

Other gums are mastic, sandarac, benzoin, and camphor, but these do not play so important a part as the foregoing.

Some of the fossil gums are beautiful. In fact, we are indebted to them for many very charming poetical effusions. An extract from one by Milton, in which he alludes to the encased fly, runs thus:

> "If a rich tomb makes happy, then
> That bee was happier far than men
> Who, busy in the thymey wood,
> Was fettered by the golden flood
> Which from the amber weeping tree
> Distilleth down so plenteously.
> For so this little wanton elf
> Most gloriously enshrined itself;
> A tomb whose beauty might compare
> With Cleopatra's sepulchre."

FIXATION OF FREE NITROGEN BY PLANTS.

It is more than a century since the question arose whether under any circumstances the free nitrogen of the atmosphere was ever absorbed and fixed by vegetable organisms. Practical agriculturists have long been of opinion that, at least in the case of the *Leguminosæ*, the total nitrogen found in the plants cannot all be accounted for by the nitrogen supplied as nitrate, etc., to the soil, and it is said that two thousand years ago the Roman farmers were acquainted with the value of occasionally substituting a leguminous for other crops, as cereals, as a means of enriching the soil in nitrogen. All the earliest experiments by scientific workers seemed to point to the conclusion that plants did not assimilate nitrogen from the atmosphere. Boussingault formed this opinion from his long-continued experiments, extending from 1837 up to 1858, at which latter date the work was taken up in this country by Gilbert, Lawes, and Pugh on their experimental farm at Rothamsted, where they completely confirmed the results of Boussingault. All these workers experimented on a great variety of plants, but the important point which was afterwards recognized was that in all cases the soils and all materials used were sterilized by heat, thereby excluding all action of microbes. In 1876 M. Berthelot called attention to this fact and also to the exclusion in the experiments of all possibility of electrical action which might be supposed to exert a certain influence on plants grown in the open air; he found that free nitrogen was fixed by various organic substances under the influence of an electric discharge. He further tried experiments with a view to ascertaining whether soils alone had the property of fixing gaseous nitrogen, and found that in most cases there was an undoubted gain of nitrogen by soils exposed to air, except in those cases where sterilization had been effected, thus pointing to microbe-action. Within the past two years Gautier and Drouin have further elucidated the question. They conclude that soils absolutely free from organic matter have not the power of fixing free nitrogen; but where organic matter is present there is fixation. They also conclude that the process is connected with the growth of certain lower forms of plants, algæ, etc.

In 1886, Hellriegel and Willfarth published the results they had obtained, by growing plants of various families in washed quartz sand, and supplying nutrient solutions containing KNO_3, etc. They found that in the case of Graminaceous plants the growth was in direct ratio to the amount of nitrogen in the soil; after this was used up the plants suffered from "nitrogen hunger." With Leguminous plants the case was very different; here, at first, there was a vigorous growth, depending on the nitrogen in the soil; then a period of checked growth, which was finally renewed and continued with vigour. In the end there was a marked increase in the amount of nitrogen in the plants above that in the seeds and soil. Some individuals, however, did not so thrive; an examination of the plants disclosed the fact that fixation of free nitrogen was always associated with the formation of nodular growths on the roots, and that where the soil had been previously sterilized no nodules were produced on the roots and there was no fixation of nitrogen.

These observations have been confirmed by a large number of workers, including Dehérain, Joulie, Dietzell, Bréal, Gautier and Drouin, Schlœsing and Laurent; and in this country by the well-known experiments of Gilbert and Lawes at Rothamsted, in the years 1888–1889.

The importance of the nodule-forming bacteria in the fixation of nitrogen having been fully established in the case of leguminous plants, there still remained the disputed questions as to whether the soil itself—apart from the growth of higher plants, but under the influence of lower forms of vegetable life—had the power of absorbing free nitrogen; and secondly, whether plants of other natural orders than Leguminosæ could under any circumstances avail themselves of atmospheric nitrogen. Both these questions are claimed to have been answered in a series of very careful experiments recently carried out by the French *savants*, MM. T. Schlœsing and E. Laurent, and described by them in detail in the *Annales de l'Institut Pasteur*, Feb., 1892. To avoid all possibility of traces of ammonia or nitric oxide, which might be present in the atmosphere, a mixture of pure nitrogen, oxygen, and carbon dioxide was supplied to the plants, which were grown in closed cylinders communicating with a series of Sprengel pumps. A known volume of nitrogen having been introduced at the beginning, any fixation by the plants during growth was estimated by directly measuring the volume remaining when growth had ceased; to check these results the nitrogen in the soil and seeds was determined before growth, and again at the end of the experiments in soil and plants (separately). Throughout the whole series of experiments the figures agreed remarkably closely; where fixation had taken place the amount of gaseous nitrogen which had disappeared according with that gained by the plants. Experiments with members of the *Legumi-*

nosæ completely confirmed the views held by Hellriegel and Willfarth; fixation of nitrogen was always associated with the growth of the "bacteroid" nodules on the roots, and these were always consequent on the supply to the soil of water which had been "infected" with nodules from leguminous plants. Where the soil had been sterilized and no microbe-washings supplied, no nodules were formed and no nitrogen was fixed. Another series of experiments with Jerusalem artichoke, oat and tobacco, as well as with natural soils without plant-growth, gave very interesting results. In almost all cases there was a marked fixation of gaseous nitrogen both by plants and soil, but wherever this was noticed the surface of the soil was covered with a growth of small green cryptogamic plants, including one or two mosses and several Algæ (*Conferva*, *Oscillaria* and *Nitzschia*); it was found, moreover, that where the soil had gained in nitrogen the gain was confined to the upper layer containing these Algæ. Experiments were then undertaken in which, using similar soils and plants (this time including mustard, cress, and spurrey) the growth of algæ was prevented and their action thus eliminated by covering the surface of the soil (after sowing the seeds) with a layer of recently ignited quartz sand; here there was no appearance of algal growth, and simultaneously no fixation of nitrogen either by plants or soils.

MM. Schlœsing and Laurent draw the following conclusions:—First, that leguminous plants can largely make use of the free nitrogen of the air under microbe influence, passing on this nitrogen into their substance in a state of combination; secondly, there are lower forms of algæ which play the same part; thirdly, soils free from organisms do not fix any appreciable amount of nitrogen, and oats, mustard, cress, and spurrey do not do so either.

LAC INSECTS IN THE UNITED STATES.*

Several kinds of plants have recently been discovered in the United States, which are infested by lac insects, notably the "stink weed" and a certain variety of acacia. These flourish abundantly from southern Utah to northern Mexico and from the Colorado Desert to western Texas. There is no reason why these valuable insects should not be gathered and put to very profitable use. It is even asserted that, with care and cultivation, the production of them could be rendered so large as to make Americans independent of foreign supplies of lac. Artificial propagation is resorted to abroad, although the bulk of the product is gathered from the jungles. Its employment is most familiar in the lacquered ware manufactured in the East, though it is utilized for many other purposes, notably in the composition of sealing wax and varnishes.

The "lac" of commerce is a resinous incrustation, resulting from punctures of the twigs and branches of certain kinds of trees by insects. Its colour varies from deep red to bright orange, and it occurs in brittle fragments. The female insects utilize it for the purpose of protecting their progeny. As soon as each one has covered herself with the secretion, which serves as a sort of cocoon, she lays her eggs and dies. The young, upon being hatched, make their way out through the crust, and seek green and juicy spots on the bark, inserting their probosces and beginning to feed at once. They never wander from the branch where they first came into being. The latter, after affording nourishment to millions, finally withers and dies. Thus the extinction of the lac making species would soon come about, were it not for the fact that other insects and birds carry them about, planting new colonies in fresh places.

* From the *Washington Star*. Reprinted from the *Oil, Paint and Drug Reporter*, May 23.

The lac insects are most plentiful in India, but they are also found in Siam, Ceylon and other countries. Siamese lac is considered the best. Certain provinces of India yield thousands of tons of "stick-lac" annually. The right of collecting the lac in some parts is rented out by the Government to companies, but the gatherers of lac are mostly jungle tribes. They obtain the product in the wild forests, sell it to small dealers, who in their turn dispose of it to big merchants. Much is done in the way of propagating the insects artificially in the central provinces of India. For this purpose, nurseries of the proper kinds of trees, such as the insects naturally feed upon, are formed. At the right season, when the larvæ are about to be hatched, twigs bearing the incrustations are cut in the woods and tied with bits of grass to the upper branches of the trees in the nursery. The insects are thus transplanted to nursery trees, where they rapidly multiply and form the precious lac. At regular intervals the twigs bearing the lac are cut off—this process of pruning encouraging the development of fresh twigs for insects to feed upon. The crude lac on trees is called "stick lac." In manufacturing it the first process is to strip the twigs of the incrustation by passing them under rollers. The wood is rejected and the separated lac is ground up by rolling into a coarse powder. In this form it is put into large tubs half full of water, in which it is stamped and trodden by coolies, who get into the tubs and do the work with their feet. The water is changed repeatedly, this performance being kept up until it comes off entirely clear. Then the lac is dried, being now designated as "seed lac," after which it is put into long cotton bags. Two men take one of these bags containing lac by the ends and hold it in front of a charcoal furnace, twisting it the while. The roasting melts the lac and the twisting causes it to exude through the cloth and drop into a trough below. From the trough it is dipped out with a wooden spoon, and skilfully spread over a metal cylinder in such a manner that, cooling and hardening immediately, it is formed into thin sheets. These sheets are the shellac of commerce.

THE SUGAR INDUSTRY OF MOZAMBIQUE.*

A vigorous effort to grow sugar-cane has been made by the Companhia do Assucar di Mozambique. The site chosen for the plantation is on the right bank of the Kwa-kwa, about 70 miles from the coast. At the end of 1890 and the beginning of 1891 some 600 tons or 700 tons of Natal cane tops were imported, of which 75 per cent. were spoiled *en route*. The first planting of 180 acres was made in January, 1891, with Natal and native tops, with the result that the native cane has been discarded as too slow and poor in growth. The soil of the first field has been found unsuitable, and another site is to be tried. It is proposed to try ratooning the canes. The rainfall of 1891 has been much less than usual, amounting to only 35 inches; in 1888 it was 63. Much of the cane was destroyed by drought, some by white ants. In addition to sugar the company proposes to plant mealies, and experimentally, sea island cotton, pepper, vanilla, and Siberian coffee have been tried and found to do fairly well. Sugar machinery of the value of £2000 has been imported, and is now on the way up-country. The mill can turn out 20 tons a day. In addition to this a good frame saw has been imported and used to cut planks for building. The experiment is to be made of crushing oil-seeds by a hydraulic oil-press, and exporting the oil. The company has leased the lakes of the Prazo in which it works, and has an ample supply of labour. The adults in the Prazo number 6,000.

* Extract from Consular Report. No. 1009.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, JUNE 18, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

INSPECTION OF CHEMICAL WORKS.

ALTHOUGH the Act of Parliament passed in 1881 in reference to the inspection of chemical works applied specially to alkali works, its administration has since been so much extended that alkali works form only a constantly decreasing minority of the works now brought under the Act. In the report for 1891 just issued it is stated that of the 1048 works now registered under the Act only 129 are alkali works, and the remaining 919 are other works which have been more recently brought under the Act. But the alkali works coming under the definition given in the Act are only those in which the manufacture of soda is carried on according to the LEBLANC process, the first step of which is the decomposition of salt by sulphuric acid, resulting in the evolution of an equivalent quantity of hydrochloric acid, which is set free in the gaseous state. Until within the last fifteen years all the soda of commerce was produced by that process; but now a large and increasing proportion of it is made by the ammonia process, which is not attended with evolution of hydrochloric acid. As an illustration of the extent to which this change in the soda manufacture is taking place, it will suffice to state that last year the quantity of salt decomposed in the two processes at the various works in the United Kingdom was 846,391 tons, and that very nearly one-third of that quantity was worked by the ammonia process.

One of the most striking facts connected with chemical manufactures in this country is the enormous development during recent years of processes by which waste products have been utilised. The production of sulphate of ammonia furnishes an illustration of this. The ammoniacal liquor of gas works has been for many years the chief source of ammonia, the annual production of sulphate of ammonia from that material being upwards of one hundred thousand tons. But more recently the liquors obtained in the distillation of shale have been turned to account as a source of ammonia, and more than twenty-five thousand tons a year of sulphate of ammonia has thus been obtained for some years past. The products of combustion from iron furnaces have also been subject to treatment, by which the ammonia contained in them has been obtained as sulphate of ammonia to the extent of about six thousand tons a year, together with a quantity of tar. To such an extent has this proceeding been carried that in some instances the capital expended in plant for that purpose exceeds that devoted to the smelting operations. It is estimated that in Scotland alone nearly half a million of money has been expended in this way at iron works.

The recovery of sulphur from the waste product of the LEBLANC process, described in our notice of the last year's report, is still being persevered with, and though the process adopted is in some respects less effective than could be desired some eighty thousand tons of sulphur have already been recovered, the present rate of production amounting to no less than nine hundred tons a week. The adoption of the CHANCE-CLAUS process for dealing with the waste of alkali works is not yet made compulsory, but there appears to be good reason for thinking that it is now time this were done. One of the results of the consolidation of alkali works under the United Alkali Company has been the stoppage of many of the smaller works, and the introduction of a more efficient management of those which are still carried on. Under these circumstances and with the stimulus of competition from the ammonia process it is, therefore, probable that greater attention will be directed to the utilization of the waste products. Another instance of the utilization of waste products is afforded by the treatment of the "pickle" from galvanizing works. This consists of a solution of either sulphate or chloride of iron. The former is evaporated to crystallization and the product used for disinfecting purposes. The chloride solution is run slowly on to the heated bed of a reverberatory furnace and the residual chloride of iron decomposed, yielding hydrochloric acid, which is condensed, and red oxide of iron, which is available as a pigment or for metallurgical purposes.

Notwithstanding the continued action of inspectors and the increased care taken by manufacturers in utilizing waste products, the noxious effects of chemical manufactories are still considerable and great room is left for improvement. This is especially the case in such a locality as Widnes and St. Helens, where about a million tons of coal are consumed annually at chemical and copper smelting works. The quantity of acid thus discharged into the air, chiefly as sulphurous acid from the coal, is estimated to amount to more than seventy thousand tons a year. If means could be found for preventing this escape as completely as it is done in the

case of alkali works, a very great improvement would be effected in the condition of the atmosphere of the district. The quantity of coal annually burnt in London is rather more than that mentioned above, but it contains less sulphur. However, the quantity of sulphurous acid thus produced is estimated to amount to no less than 108 tons per square mile during the winter months and to 20 tons in the summer. At St. Helens the area covered by manufacturing works is only three square miles; consequently, sulphurous acid is discharged at the rate of more than twenty thousand tons per square mile during the year. This comparison will serve to explain the difference to be observed between the condition of trees and vegetation in London and that prevailing in the manufacturing towns.

AN ASPECT OF FRENCH PHARMACY.

CONTINENTAL pharmacists are often stated to occupy a much more favourable position in regard to their business arrangements and social status than their British *confrères*; but, as we have on former occasions insisted, the measure of protection afforded by foreign states to those engaged in the practice of pharmacy is more than counterbalanced by irksome restrictions, and control by various outside authorities. Some facts quoted by a French contemporary in discussing a recently published article by Professor DUPUY appear of sufficient interest in this connection to be worth reproducing. At the same time, their exposition will serve to show that our neighbours across the channel are as far from realizing an ideal state as ourselves.

The professor seems to have dealt with his subject in a comprehensive fashion, for he commences by reviewing numerous documents and official statements which oppose the view, generally accepted in France, that the pharmacist is to be considered a tradesman, pure and simple. He quotes royal proclamations, and reports to republican conventions, which free pharmacy from all suspicion of commercial enterprise. Then he cites authorities on jurisprudence, who hold that the price of pharmaceutical preparations must be based on the value of the knowledge acquired by pharmacists, knowledge of which the application constitutes a profession no less liberal than that of medicine. Unfortunately, however, whilst during several years some tribunals have supported this view of the matter, others have expressed a contrary opinion. The learned professor therefore asks whether the pharmacist, supposing him to be an ordinary tradesman, ought to be compelled to submit to all the rigorous restrictions imposed by the legislature upon the class to which he belongs? The ordinary tradesman, we are told, establishes himself in business when and where he will, enters into partnership with whomsoever he pleases, is not limited to one place of business or prevented patenting his products, has no special responsibility, and is not kept under control by others. He may benefit also by testamentary dispositions or deeds of gift made in his favour by grateful customers. But with the pharmacist the reverse of all this holds, and M. DUPUY, after making manifest the vast differences in treatment, concludes by declaring that for all these reasons he believes he has shown that, if the pharmacist is declared to be a tradesman, it ought at least to be admitted that he is a specialized tradesman, who, not possessing the rights of all other tradesmen, ought not to be submitted to such restrictions as are imposed upon them; and that it would be right to create for him special laws, less vigorous and more equitable than those which actually govern him. As the question to be decided is a very important one for the profession of pharmacy it would be very desirable to see introduced into the proposed new law affecting the practice of pharmacy, the following clause: "*the pharmacist is not a tradesman.*' Moreover, the hope is expressed that the public authorities will understand at last that the conditions as to scientific training exacted of aspirants for the diploma of pharmacist place pharmacy in the rank of the liberal and learned professions, and that it is a matter of importance to support it in this lofty position with all its privileges.

The state of affairs revealed in the foregoing paragraph does not strike us as being vastly, if at all, in advance of the position at home. We prefer to think, indeed, that the opportunities of the average British pharmacist are, if anything, superior to those here briefly represented, whilst there is little reason to doubt that he would both fail to sympathize with the notions of inferiority implied in the use of the term tradesman, and with the almost pathetic reliance upon the supposed power of the legislature to remove the obnoxious designation and create a millennium in pharmacy forthwith. Such weak-kneed dependence upon the fancied ability of statutes to create and enforce what should naturally evolve, by the persistent endeavour of the individuals to be directly benefited, is not likely to improve the prospects of pharmacy, either as a trade or as a profession.

POISON PROBLEMS.

WE still continue to receive numerous inquiries relating to the sale of proprietary medicines, and we may take this opportunity of acknowledging also the receipt of useful information on this subject from several correspondents. In regard to some of the questions asked it is not altogether easy to give replies. The construction that has now been put upon the Pharmacy Act is so far at variance with past practice, that the point to be considered is not so much the bearing of that construction as how far it should be immediately enforced. Thus, for instance, the misconception that has

prevailed as to the necessity of labelling all proprietary preparations containing scheduled poisons has been general, proprietors and retail vendors of all kinds have been in the same position, and it was not until the practice hitherto adopted became obviously prejudicial to public safety that it was decided to be contrary to the law. That a change of procedure will now have to be adopted there can be no doubt. Then comes the question how these preparations are to be labelled, and we have been frequently asked whether it is necessary to state the name of the poison contained in any preparation. In the first prosecution instituted by the Treasury (*Pharm. Journ.*, xx., 806) the position was taken that the sale of a preparation containing poison is in fact a sale of that poison, and consequently subject to the provisions of the Act, but as the case was not contested that point was not decided. Probably the safest course would be to refer to the schedule of the Act to ascertain with what article there named as a poison the preparation in question is to be identified. Taking the case of laudanum or of paregoric, these articles, though not specially named, would come under the heads of preparations of opium or preparations of morphine. In that sense laudanum and paregoric are in fact articles comprised in the schedule. In the case of non-official preparations probably the name of the article would not be sufficient, and it would also be requisite to state the poison of which it was a preparation, as is now being done with chlorodyne, Powell's balsam of aniseed, Mrs. Winslow's syrup, and for many years with Kay's essence of linseed.

In a letter from the proprietor of a preparation of the kind now referred to, which has been forwarded to us by a correspondent, some disinclination to adopt this course is expressed. We think that is a mistake, for the Treasury authorities have declared their intention to enforce the provisions in regard to labelling and to press the matter "to the uttermost." It is entirely erroneous to suppose that the action taken in this matter has been taken by the Council of the Society. It has been done in the general interest of the public, quite independently of the Society. But it is highly probable that the Council may be called upon, as it was in regard to the sale of poison by unqualified persons, to take further action for enforcing the law, by exercising the powers conferred upon it by the Pharmacy Act. In that case it would be impossible to disregard the obligation that rests upon the Society. This is a matter in which there must be conformity with the law and, as we have already pointed out in regard to secret preparations, the onus of conforming to the law lies with the proprietors of those preparations. The plea that a preparation contains only a very small quantity of a poison within the meaning of the Act cannot avail, when it is remembered that such an article as syrup of poppies is included in the schedule of poisons. It seems perfectly clear that if a preparation contains anything which brings it within the scope of the poison schedule, whatever the quantity may be, the provisions of the Pharmacy Act must be complied with in the retail sale of that preparation, and it is the declared intention of the Treasury authorities that this interpretation of the Pharmacy Act is to be stringently enforced.

COPPER IN PRESERVED PEAS.

In two recent cases of prosecution under the Food and Drugs Act for the sale of preserved peas containing copper, opposite decisions have been given. In a case heard at Leeds, a firm of provision dealers was condemned to pay a fine of twenty shillings and costs, as the magistrates guided by medical evidence were of opinion that the peas constituted a poisonous article, which taken as food would act injuriously on a weak stomach. The other case was at Liverpool, and for the defence reference was made to the evidence given in the Glasgow case by Professor Fraser and Dr. Dougall, who stated that they had never heard of an instance of injurious results from the consumption of peas containing copper equivalent to form 1 to 1½ grains of copper sulphate in the pound of peas. Dr. Campbell Brown, the city analyst, admitted that the copper was in an insoluble condition as an albuminate. The stipendiary magistrate therefore dismissed the summons, as he did not think the coppered peas were proved to be injurious, though he did not wish to be considered as laying down any general maxim on the question. It would appear, therefore, that what is an offence in Leeds is not so in Liverpool, a state of things decidedly unsatisfactory to all concerned.

MEETING OF THE BRITISH ASSOCIATION.

The usual notification of the meeting of this body is now being issued to the members. It will take place this year at Edinburgh, commencing on the third of August, under the Presidency of Sir Archibald Geikie, the Director-General of the Geological Survey of the United Kingdom. There is also being issued with this official notice a circular from the local secretaries in Edinburgh, in which reference is made to the manifold attractions which the city of Edinburgh presents to visitors, its adaptation to lend *éclat* to a meeting of the British Association, and the increased capacity of offering suitable accommodation for the work of the various sections in the rooms of the New University Buildings

FUTURE PUBLICATION OF THE JOURNAL.

It will be seen from the announcement which appears in the advertisement columns that the Council has decided to make a change in the publication of the Journal, and that the next number will be the last published by Messrs. Churchill. From and after the 30th of this month the office of publication will be at 5, Serle Street, Lincoln's Inn, and all communications relating to advertisements are to be sent there, addressed to Messrs. Street and Co., the advertisement agents.

Transactions of the Pharmaceutical Society.

SPECIAL MEETING OF THE COUNCIL.

Wednesday, June 15, 1892.

Present—

MR. MICHAEL CARTEIGHE, PRESIDENT, IN THE CHAIR.

MR. WILLIAM GOWEN CROSS, VICE-PRESIDENT.

Messrs. Bottle, Greenish, Hills, Martindale, Richardson, and Warren.

The PRESIDENT moved that the amended clause, No. 20, of Section X. of the Bye-laws, which was read a first time at the ordinary Council meeting on the 8th instant, be now read a second time.

The motion was seconded by the VICE-PRESIDENT, and carried unanimously.

The clause, as amended, reads as follows:—

"*Section X., Clause* 20.—All persons intending to present themselves for examination in the Major, the Minor, or the Modified Examination, shall give to the Registrar notice in writing of their intention in that behalf on or before the fifteenth day of the month immediately preceding that in which the Examination is to take place."

DONATIONS TO THE LIBRARY AND MUSEUM.

At the meeting of the Library, Museum, School and House Committee, held on Wednesday, the 15th inst., the undermentioned donations were reported, and it was ordered that the thanks of the Society should be communicated to the respective donors:—

To the Library in London—

Smithsonian Report, 1889-90. 2 vols. From the SMITHSONIAN INSTITUTION.

West (W.), Contribution to the Fresh Water Algæ of Ireland, 1891. From the AUTHOR.

Gerock (J. E.), Notizen über die Zusammensetzung des Valerianöles, 1892. From the AUTHOR.

Schneegans (A.) und J. E. Gerock, Ueber Spiræa Ulmaria, 1892. From the AUTHORS.

Tschirch (A.), Indische Heil- und Nutzpflanzen und deren Cultur, 1892.

— Twenty-six Pamphlets on various Subjects. From the AUTHOR.

Trabut (L.), Observations tératologiques sur un tænia saginata, 1890.

— Action contraire de la quinine, 1890. From the AUTHOR.

Kaiserliche Leop.-Carol. Deutsche Akademie der Naturforscher, Nova Acta, tomi 55–56.

— Katalog der Bibliothek, Lief. 3. From the AKADEMIE.

Edinburgh University Calendar, 1892. From the UNIVERSITY.

U. S. Department of Agriculture, Division of Chemistry, Bulletin, no. 13, pt. 6 ; no. 32. From the DEPARTMENT.

Squire (P. W.), Methods and Formulæ used in the Preparation of Tissues for Microscopical Examination, 1892. From the AUTHOR.

Flückiger (F. A.) Schwarzer Phosphor, 1892.

— Dr. med. William Dymock, 1892.

— Zur Geschichte der Pharmacie in Venedig, 1892. From the AUTHOR.

Jardin impérial de botanique, St. Pétersbourg, Acta horti petropolitani, tom. 11, fasc. 2. From the DIRECTOR.

University of London, Calendar, 1892 (in part). From the UNIVERSITY.

Radcliffe Library, Catalogue of Books added during 1891. From the RADCLIFFE TRUSTEES.

To the Library in Edinburgh—

Pharmaceutical Journal, [1], vol. 18 to [2] vol. 11. 12 volumes. From Mr. ALEXANDER NOBLE.

To the Museum in London—

Specimen of one of the Plants yielding Sarcocoll. From Mr. J. G. PREBBLE, Bombay.

Specimens of Native Medicines from Sierra Leone. From Mr. G. F. SCOTT ELLIOT, M.A.

Four specimens of a new variety of Cuban Sponge. From Messrs. CRESSWELL BROTHERS.

To the Museum in Edinburgh—

Specimen of Kokum Butter. From Mr. THOS. STEPHENSON, F.C.S., Bombay.

MEETING IN EDINBURGH.

ELECTION OF EXECUTIVE OF THE NORTH BRITISH BRANCH.

A meeting of the members and associates in business of the Society, residing in Scotland, was held in the Society's House, 36, York Place, Edinburgh, on Wednesday, June 15, at 12 noon. Mr. J. Laidlaw Ewing in the chair.

Apologies for absence were received from Messrs. Frazer and McAdam, Glasgow.

The minutes of last meeting were read and approved.

The Chairman said he was glad to be able to congratulate them on the steady progress in the membership of the Society. Two years ago there were 300 voters, last year there were 308, and he was glad to say they had this year 324. But that was not quite so satisfactory as they would like it to be. If they compared Scotland with London, the population of which roughly agreed, it would be seen there was considerable room for increase in Scotland. In London there were somewhere about 700 or 800 members, while in Scotland they had only between 300 and 400. That was a subject that had engaged the earnest attention of the Executive, and it had been suggested to their friends in London, that by a better arrangement of local secretaries a considerable increase in the members of the Society in Scotland might be attained. He wished to say that they hoped in the new Parliament they would be more successful in regard to the Pharmacy Bill, and that through the consolidation of the Society they would be able to take in all those who took an active interest in pharmacy in Scotland. He was also able to congratulate them on the large number of those who had become candidates for the Executive. No less than 64 gentlemen had been nominated as against 13 last year; and of these 29 had stood. He was glad to see there was such an active desire to serve on the Executive, and perhaps Mr. Storrar would excuse him when he said there was more interest taken in the election in Scotland than in that of the Council, because there was no contest in connection with the Council. That might be a good sign, and he made no remark upon it. He pointed out that they had had one or two changes in their representation on the Council. They would allow him to express their gratitude to Mr. Watt for the services he rendered during the time he represented them on the Council in London. He was a man of excellent judgment and good sense, and he had at all times found him most willing to do his best for Scottish pharmacy. But he was glad to congratulate them on being able to obtain in Mr. Watt's place a gentlemen from the north of Scotland, and one who he felt sure would discharge the duties of his office with the confidence of all the members. They were pleased to still have the services of Mr. Storrar. He did not know anyone in Scotland who could

serve them so well, and he hoped he would be long spared to represent them. During the year there had been changes in the examinations. These changes had proved satisfactory both to the candidates and the examiners. At the same it had become evident that more accommodation was required to carry them on satisfactorily, and the question of increased accommodation would be referred to the new Executive and would form a very important matter for further consideration. Their representations to their friends in London had been sympathetically received and he had no doubt would be satisfactorily met. The percentage of passes was the same last year as in the previous year. They had lost two excellent Examiners in Dr. Clark and Mr. Gilmour, but he was glad that they had got two efficient substitutes in Mr. Boa and Mr. Jack. The evening meetings were most successful. They began with an excellent address from Professor Balfour, and the subsequent meetings were of the highest interest. The work done by pharmacists had been acknowledged by Professor Attfield in his report to the Medical Council and was a matter of encouragement. He hoped those gentlemen who had assisted them during last session, both in Edinburgh and the country, would continue to give them their help in the session to come. There was an increase in the circulation of books, especially among provincial readers, and the Library was rapidly increasing in value and usefulness. There had not been much to chronicle during the past year except two important questions, one of which had reference to the sale of poisons. He had seen the Pharmaceutical Society cavilled at because it had not moved in that matter. He thought it was well for them that this matter had been raised as it had been. The medical profession was the first to move on the subject, and at its instigation the Government undertook a prosecution that had taken away the imputation that would otherwise probably have been thrown on the Society, namely, that it was too selfish about its members' trade interests. They must all rejoice at the verdict that had been given, not from their own point of view entirely, but because it would be for the better protection of the citizens at large. He was glad to notice that the Society was about to take action in connection with that verdict, and he hoped it would be successful. The next point was with regard to the prosecutions which had taken place in Glasgow. These prosecutions had disclosed a state of pharmacy in Glasgow which they had not to contend with in the eastern part of the country, and he was sure they had their strongest sympathy. The importance of these prosecutions had been recognised by the leading pharmacists in Glasgow, and he noticed from a late issue of the *British Medical Journal* that the medical profession in Glasgow was also moving in the matter. He was glad to notice that there was some prospect of a resuscitation of the local association of chemists in Glasgow. He hoped it would be successful, and he was sure those moving in the matter would have every encouragement in Edinburgh, and he had no doubt at head-quarters in London. He was glad to say he had not much to remark with regard to obituary notices in Scotland, but it would not become him were he not to refer briefly to the great loss the Society had sustained in England by the death of two Ex-Presidents, Mr. Sandford and Mr. Thos. Hyde Hills, and also in the death of Professor Redwood, a distinguished pharmacist. He was sure he was expressing correctly the feelings of all there, and all pharmacists throughout Scotland, when he said they deeply sympathized with the Society in the loss of those distinguished men. One word personal to himself. He had had the pleasure of being in London at the Annual meeting of the Society, and would desire to express his thanks for the extreme courtesy and kindness he received there. But it was not on his own account he wished to say this; anything that was done to show him respect there he felt was done out of respect for the North British Branch, and he was glad to think that good relations at present subsisted between them and the gentlemen at head-quarters, and he hoped these would continue and increase. In conclusion he would like also to express his gratitude to his friend Mr. Rutherford Hill, their excellent Assistant Secretary, for the kindness and assistance he had given him during the past year. He did not see how he could have managed the business very well if it had not been for Mr. Hill's help. And last of all he had to express his sense of gratitude to the members of the Executive for their kindness in enabling him to do his duty to the best of his ability.

The Assistant Secretary then read the report of the Scrutineers as follows:—

Report of Scrutineers.

"At a meeting held on April 13, 1892, the Executive appointed June 15, 1892, as the date of the election for the ensuing year.

"Three hundred and twenty-three nomination papers were issued by the Assistant Secretary on May 24.

"The nomination papers returned showed that sixty-four members and associates in business had been nominated, of whom the following twenty-nine signified their willingness to act if elected:—

Currie, William Little, 223, Byres Road, Dowanhill, Glasgow.
Duff, William, 17, Smith's Place, Leith Walk, Edinburgh.
Duncan, William, Royal Dispensary, Edinburgh.
Duncan, William, 13, East Princes Street, Rothesay.
Ewing, James Laidlaw, 52, North Bridge, Edinburgh.
Findlay, James, 69, Dundas Street, Glasgow.
Fisher, John Hutchison, 66, High Street, Dunfermline.
Fowler, George Ross, 38, Castle Street, Forfar.
Fraser, Jonathan Innes, 13, Dundas Street, Edinburgh.
Frazer, Daniel, 127, Buchanan Street, Glasgow.
Gibson, Adam, East Thistle Street Lane, Edinburgh.
Glass, William Stephen, 46, Clerk Street, Edinburgh.
Hardie, James Miller, 68, High Street, Dundee.
Jack, James, 102, High Street, Arbroath.
Kermath, William Ramsay, 1, North Bell Street, St. Andrews.
Kerr, Charles, 56, Nethergate, Dundee.
Kinninmont, Alexander, 69, South Portland Street, Glasgow.
Lunan, George, 20, Queensferry Street, Edinburgh.
Maben, Thomas, 5, Oliver Place, Hawick.
McAdam, Robert, 34, Virginia Street, Glasgow.
McLaren, David, 42, South Clerk Street, Edinburgh.
Nesbit, John, 162, High Street, Portobello.
Noble, Alexander, 139, Princes Street, Edinburgh.
Paterson, James, 15, Regent Quay, Aberdeen.
Shairp, William, 79, Port Street, Stirling.
Stephenson, John Bertram, 48, Frederick Street, Edinburgh.
Strachan, Alexander, 138, Rosemount Place, Aberdeen.
Sutherland, John William, 68, High Street, Dumfries.
Thompson, Thomas, 35, George Street, Edinburgh.

"A voting list was accordingly drawn up and, on June 6 323 voting papers were issued. An additional voting paper was issued on the 11th inst., making 324 in all.

"The Scrutineers met last night at 7.30 and proceeded to examine the voting papers. The result was found to be as follows:—

Voting papers issued	324
,, ,, returned	174
,, ,, informal	2

"There were thus 172 votes to be recorded.

"The following gentlemen have a majority of votes:—

Ewing, James Laidlaw, 52, North Bridge, Edinburgh.
Fisher, John Hutchison, 66, High Street, Dunfermline.
Frazer, Daniel, 127, Buchanan Street, Glasgow.
Gibson, Adam, East Thistle Street Lane, Edinburgh.
Hardie, James Miller, 61, High Street, Dundee.
Jack, James, 102, High Stree, Arbroath.
Kermath, William Ramsay, 1, North Bell Street, St. Andrews.
Kerr, Charles, 56, Nethergate, Dundee.
Kinninmont, Alexander, 69, South Portland Street, Glasgow.
Maben, Thomas, 5, Oliver Place, Hawick.
McAdam, Robert, 34, Virginia Street, Glasgow.
Nesbit, John, 162, High Street, Portobello.
Noble, Alexander, 139, Princes Street, Edinburgh.
Paterson, James, 15, Regent Quay, Aberdeen.
Stephenson, John Bertram, 48, Frederick Street, Edinburgh.
Strachan, Alexander, 38, Rosemount Place, Aberdeen.
Sutherland, John William, 68, High Street, Dumfries.

"The voting papers and all other documents connected with the election are submitted herewith.

J. LAIDLAW EWING, *Chairman.*
"ROBERT AITKEN. CLAUDE F. HENRY.
"WILLIAM BURLEY. JOHN ROBERTSON."

The actual result of the poll was as follows:—

Ewing	140	Sutherland	99
Kermath	130	Noble	87
Kinninmont	126	Duncan *(Edinburgh)*	75
Maben	126	Lunan	65
Stephenson	122	Fraser	61
Kerr	120	Thompson	60
Strachan	120	Duncan *(Rothesay)*	56
Hardie	119	Currie	55
Jack	119	Fowler	45
Frazer	115	McLaren	43
Nesbit	115	Shairp	40
Gibson	107	Findlay	32
McAdam	105	Duff	28
Fisher	101	Glass	15
Paterson	99		

The Assistant Secretary reported that six voting papers had been received by post that morning, and were therefore too late to be included in the enumeration.

Mr. Murdoch, Falkirk, moved the adoption of the report. He said the Chairman's statement so far as it went was satisfactory. No doubt it was satisfactory so far as those prosecutions in Glasgow must be a means of improving the trade, still they found shops in every locality now which had no right to be there. They had them under the designation of medical halls and apothecaries' halls, and it certainly would be much better if the pruning knife were used even a little more; but he had no doubt the Pharmaceutical Society would see their way to it in time. So far as the Chairman's statement went, he thought it was certainly highly satisfactory to the trade.

Mr. Martin, Motherwell, seconded the motion, and the report was unanimously adopted.

The Chairman then declared that the first seventeen names on the list given by the Scrutineers, together with the President of the Society (Mr. Michael Carteighe), the Vice-President of the Society (Mr. William Gowen Cross), John Johnston, Aberdeen, and David Storrar, Kirkcaldy, as *ex officio* members, would form the Executive for 1892–93.

On the motion of the Chairman, a vote of thanks was awarded to the Scrutineers.

The Chairman said there would now be an opportunity for any gentleman who desired to ask any question or refer to any matter of pharmaceutical interest, or to suggest any subject that might receive consideration by the Executive.

Mr. Aitken, Edinburgh, asked if there was likely to be anything further done in regard to the question of the sale of methylated spirits on Sundays.

The Chairman replied that the matter was considered at last meeting of the Executive and referred to the Council in London. The President had seen the Revenue authorities, and they had promised that some plan would be adopted by which duty free spirit might be sold in small quantities.

Mr. Aitken said he was speaking of cases of bronchitis in which people required it on Sunday as well as on week days, and the sale of it on Sunday was prohibited.

Mr. Storrar said that the matter came up at the Council at last meeting. He might say that Mr. Hill had asked him at last Council meeting to see Mr. Carteighe about the matter. He had, however, no further information about it. He was sorry to say he had forgotten all about it, but, personally, he might remark that he did not believe there was any chance of them getting the privilege of selling methylated spirit on Sundays. Personally, also, he could not see that there was to be any special advantage in having a right to do so. So far as he understood the matter it referred to those bronchitis kettles, a great many of which are used with spirit lamps.

The Chairman said he thought the words of the answer by Mr. Carteighe on that subject were that their Scotch friends in exceptional cases would take means to meet the difficulty, but he held out no hope that the Government would give any permission to sell on Sundays. He had asked when in London, but he understood the authorities would not move in the matter.

Mr. Aitken said that left the matter in a very unsatisfactory state.

Mr. Murdoch, Falkirk, said that the matter which he had to bring under notice was that the number of open surgeries was always increasing to the detriment of the trade. There was scarcely a village in Scotland but there was a doctor's shop, with a young man or a young woman managing the sale of all kinds of poisons, and the Act took no hold of them. In the district of Coatbridge, with a population of 30,000, there was not a single registered chemist's shop. These shops were all owned by medical men, and he did not believe there was one qualified assistant among the whole lot of them. Now if they were going on multiplying as they were there would soon be no druggists left. They would require to go into some other business, because they found these open surgeries were increasing daily. He found in his district that the villagers were having shops opened by medical men and kept open by unqualified persons. Now the trade could interfere with an unlicensed assistant selling poison, but it had no power over medical men. He supposed there was no help for it, but that they were obliged to remain as they were at present. If anything could be done in the way of checking this it would be very desirable. If a medical man kept an open shop it would be as much compulsory on him to keep a qualified assistant as on a regular druggist.

Mr. Storrar: You mean their keeping open shop for the general sale of drugs and poisons?

Mr. Murdoch: Yes.

Mr. Storrar: They are bound to keep qualified assistants. It is only for their own private practice that they may be dispensed by an unqualified man, but if they have an open shop or surgery, they are as much bound to have a qualified person in it as an ordinary druggist is.

Mr. Kinninmont said he questioned that very much. He thought that by the 16th section of the 1868 Act surgeons were entitled to keep open shops and have unqualified assistants in them if they liked. They would have to be careful what they did. There was

such a place as Stewarton, for example, where there was a large population but no chemist's shop. The nearest chemist's shop was at Kilmarnock. Were they to compel the surgeon there to shut up his shop or keep a qualified assistant? They must see what they were entitled to do by the Act, and he maintained that, according to the Act, they were entitled to keep an open shop with or without a qualified assistant. That was a question that had never been decided yet, and it would require to be tested, but they would have to take care they did not raise the whole of the medical profession against them. He did not object to have the point tested, but he objected to having it tried and failing. A druggist would not live in such a place for there was no dispensing. It was all done by the doctors themselves. Even though they made the doctor dispense by his own hands they would not be a bit better.

Mr. Murdoch: No, but where in Coatbridge there are 30,000 of a population there might surely be a chemist.

Mr. Kinninmont said it was the same thing in a part of Glasgow. Clubs went up and limited liability companies. All that a man had to do was to call himself a limited liability company, and he could dispense as he pleased apparently. If they could get an Act restoring it to its original meaning it would be much better, but it was no use trying to get dispensing out of the hands of the medical men. They would not get that. He had in his mind's eye a large district in the south in which there were four doctors who kept open shops. It was a district very like Coatbridge. The doctors did all the dispensing and all the trade that was to be had in it. He did not think they could meddle with them. It was owing to the nature of the district. It was a working district worked by clubs. A doctor could not get practice unless he went to his customers, who gave 4*d*. a week and got medicine and everything else.

Mr. Murdoch: It is down to 2½*d*. a week now.

Mr. Martin said that as coming from that district he might throw some light upon the subject. He lived in Motherwell, and there was a contrast there. There was not a chemist in Coatbridge, but there were five in Motherwell, all with little shops. Now these two districts were of the same nature. The reason of the difference was that in Coatbridge and Motherwell the medical men were not paid so much a visit as in Edinburgh or other towns. There was 2*d*. a week kept from a working man's wages. The whole community was of the working class, and the doctor got a lump sum, and for that he had to supply medicines and advice. That in a kind of a way necessitated doing away with dispensing. In Motherwell they had been able to agree with the medical man and to dispense at low rates; perhaps some present would be surprised if he told how low. But they did the work and there was not a doctor's shop in the place; they were all chemists, registered men. In Coatbridge, which was a little bigger and of the same nature, it was all doctors' shops. There seemed to have been no chemist able to agree with the medical men, but if a chemist were opening there and saying to the doctors, "I will do your dispensing at a reasonable rate," then he could get on too. The doctors were glad to get rid of it. He dealt with two or three and they were glad to be rid of the business and pay him at the end of the year; and he got the rest of the work, which was not very much. But that was how it was worked there. In the Glasgow district, by trying to accommodate the doctors they would be able to sweep away the doctors' shops. But that would not apply to Glasgow. He knew about that too, the doctors were paid by fees in many cases, and he did not think they would manage easily there. But in the rural districts he thought they would find as a rule that the doctors were glad enough to be rid of it.

Mr. Stephenson said he understood the question was decided in a recent case. The interpretation of the law was that no unqualified man could keep open shop for selling poisons with his own unqualified hands. No man could do that, be he doctor or assistant. He thought the thing was settled.

Mr. Nesbit said a doctor is a qualified man.

Mr. Stephenson: I think not.

Mr. Rutherford Hill: A doctor may but his unqualified assistant may not. This was settled in the Hamilton and Dundas Street cases.

The Chairman said he was sure they all sympathized with their friends in the position which had been described. He could assure them the matter was not being overlooked. It was engaging the attention of the proper authorities, but it was not for them to say what was being done and what not.

Mr. Storrar said there was one other duty that must be performed; that was to give a very hearty vote of thanks to Mr. Ewing for his conduct in the chair that day; and he should like that they returned to him their very sincere thanks, not only for occupying the chair that day, but also for his management of the North British Branch's business during the last year. He was sure they all had felt, and still felt, very great regret at losing their late friend Mr. Gilmour, and there was considerable hesitation as to getting a man to follow him. Now, however, they had found a most efficient substitute in Mr. Ewing. He was not only the representative of a historic house in Scotland, and as such had a good position in the trade, but he himself had great business tact and had shown great devotion to work, and he was sure he had done excellent work in the interests of pharmacy in Scotland during the past year. He only hoped Mr. Ewing would continue to do so during next year, which would be an important one in Edinburgh especially.

Mr. Nesbit, Portobello, seconded this motion, and it was carried amid applause.

The Chairman, in acknowledging the compliment, assured the meeting that he would always try to do his best to serve the Pharmaceutical Society.

This was all the business.

Proceedings of Societies in London.

SOCIETY OF ARTS.

Composite Heliochromy.*

BY F. E. IVES.

(*Concluded from page* 1036.)

Both Duhauron and Cros had the idea of synthesis by optical superposition as well as by colour-prints, but neither of them succeeded in carrying out the idea practically. Superposition by triple optical lantern projection was first carried out successfully by me, in my demonstration at the Franklin Institute, Philadelphia, in February, 1888, showing a landscape photographed from nature. I employed a single lantern box, having three optical systems close together, with a triple lime-light jet, and three positives mounted side by side in a single wooden frame, behind red, green, and blue glasses. A considerable variety of subjects were shown with the same lantern in November of the same year, when I first clearly stated and demonstrated the principle which represents the application of the Young-Helmholtz-Maxwell colour theory.

The first workable plan of optical superposition other than by lantern projection was devised by Antoine Hippolyte Cros, brother of Charles Cros, and patented in 1887. In this device, the three pictures are arranged relatively to each other like the steps of

* From the *Journal of the Society of Arts*, May 27.

a staircase, and by means of a peculiar system of mirrors, some of which are attached to the face of a rapidly revolving wheel, with open spaces between them, the different pictures are seen by the eye in one optical plane, in such rapid succession, that they appear like a single picture, with colours blended. The same device, which is a very ingenious one, was to be used also for making the negatives; but it is so clumsy, so troublesome, by reason of the necessity for providing means to keep the mirrors in motion, and includes such a narrow angle of view, that I believe it has no practical value.

Both Duhauron and Cros taught that synthesis by optical superposition should be accomplished with the same mixtures of light rays that acted to produce the different negatives. The picture made through an orange screen was to be seen by the light transmitted by the same, or an exactly similar screen, and so on.

I hope I have made it clear that such a procedure is quite irrational, in view of the facts which support the Young-Helmholtz-Maxwell colour theory. The photograph made by the joint action of various different colours of spectrum rays must be seen by rays of one colour only. Spectrum rays of various colours excite one fundamental sensation, but only spectrum rays of one single colour will serve to represent that fundamental sensation.

I have taken particular pains to emphasize this fact in every paper I have published upon this subject, but have not yet succeeded in impressing it upon the minds of the French writers, who continue to assert that my procedure does not differ in any essential particular from that indicated by Duhauron and Cros. I think that this one difference alone is of vital importance.

The application of the Young-Helmholtz-Maxwell theory involves important changes from the older methods, not only in the negative process, and in the synthesis by optical super-position, but also in the production of permanent colour-prints. Theoretical considerations alone led me to conclude that a transparent colour-print from either negative could be made to perform exactly the same function that the positive transparency from the same negative performs in the synthesis of triple lantern projection, and a simple experiment with the triple lantern confirms my conclusions.

The white disk that we obtain in screen projection by mixing the red, green, and blue-violet lights, corresponds to the white paper which may form the basis of a permanent colour-print heliochrome. When we insert the positive of the red sensation in its place in the lantern, its shadows cut off the red light, leaving the disk still white except in the shadows, where there remains only a mixture of the other two lights, green and blue-violet; a transparent print from the same negative performs the same function when laid upon the white paper, provided that its shadows also cut off the rays that excite the fundamental red sensation, but freely transmit the green and blue-violet. I have found that a coal-tar dye, sold as "thio blue A," absorbs those rays which excite the fundamental red sensation, but freely transmits the green and blue-violet; a Woodburytype process print in this colour fulfils the requirement for a permanent print to represent (by transparency) the effect upon the fundamental red sensation. By a similar process I have found that fuchsine fulfils the requirement for making a print to represent the green sensation, and aniline-yellow the print for the blue-violet sensation. It is true, as I have already pointed out, that these permanent colour-print heliochromes will show a slight degradation of colour in ordinary white light, but they should exactly reproduce the natural colours when viewed in a white light produced by mixing the red, green, and blue-violet spectrum rays.

The theoretical conditions of success have, therefore, been realised for the negative process, and for all three methods of synthesis.

But there is another aspect of this subject, which from a practical and commercial point of view, is quite as important as that of realizing the theoretical conditions of success. I am of the opinion that, however perfect results this process could be made to give, it would not be reasonable to expect it to be commercially successful, so long as complicated by the necessity for making three separate photographic negatives and three separate photographic colour-prints, in order to obtain a single reproduction in colours. Such a complicated procedure might be carried out successfully by experts, dealing with such subjects as paintings or similar art objects, but would not be available for landscape photography, or in the hands of amateurs.

The only way to make the process simple and reliable enough to be available generally, is to reduce the number of negatives to one, and dispense with the colour print process altogether. This I have accomplished by the invention of a camera that makes the three pictures on a single plate, by one exposure from one point of view, and a device, which I have named the heliochromoscope, that optically recombines the triple black and white photograph into a single photograph reproducing the natural colours. With this camera (about the size of a kodak) and the heliochromoscope (the size of a hand stereoscope), the reproduction of the natural colour by photography is not only made practically available, but reduced to the simplicity of stereoscopic photography.

I wonder if people are prepared to realise the full significance of this fact. The hope of producing colour *prints* by a direct process, is calculated to discredit the value of an equally simple method that accomplishes substantially the same result in a different way. I said, "substantially the same result," but, in a way, it is a better result, because it is quite impossible that any coloured picture, with its distracting surroundings and surface reflections, should ever produce such a perfect illusion of nature itself as we may obtain with this little instrument, consisting of several small mirrors, two of them transparent, placed at certain angles with reference to the photograph, and inclosed in a box. If the heliochromoscope was merely a box for seeing photographs in colours, it might be regarded with indifference; but I hold that it is as far from being merely that as the phonograph is from being merely a device for making a noise by turning a handle. It is capable of accomplishing for us, in the reproduction of colours, more than the phonograph accomplishes for us in the reproduction of sounds, because the illusion is more perfect. I quite believe that the writer who, in a recent article in *The Speaker*, described the heliochromoscope as a toy, comparable to the kaleidoscope, would have been capable, under similar circumstances, of comparing the phonograph to a baby's tin rattle.

I have also tried to simplify and perfect the colour-print process. The employment of the new triple camera, making one operation take the place of three, is one step in that direction. The use of the dyes I have mentioned, corresponding to the colours produced in screen demonstration, is another. The production of a single print instead of three, cutting the images apart only when ready to be dyed, is another. Experiment with the Woodburytpye process is another. The Woodburytype process offers the vitally important advantage for reproduction in large numbers that, having found experimentally the right amount of dye required in each of the three colour-prints, an indefinite number can be made without any variation; it will be available for the commercial production of lantern slides. These appear to be real advances; but, after all, the

further complication and mechanical difficulties of carrying out the print making process, render it comparatively unsatisfactory up to the present time—and the value of composite heliochromy must be estimated, for the present, on the basis of its application to the photographic reproduction of the natural colours by optical superposition.

If the heliochromoscope is the only solution of the problem that is sufficiently simple to be practicable for general introduction, there is, nevertheless, a field for the application of the method of colour projection for lecture illustration. Here, also, we escape the complication and mechanical difficulties of colour printing, and obtain results which are permanent as far as the colour record goes, and which can be shown to many people at one time. It will be necessary, however, to employ the arc electric light in order to project landscape views at night as perfectly as they have already been projected by sunlight. The value of the method cannot be fully demonstrated with the lime light.

In conclusion, I would like to say another word to emphasize the fact, which I think is quite sufficiently demonstrated in the heliochromoscope, that although we are not able to make photographs in natural colours of exactly the kind that people have been looking for, we have, nevertheless, found a true solution of the problem of reproducing the natural colours by photography, as remarkable in its results as the telephone or phonograph, more perfect in the illusion of nature than would be possible in coloured pictures, and almost as easy to realize as stereoscopic photography. It seems to me that this is an advance so great that it should finally break down the prejudice against the idea of composite heliochromy which has grown out of the long series of failures of unscientific, complicated, and impractical methods. With no more operations than are required to make an ordinary photograph, we now make a photograph that, as we are able to see it, reproduces nature itself, light, shade, and colour.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting was held on Thursday, June 9, Mr. H. A. D. Jowett in the chair.

The following paper on "Granilla" was read by Mr. G. A. Shaw:—

Note on "Granilla," an Inferior Cochineal.

BY GEORGE A. SHAW.

Up to the present time very little has been known amongst pharmacists about this article of commerce, and writers on the subject of cochineal give very conflicting statements as to its origin and composition. Dr. Pareira, in his well-known work on materia medica, states that "granilla consists of very small cochineal insects and smaller wrinkled globules or ovate masses, cocoons (I have been unable to find any cocoons), and new born insects somewhat like fragments of cochineal insects." In a paper read before the Pharmaceutical Society about 1848 a Spanish writer, José da Nobrega, says that "in the Mexican provinces two qualities of cochineal are known, first, Grana Fina, that which is grown on the cultivated nopal, and, secondly, Grana Sylvestra, that which is found on the wild cactus, this is known as granilla." In a letter to Dr. Pareira, in 1845, August Faber, a cochineal merchant, writes as follows:—"Granilla is imported from the same places as cochineal, namely, Mexico and Honduras, and it consists of small immature insects. Garblings consists of broken pieces of insects mixed with dirt and extraneous substances gathered from the plant in taking the insects. Each bag of cochineal on its arrival in the London market is sifted, and in this manner the garblings are obtained, as they are seldom imported as such." Mr. Smith, an old Secretary of the Pharmaceutical Society and an authority on the subject, says that granilla consists of small immature female insects. Other references appear to be repetitions of these statements.

So much, then, was the information I was able to obtain on the subject. In the hope of clearing up the evident uncertainty as to its constitution and origin I undertook to examine two samples of granilla which were in the educational collection at Bloomsbury Square. One sample, A, was black, and the sample B was of a dusty gray colour, corresponding respectively to the black and gray varieties of ordinary cochineal. After ascertaining the amount of ash left on incineration, the only methods of arriving at any satisfactory conclusion were, of course, purely mechanical, so that the figures cannot be said to be absoletely accurate, but will give a good idea of the relative amount of each substance in the granilla. The method I adopted was to first separate the mixture by shaking with chloroform, and then separating that which floated and that which sank into their respective constituents by means of a camel-hair pencil under a lens.

The first specimen I examined was the dark-coloured granilla A. This specimen was free from dust and of a dark purple colour throughout. On incineration it yielded an ash, corresponding to 20·5 per cent. This ash was chiefly composed of an impalpable powder, together with a small quantity of sandy matter. The granilla was then treated with chloroform, and was found to contain only a small quantity of earthy matter, such as sand, etc. The portion lighter than chloroform was then skimmed off, allowed to dry on a glass plate, and separated with a camel-hair brush into several parts. The first portion weighing 86 per cent. was made up entirely of small immature cochineal insects, together with fragments of larger insects of the black, shining variety. This granilla is therefore of a fairly good quality, and would probably yield a comparatively large amount of colouring matter. The next portion, consisting of cactus spines, fragments of wood, leaves, and other vegetable debris, gave a weight corresponding to 8 per cent. The whole of this vegetable debris is of the same colour as the cochineal insect, namely, of a dark purple. To this fact I shall have to allude later on. The last part, 4 per cent., consists of small, vermiform bodies, which yielded a large amount of ash on incineration and appeared to be almost entirely inorganic. On treatment with nitric acid the whole of the interior was dissolved out, leaving a framework which under the microscope was seen to be of a distinctly cellular structure, thus leading me to think that they must be of vegetable origin. I was afterwards able to identify these as the small succulent leaves of the cochineal cactus, *Opuntia cochinellifer* (a specimen of which is in the botanical gardens at Regents Park), so that there is little doubt that they have been brushed off the cactus during collection of the insects. I was also able to separate a collection of wing cases of some foreign insects, together with two almost perfect specimens, which were identified for me by Mr. Cahan, of the South Kensington Natural History Museum, as two species of the lady-bird family, Coccinelidæ, namely, *Hyperaspis Connectens* and *Hyperaspis Trimaculata*. As neither of these species occur in the Canary Islands, but are indigenous to Mexico, it follows that both samples of granilla are of Mexican origin, since each sample contains the wing cases of these insects. The Coccinelidæ are parasitic in the Coccideæ and Aphidæ, the former being the family to which *Coccus Cacti* belongs, and hence there is little wonder at their being found mixed with the cochineal insects.

The other sample of granilla B is of a light colour, extremely dusty, and evidently of a much poorer quality. On incineration 100 grains left an ash weighing 50·5 grains (=50·5 per cent.). Ordinary cochineal generally has an ash of 3 or 4 per cent. This ash contained a large proportion of sand, which can readily be seen on examination. Whether this large percentage of sand points to an accidental admixture or to a sophistication I cannot say. It has been stated that some cochineal growers prefer to kill the cochineal by scattering over it a small quantity of hot ashes. If this be the case, then the presence of so much earthy matter in the granilla can be readily accounted for. On examining this sample as I have just described, I found that its composition much resembled that of sample A. As might be expected from the percentage of ash a large quantity, namely, 36·8 per cent., sank in chloroform and proved to be entirely earthy matter. The weight of immature cochineal insects and fragments, yielded by 100 grains, was only 36 grains, so that the amount of colouring matter in this sample of granilla would be very small. Vegetable debris amounted to 21 per cent., and consisted of fragments of wood, spines, etc. The spiny leaves described before made up another 5·2 per cent. and should be classed as vegetable matter. In this sample also the wing cases mentioned in connection with the other sample A, occur, together with a collection of miscellaneous bodies which are unrecognizable. An aqueous infusion of this specimen is very mucilaginous, so much so that it is quite unfilterable, owing I suppose to the starchy nature of the vegetable matter. The three other samples of granilla were given to me by Messrs. Beazley and Co., cochineal merchants of Mincing Lane. They are all from the Canary Islands, and none of them contain any wing cases of the two insects alluded to before.

The sample marked C gives only 12·5 per cent. of ash, which is by far the lowest ash given by any sample of granilla I have examined. Like A it is black and contains vegetable debris, and small cochineal insect and fragments.

The sample D has been "rounced," that is, it has been shaken with a very small quantity of moisture to give it the black appearance. Its ash is 25·5 per cent. and it contains a fairly large quantity of sandy matter.

The last sample, E, very much resembles B, but is of a better quality, its ash being only 23 per cent. compared to 50 per cent. of the other light-coloured sample. The results may be tabulated as follows:—

GRANILLA.

A, black variety, contains:—	
Small cochineal insects and fragments	86 per cent.
Vegetable matter	12 „
Earthy matter	2 „
Ash	20·5 „
B, gray variety, contains:—	
Small cochineal insects and fragments	36 „
Vegetable matter	26 „
Earthy matter	37 „
Ash	50 „
C, black . . . Ash	12·5 „
D, black . . . „	25.5 „
E, gray . . . „	23 „

From these data it will be seen that granilla consists of the siftings of the cochineal insects, and contains such matters as might readily contaminate the cochineals during collection, and that it is not, as stated by some writers, a wild species of *Coccus*. It rarely comes into the market at the present day, as its value has gone down to 3*d*. or 4*d*. per pound. At one time, as each bag of cochineal came into London, it was sifted, and the siftings, which were composed principally of dust, were known as "Garblings," and constitute quite a different thing to granilla. This custom is, however, gone out of use, owing to the low price of cochineal.

Whilst on the subject of cochineal I should like to say a few words on the different varieties of commerce. I was informed by a cochineal merchant and grower, Mr. Frederick Rowsell, of Mincing Lane, that in the Canary Islands three varieties existed, namely, black-grey, silver-grey, and rosy-black. They are obtained as follows: In January, the mature insects which have been kept through the winter are allowed to spawn, and the young are conveyed and attached to the cactus plants either on strips of calico or in muslin bags. These come to maturity about March, when the first crop is collected. This crop yields the black-grey grain. This variety is said to be much richer in colouring matter than any other, and for that reason it is always used for the preparation of carmine. Those insects which are left on the plants produce the second or main crop, which is ready for collection about June or July. This is the silver grain, and is much richer in the waxy coating which is characteristic of grey cochineal. Both these varieties are killed either by suffocation with charcoal or sulphur fumes or they are spread on trays and allowed to dry in the sun. The rosy-black grain may be made up of insects of either of these crops. The difference depends on the way in which the insect is killed, the black-grain being killed by a wet process, whereby the waxy coating is melted and varnishes the body. This is borne out by the fact that the whole of the vegetable matter in the sample of black granilla, A, is coloured, which cannot be explained except by the supposition that the whole had been immersed in water.

At the present day Mexican cochineal very rarely comes into the market, being almost entirely replaced by that from the Canary Islands. Before the introduction of aniline colours, the Mexican grain was much esteemed as being the only cochineal the colour of which would penetrate leather. Black cochineal from the Canary Islands frequently contains what is known as black sand, which is extremely heavy and has the property of being magnetic, and can therefore be very readily detected by means of a magnet. This is not an adulteration, but merely an accidental contamination through careless collection. The whole of the ground in the cochineal fields is covered with this sand, which is of volcanic origin, to a depth of one or two feet, and it is easy to see how it comes to be mixed with the commercial article. In conclusion I must add that I am much indebted to Mr. Greenish and Mr. Frederick Rowsell for much useful information, and also to Messrs. Beazley and Co. for the specimens of cochineal and granilla on the table.

After a short discussion on Mr. Shaw's paper, Mr. A. J. B. Cooper read a paper on "Parasites," in which he discussed the effects of parasitism, both on the host and on the parasite. Among other phanerogamous plants, either entirely or partially parasitic, the mistletoe, dodder, toothwort, broomrape, bastard toad-flax, eyebright, rattle, and cow-wheat were described and illustrated; the saprophytic phanerogams being illustrated by Neottia, Epipogium, Corallorhiza, and Monotropa; and parasitic fungi by the wheat rust, ergot and fly and caterpillar fungi. A brief reference to symbiosis concluded the paper, which gave rise to a discussion in which the Chairman, Messrs. Shaw, Fuge, R. H. Jones, and the Secretary took part.

The meeting then adjourned.

NORTH AND NORTH-WESTERN CHEMISTS' ASSOCIATION.

A meeting of the above association was held at the St. Lawrence Institute, Priory Park Road, Kilburn, on Thursday, May 26, at 9 o'clock, when a paper, of which the following is an abstract, was read by Mr. L. Cooper on "The Chemistry of Dry Plate Photography":—

After some preliminary remarks, Mr. Cooper proceeded to explain that in order to prepare an emulsion of a silver haloid salt with gelatine, $AgNO_3$ is mixed with the gelatine solution and some soluble haloid salt added, such as KBr or NaCl, which ppts. the AgBr or AgCl in the gelatine. The salt generally employed is KBr, and the quantity is so adjusted as to leave no excess of $AgNo_3$. It is in this that the gelatine bromide emulsion differs from, and is superior to, collodion. It is very well known that colloidal substances, such as gelatine, form chemical compounds with crystalline salts; for instance, if the KBr be not in excess, a compound known as gelatine nitrate is formed, and this is sufficiently strong to disguise the presence of the silver salt. In consequence of this, if KBr be in deficiency, the plate is unpleasantly affected, as light decomposes it, forming an oxide or liberating metallic silver, with which the developer fogs the plate. Hence the importance of completely decomposing the gelatine nitrate with KBr. When first precipitated in the emulsion, the AgBr is in an extremely fine state of division; and to increase the sensitiveness of the emulsion, it is allowed to stand for a short time at a temperature of 60° F. This also accelerates the ripening of the emulsion, and this sensitiveness is still further intensified by surrounding the emulsion with boiling water. It is obvious that after this process we have a jelly containing KNO_3,KBr, in addition to the AgBr; hence, before the emulsive film can be allowed to dry on the plate, the soluble and crystalline salts must be removed. The cold emulsion is therefore forced through sieves in a fine state of division and washed until all soluble salts have dissolved out. The washed emulsion is then re-dissolved in warm H_2O and the solution filtered. Plates may then be coated with a uniform film and allowed to dry.

This emulsion is an absorbent of bromine. The gelatine acts as a sensitizer, and, on account of the contact existing between it and the silver particles, the sensitizing action is capable of being exerted in the highest conceivable manner. The co-operation of both physical and chemical conditions results in a mixture which, for its sensitiveness to light, transcends anything hitherto discovered.

When the plate so prepared is exposed, the light acting on the AgBr reduces it to a lower bromide, and the invisible image so formed is of exactly the same chemical composition and only differs from the previous salt in degree. The reasons leading to this belief are that the invisible image is built of the same material as the darkened haloid, and the substances which accelerate or retard the formation of the latter act in the same manner on the latent picture. We must regard the latent image so far as consisting of an oxyhaloid salt of silver, or of a combination of such a salt with an unaltered haloid. The quantity of the halogen so liberated depends of course on the nature of the sensitizer, as well as on the exposure given; and the varying intensity of action, corresponding to the lights and shades, being represented by varying amounts of reduction product, we have the maximum amount of decomposed haloid molecules in the stronger lights, fewer in feebler lights, whilst in deep shadows no decomposition occurs.

As no free $AgNo_3$ exists in this plate, we can use a much stronger alkaline or acid developer than in the wet plate process. Also, because of the silver haloid particles being embedded in gelatine, a substance which acts as a restrainer, we can apply a reducing solution which would be strong enough to reduce the haloid salt to the metal, were it not so protected. There is thus a great gain, both in having a sensitive film to start with and in being enabled to use a stronger developer after exposure.

All developers act in the same manner, and amongst the numerous reducing substances so employed, several organic ferrous salts, especially the oxalate, are now in extensive use.

In order to restrain the strong reducing power of the ferrous oxalate, KBr is added to the developer, its function being similar to that of the alkaline pyrogallates. The oxalate, which is the reducing agent, becomes oxidized to the ferric state by the bromine released in the reaction that occurs; and the reduction product is further reduced to metallic silver, whilst the unaltered AgBr, except when it is in contact with the nascent silver, is not attacked, owing to the restraining action of the KBr in the solution and the gelatine in the film.

The action of the reducing agent may be thus represented—

$$3\,Br_2 + 6\,FeC_2O_4 + 3\,K_2C_2O_4 = 3\,Fe_2(C_2O_4)_3 + 6\,KBr.$$

Details were then given of the processes employed to correct under- or over-exposure, and a description of the methods of obtaining prints concluded a very interesting paper.

Parliamentary and Law Proceedings.

JOHNSTONE *v.* TILDEN (PRESIDENT OF THE INSTITUTE OF CHEMISTRY) AND OTHERS.

In the Queen's Bench Division of the High Court of Justice, on Tuesday, May 31, 1892, Johnstone v. Tilden and others applied to the Lord Chief Justice to be allowed with Mr. Jelf, who appeared for the plaintiff, to make a statement in reference to this case.

Mr. Jelf said that he appeared for the plaintiff, Dr. Johnstone with Mr. Pocock and Dr. O'Connor. The action was brought by the doctor against the Institute of Chemistry of Great Britain and Ireland, represented here by the Solicitor General. The action was brought to prevent the Institute from persevering in excluding him from being a member and fellow of the Institute upon a certain charge of unprofessional conduct which had been made against him. After very carefully considering the facts, and the evidence on which this case was sought to be based, and although his client was very desirous of clearing his character as much as he possibly could, he had pointed out to Dr. Johnstone that the Charter of the Institute gave the Institute very large powers, so long as they were acting in good faith and in accordance with their rules, in deciding rightly or wrongly on the matters brought before them. His client had, he hoped wisely, placed himself in his hands in the matter; and in accordance with what had passed between the Solicitor-General and himself, they had agreed, with his lordship's permission, to deal with the case by making a short statement on each side. On the part of the plaintiff, he desired to withdraw unreservedly any suggestion that these gentlemen had been acting otherwise than in good faith and in accordance with the rules of the Institute. On the other hand he was glad to say that the Solicitor-General saw his way to saying this on behalf of the gentlemen whom he represented, "that their action was founded entirely on their view of the professional conduct of the plaintiff on a single occasion, and involved no imputation upon his character or professional capacity." Two views might possibly be taken of the question that was at issue; but looking to the circumstances of the case, and, it seemed to him, the very handsome way in which he

had been met by the Solicitor-General with the consent of his clients, he thought it would be extremely unwise for his client to fight for more than he had received. Under those circumstances, they had agreed, with his lordship's consent, to withdraw the record, and meanwhile the plaintiff undertook to give up any title he might have had to be a fellow or member of the Institute, and to hand over what perhaps he could not say that his client was entitled to keep, but no doubt he would do what was right—he would not persist in representing himself as a member of the Institute, and he would hand over his documents.

The Solicitor-General said he was much obliged to his lordship for allowing him to interpose. Representing the authorities of the Institute of Chemistry his only desire was to make it perfectly clear, and it was their only wish to make it clear that they acted throughout deliberately, and in the exercise of the deliberate judgment vested in them, and according to the rules of the Institute to which the plaintiff himself belonged. The words his learned friend had read were words that he agreed to. He agreed that there might be some controversy and difference of opinion as to the action of the plaintiff himself, which was brought under the notice of the defendants, but it was carefully considered by them. They took the course they were bound to take in the interests of their profession, and he was glad to have the opportunity of saying, not only that they had acted regularly in the matter, but they were anxious their action should not be taken to carry with it an imputation which it really ought not properly to bear. It was a question of professional conduct in a single instance, and their action upon it and that action they were obliged to notify. In this case, they had agreed to the record being withdrawn with his lordship's permission.

Mr. Jelf: And no costs.

The Lord Chief Justice said he could only give effect to the desire of the parties and the record might be withdrawn.

Alleged Poisoning by a Cough Mixture.

An inquest was held on Saturday, June 4, by W. H. Bell, Esq., Coroner for Rochester, respecting the death of Ethel May Taffs, aged seven months.

Eliza Ann Taffs said deceased had always been delicate and that she had taken her to Dr. Jefferiss about five weeks ago because she had a cough. She told the doctor the child had been taking some cough mixture bought at an herbalist's. The doctor had treated the child, but the cough got no better, so she sent to Tuck's, the herbalist, for some more cough mixture, and gave deceased half a teaspoonful. The medicine checked the cough and the child afterwards slept. Later she heard her cry and found her convulsed. Some simple remedies were applied, and when her husband came in he went for the doctor, who could not come, however, because it was during his surgery hours. Witness then took the child to him and afterwards carried out his instructions, but very early next morning the cough started and death appeared to be caused by choking. Only one dose of the cough mixture had been given, and witness was not aware that it contained poison. She had used it before for this child and for her other children and had never noticed that it caused any drowsiness.

Elizabeth Tuck said her husband was a botanic herbalist and had been for ten years. She assisted him in the business. The cough mixture she sold was made from herbs, and contained one drachm of chloroform and half-a-drachm of acetate of morphine in a gallon. She knew these were poisons and that they should only be used in very small quantities, but had never before heard of any ill-effects produced by the mixture.

Mrs. Tuck's daughter, aged 14 years, stated that a little boy came for a pennyworth of cough mixture and she gave him half an ounce.

Alfred Taffs confirmed his wife's evidence.

Dr. Jefferiss said he had attended various members of the Taffs' family, and had recently treated deceased for a cold. He did not think the child was seriously ill, and when it was last brought to his surgery he could not comprehend the cause of its condition. It was in a comatose and livid condition, and he asked if anything had been given other than he had ordered. The mother told him she had given a little cough syrup, but nothing else. He tested what remained of the syrup, and found that it contained a preparation of morphia. Witness considered the child's case was hopeless, but did what he could for it. The symptoms were such as he would expect to see in poisoning by morphia, and that contained in the mixture was certainly the cause of death. A child suffering from bronchial affections would be more susceptible to morphia, and one ninetieth of a grain had been known to cause the death of an infant. In the half spoonful of cough mixture given the deceased, he should estimate there would be about one eighty-fifth part of a grain of acetate of morphia. The chloroform would aid this in its action. His opinion as to the cause of death might be stated: "Insensibility, or coma, following the administration, or caused by a dose, of cough mixture containing morphia." Opium in any form was a most improper thing to give in such a case. He had granted a certificate stating that death was due to bronchial catarrh and coma.

After a dispute between the jury and the doctor, who objected to the course of procedure, a verdict was returned of "Death from natural causes, viz., bronchial affection."

The Coroner added that they wished it to be represented that unqualified people should not put these poisonous ingredients into their medicines.

Reviews and Notices of Books.

The Principles of Chemistry. By D. Mendeleeff. Translated from the Russian by George Kamensky, of the Imperial Mint, St. Petersburg. Edited by A. J. Greenaway, F.I.C. In two volumes, 8vo.*

The chief object of this work is to promote the study of chemical science from the more purely philosophical point of view. Statements of practical data as well as descriptions of methods of observation and of experimental operations find their place, but they are made use of especially to illustrate the principles of the science and the doctrines by which ideal conceptions of the causal connection of chemical phenomena and of the nature of chemical change are obtained. The author admits that in carrying out this design the execution has probably been largely influenced by his personal relation to a branch of philosophical speculation, in the development of which he has been prominently concerned. Although, as he states in his preface, he has endeavoured to make the book a true mirror directed towards the domains of chemical transformations, the influences near to him have been reflected the most clearly, most brightly illuminated, and involuntarily the entire work has been tinted with their colouring. Naturally, therefore, those relations between elementary substances, which are expressed by the periodicity of their atomic weights and other characters receive considerable notice, and it is the aim of the author to show that palpable advantages are derived from the application of the periodic law in an elementary treatise on chemistry. Another motive

* London: Longmans, Green and Co.

which has induced him to adopt this course is the conviction entertained by him that the time has now arrived when a knowledge of physics and chemistry, as well as of other branches of natural science, should form as important a part of education as a knowledge of the classics did two centuries ago. While at that time the nations which excelled in classical learning stood foremost, we now find, on the contrary, that those which are most advanced in the cultivation of the natural sciences either hold the first place in all that relates to solid national wealth, or are rapidly advancing to that position.

The introductory chapter is devoted to a general description of the nature of chemical action and of the material changes which it produces, so far as the conceptions involved can be grasped without more special knowledge of the particular facts of chemistry. In the description of the chemical elements, the phenomena of combination and decomposition, etc., historical references are made to the progressive alterations which have taken place in the views prevailing as to these subjects. In this way the student is instructed as to the fundamental ideas of the indestructibility of matter, the conservation of energy, the quantitative relations obtaining in all kinds of chemical phenomena, the individuality of the elementary substances, and the use of symbols for representing them and their compounds. Incidentally the relations of the theoretical views held in these respects, at different periods of the world's history, are also explained and the student, thus prepared, is then led to consider more fully the matters of detail by a knowledge of which general chemical conceptions are more thoroughly formed.

The description of the physical and chemical characters of water and its constituents, of atmospheric air and the compounds of nitrogen occupy the first six chapters of the first volume, in the course of which opportunity is taken to treat of the nature of solution and combustion, the constitution of salts, the law of multiple proportions, the phenomena of diffusion, dissociation, contact action, and chemical equilibrium. The seventh chapter is devoted to an exposition of the laws of gaseous combination, established by Gay Lussac, Avogadro, and Gerhardt, of their value as the means by which definite conceptions of molecules and atoms are formed, and of the application of vapour density to the determination of chemical composition. Chapters eight and nine deal with carbon and its compounds, and chapters ten to thirteen with the halogens and the alkali metals, ending with a general comparison of the relations of these two groups, and the more or less intermediate character of other elementary substances. The last chapter of the first volume treats of the subjects of valency, and the law of specific heat established by Dulong and Petit.

The fifteenth chapter, which opens the second volume, treats of the grouping of the elements and the periodic law. After showing that the data concerning chemical transformations given in the previous chapters are insufficient for accurately judging of the resemblance of the elements, the need of a knowledge of their exactly measurable or common properties is pointed out. Among these are isomorphism, the relation of the volumes of analogous compounds of the elements, the composition of their saline compounds, and the relation of the atomic weights. The modes in which these properties are made use of for the grouping of the elements are then explained, and in regard to the last-mentioned property expressed by the atomic weights, it is described as the one which is accurately measurable and subject to no doubt. Its magnitude indicates the relative mass of the atom or the relation between the masses forming the chemical and independent individuals or elements. The fundamental idea which leads to arranging all the elements according to their atomic weights is thus stated. According to the sense of all physico-chemical data the mass of a substance is that property on which all the remaining properties of matter must be dependent, because they are all determined by similar conditions, or by those forces which act in the weight of a substance, and this is directly proportional to the mass. Therefore, it is most natural to seek for a dependence between the properties and analogies of the elements on the one hand and their atomic weights on the other. The descriptions of the elements in the following nine chapters of the second volume are arranged according to the periodic system. At the end of the work there are three appendices containing the lectures delivered by Professor Mendeleeff at the Royal Institution, and to the fellows of the Chemical Society, as well as a paper on Curtius' discovery of Azoimide. There is also a subject matter index and an index of authorities. The work is well printed, on excellent paper, and is illustrated with a number of well executed woodcuts.

LECTURES ON PRACTICAL PHARMACY. By BARNARD S. PROCTOR, F.I.C. Third edition.*

After an interval of eleven years we are favoured by the issue of a new edition of this now classical work. It should be a source of gratification to all who have the best interests of pharmaceutical education at heart that, in spite of the publication of a number of books dealing more or less imperfectly and unsatisfactorily with the art of pharmacy, Mr. Proctor's lectures should yet hold the leading position as a text book and work of reference. In the preparation of the former edition the author was obliged to undertake the revision of the subject matter very shortly before the appearance of a new edition of the British Pharmacopœia. He therefore laboured under the disadvantage of knowing that part of his work would be out of date soon after publication. In spite of this the value of his book was undoubtedly greatly enhanced by the alterations then made, and many of the suggestions therein embodied with regard to improvements in official processes were adopted in the B.P., 1885. Repetition of these was thus rendered unnecessary, and in the present edition a certain amount of space in the lectures on official pharmacy, formerly occupied by comments, is economised and utilised for the introduction of fresh matter. The progress of pharmacy has also necessitated considerable enlargement, for the additions, small and great, occupy nearly a hundred pages. A great many of these changes are only apparent on a careful examination of the text, the operations of excision and insertion having been so skilfully conducted as to leave the book unaltered in arrangement. The earlier lectures, dealing with the physics and mechanics of pharmacy, are modified very slightly, but much of the information concerning drug grinding, which had no practical value to the average retail pharmacist, is deleted from lecture two, whilst the notes on filtration and percolation are amplified. It is, however, in dealing with the pharmacopœia and its preparations that Mr. Proctor is at his best. This portion of the work is greatly extended, and it is satisfactory to note that much stress is laid upon the necessity of endeavouring to make the official processes yield products at least as uniform in strength as the material dealt with. In many cases indeed it is advisable to make some attempt to produce preparations in advance of the crude drugs in uniformity. Unvarying potency, we are told, must be the desideratum of the therapeutist, as well as of the pharmacist who desires to make his art respected by the medical profession, and any attempt at "elegant" pharmacy must be subsidiary to this.

* London: J. and A. Churchill. Demy 8vo. Pp. i.–xiii., 1–539. With 32 plates. Price 14s.

The advice to pharmacists to investigate and criticise the official formulæ with a view to improving the processes comes well from one who has in his own work shown what valuable results may be thus attained, and the practical criticisms which follow serve admirably to illustrate the arguments adduced. Discrepancies in the products obtained by different workers may often be explained by the suggestion, on page 155, that many of the official formulæ work satisfactorily in the quantity prescribed, though modification of the process may be desirable if ten or a hundred times the quantity be operated upon. Practical hints such as this are scattered plentifully throughout the work, and will doubtless be regarded by many as constituting the most valuable portion of it. Fresh information, however, is also given respecting dispensing operations and pharmaceutical testing, though the need for the latter is not so great since the publication of the author's useful little manual on the subject. The pharmacy of individual drugs is kept up to date, and we note that a new lecture is devoted to the stumbling-blocks met with in dealing with weights and measures, specific gravities, and temperatures. There is also an additional appendix treating of the neutralizing powers of acid and alkaline materials used in pharmacy. The absence of information regarding some recent developments in pharmacy is noteworthy and may be regretted by a few, but the statement in the preface, that the art is burdened with numerous so-called improvements having no importance beyond the pecuniary interests of their promoters, will doubtless be accepted by the majority as sufficient justification for the course adopted. The familiar fac-similes of autograph prescriptions and a capital index conclude the volume, which is well printed on good paper and of a convenient size. Praise and recommendation of it are superfluous, but we may say that we do not think anyone engaged in the practice of pharmacy will regret the necessity of increasing his library by the purchase of this book, or of replacing a good one, in the former edition, by a better in this.

THE PUBLIC HEALTH (LONDON) ACT, 1891. By ALEXANDER MACMORRAN, Barrister-at-Law.*

This work should be in the hands of every medical officer of health and sanitary inspector. The important functions now filled by health officers make it imperative that they should be well acquainted with the details of the Public Health Act, all of which appear to be well elucidated in this book.

Obituary.

Notice has been received of the death of the following:—

On the 11th of April, J. J. Coulding, Manchester. (Aged 48 years).

On the 20th of May, R. Lyon, Chemist and Druggist, late of Ipswich. (Aged 66 years).

On the 28th of May, William Ive, Chemist and Druggist, South Kensington. (Aged 48 years). Mr. Ive had been a Member of the Pharmaceutical Society since 1869.

On the 7th of June, John Lord, late of Salford. (Aged 67 years).

Alpha.—1. *Carex ampullacea;* 2. *Carex vulgaris;* 3. *Carex flava;* 4. *Carex Panicea;* 5. *Carex stellulata.* To be correctly determined sedges should have the stem leaves and mature fruit; 6. Probably *Chrysosplenium oppositifolium.* We cannot undertake to name specimens not in flower.

C. T. Kemp.—Scott's 'Manual of Urine Testing' (Lewis) or Legg's 'Guide to the Examination of Urine' (Lewis, 2*s.* 6*d.*) would probably suit you.

* London: Shaw and Sons. Cr. 8vo. Pp. 306. 10*s.* 6*d.*

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith. Matter intended for publication should be written on one side of the paper only.*

JALAPURGIN AND ORIZABIN.

Sir,—Messrs. Umney and Morson have once more drawn attention to the deplorable confusion regarding the resins of jalap, see *Pharm. Journ.*, April 30, 1892, p. 908.

From a scientific point of view the case is very plain. There is the active principle of true jalap, *Ipomœa Purga*, and that of *Ipomœa Orizabensis*. Both these substances are commonly called resins, although they are widely different from any other substance on which the name of resin has ever been bestowed. We may continue to call those substances resins until chemistry ultimately fixes their true place in the chemical system.

The resin of *Ipomœa Purga* is but sparingly soluble in chloroform, ether, or in essential oils.

The resin of *Ipomœa Orizabensis* is largely soluble in the liquids just mentioned; it is much less active as a medicine.

When the resin of *Ipomœa Purga* began to be somewhat more exactly investigated by Buchner and Herberger, in 1831, they called it jalapin. Kayser, in 1844 (*Annalen der Chemie und Pharmacie*, vol. li., p. 81) found it to be soluble in sulphuric acid, affording a red solution, and therefore he called the resin rhodeoretin; he was probably not aware of the paper of his predecessors.

In the meantime the root of *Ipomœa Orizabensis* became known in Europe (*see* 'Pharmacographia.') Its resin was thoroughly examined in 1855 by Wilhelm Mayer (Liebig's *Annalen der Chemie*, vol. xcv., p. 132), who unfortunately described it as jalapin; whereas he applied a new name, convolvulin, to the active principle of the true drug. It is quite natural that now the confusion under notice arose; the manufacturers who were not exactly informed of Mayer's carelessness may be pardoned to some extent for furnishing the less active resin, the cheaper one, instead of and under the name of, the true article jalapin.

The ill-sounding designation of convolvulin may be said even to be botanically misleading; it has never and nowhere been accepted by the trade as far as I know.

I have long ago attempted to introduce the name *Orizabin* for Mayer's Jalapin, as recommended in my 'Pharmakognosie,' (Berlin), 1883, p. 403, or in my 'Pharmaceutische Chemie,' vol. ii. (Berlin, 1888), 305. Orizabin would be quite in accordance with jalapin, both these names referring to well known places in the native country of the two mother plants. Whether the manufacturers, the pharmacists, and the medical practitioners will be satisfied with my name must remain to be ascertained. I am not at all in favour of similar changes unless they be absolutely unavoidable, as in the case under notice.

The same must be stated with regard to the name of jalapin. To get rid of the present confusion we must, to my utmost regret, discard it. We should accept Professor Maisch's proposal (see *American Journal of Pharmacy*, 1887, 321, also 'Year-Book of Pharmacy,' 1888, 177), and term *Jalapurgin* the active principle of the true drug, the root or tuber of *Ipomœa Purga*.

We have thus:—

Jalapurgin, partially insoluble in ether, meaning the true, official article, the original jalapin, against—

Orizabin, soluble in ether, meaning the cheaper, the less active resin, awkwardly called jalapin by the late Wilhelm Mayer.

Strassburg. F. A. FLÜCKIGER.

NOTICES OF MEETINGS.

School of Pharmacy Students' Association.—Thursday, June 23.—Paper: "Electro-Metallurgy," by J. Brown.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Saul, Richardson, Robertson, Jones, Foottit, Morgan, Summers, Type, Pinchen, Blount.

DIGITALIN.*

BY H. KILIANI.

Hitherto the numerous attempts to obtain the pharmacologically important constituents of *Digitalis purpurea* in a state of chemical purity and in a crystalline condition have been without any practical result. Nativelle† believed that he had been successful in attaining that object, and for some time a preparation, made according to his directions, was used, especially in France; but it was afterwards given up, since it proved to be irregular in its action and indeed even hurtful. The "digitaline crystallise" of Nativelle was not a homogeneous substance, and in that respect it resembled all the other substances which have been introduced into commerce under the same or similar names. The recognition of this fact is most of all due to the meritorious investigations of Schmiedeberg,‡ the principal results of which are as follow :—

The leaves and seed of *Digitalis purpurea* contain a preponderating amount of an inactive glucoside resembling saponin and named digitonin. They also contain three other substances which possess the characteristic power of acting upon the heart—crystallizable digitoxin and the two amorphous glucosides, digitalin and digitalein. Among these digitoxin does not appear to be suitable for therapeutic purposes, partly because great irregularity in its absorption is to be apprehended on account of its complete insolubility in water, and more especially because the investigations of Koppe§ have shown that it also gives rise to very unpleasant and even dangerous effects. On the other hand digitalin and digitalein would be very suitable for practical use in medicine if it were possible to obtain them in a state of purity.

Several years ago I commenced a further investigation of the constitutents of digitalis, and to some extent the results arrived at have been published.|| Digitonin was obtained in crystalline condition, its composition was ascertained, the products of its transformation investigated, and it was further proved that the article then met with in commerce under the name of crystallized digitalin was nothing more than nearly pure digitonin, or in other words, a substance perfectly worthless in regard to action upon the heart, while in other respects directly injurious, as will be shown at the end of this communication.

I am now in a position to state that the solution of the main problem has been achieved, namely, the discovery of a practically applicable method of preparing the really active principle of digitalis in a state of purity. For this satisfactory result I am essentially indebted to the friendly assistance of Professor Boehm, of Leipzig, in carrying out the pharmacological testing of a large number of my products, by which I was led to the right path in my inquiries.

The conclusions thus arrived at were as follows:

1. Besides digitonin and the active substances, the different kinds of commercial digitalin hitherto known generally contain two perfectly amorphous glucosides.

2. The digitalein of Schmiedeberg is certainly also a mixture ; its action upon the heart is perhaps due to the presence of a glucoside that has not yet been separated in a state of purity, or perhaps it may be due to some admixture of digitalin.

3. On the contrary, the digitalin of Schmiedeberg is a distinctly individual substance which possesses in a marked degree the characteristic property of acting upon the heart.

This substance is now being made according to my directions by Messrs. Boehringer, and it is to be obtained as a medicinal agent under the name of *Digitalin verum*. Unfortunately this substance cannot be brought into an actually crystalline condition. For that reason it appears to be the more appropriate that its characters should be minutely defined, and that satisfactory evidence of its chemical individuality should be given.

Digitalin has the form of a white amorphous powder, the particles of which swell up when immersed in water. It is soluble in about one thousand parts of water and in about one hundred parts of fifty per cent. alcohol. The water solution froths on being shaken, and it is remarkably prone to become mouldy. Digitalin is dissolved in considerable amount by hot absolute alcohol or spirit of 80 or 90 per cent., and when a minimum of solvent is used, the solution on cooling becomes almost solid from the separation of a thick magma of granules which, as observed by Schmiedeberg, appears to the naked eye as if it were a case of crystallization. Examination by the aid of the microscope, however, shows that the mass consists of granules which though of very uniform size are entirely destitute of structure.

The uniformity of this deposit is, however, in itself a very characteristic feature of the substance; it is, moreover, an excellent criterion of its purity. When digitalin contains only a small percentage amount of the glucosides associated with it in digitalis, it is impossible to effect its separation from solution in the form above described. When it also contains some digitonin, and 85 per cent. alcohol is used for dissolving it, crystals will be found among the granules deposited from the solution after cooling.

These impurities of digitalin may be detected with greater accuracy by means of the following tests :—

1. A few granules when mixed with about 2 c.c. of caustic potash solution (1 : 10) should retain their whiteness for at least one minute. The presence of the minutest admixture of the amorphous glucosides is at once revealed by the rapid appearance of an intense yellow coloration.

2. When digitalin is made into a thin paste with water and there is added for every 100 parts of water 22 parts amylic alcohol, on leaving the mixture for twenty-four hours in a closed flask, distinct crystalline warts will be apparent if digitonin be present even in very minute proportion.

Digitalin is almost insoluble in chloroform or ether : when the moderately dilute solution in absolute alcohol is gradually mixed with small quantities of ether the liquid suddenly becomes turbid, and within a short time there is a copious deposition of digitalin granules. On pouring off the solution and adding to it more ether a second point of saturation is reached, and with it a further deposition. The same effect may be produced a third time or

* *Archiv der Pharm.*, 230, p. 250.
† *Journ. de Pharm.*, iv., 9, 253 ; 16, 430 ; 20, 87.
‡ *Arch. f. Exper. Pathol.*, 3, 16.
§ *Arch. Exper. Pathol.*, 3, 274.
|| *Ber. d. deutsch. Chem. Ges.*, xxiii., 1555 ; xxiv., 339, 3951.

more, and this behaviour is evidence of the purity of the substance.

Contrary to previous statements the taste of digitalin is but slightly bitter : the intense bitterness and very disagreeable taste previously ascribed to digitalin are characters belonging to the amorphous glucosides with which it is associated in digitalis.

Digitalin dissolves in concentrated hydrochloric or sulphuric acid with a golden yellow colour, and in the latter case the colour rapidly passed into blood red. On adding to the solution, while still yellow, a drop of nitric acid, ferric chloride, or bromine water, a brilliant purple like that of digitalis flowers is produced, but the colour is very evanescent. This coloration is obtained with more certainty and so as to be permanent for one or two hours, when a very small quantity of digitalin is dissolved in ordinary sulphuric acid without any addition. Probably the small quantity of nitric acid commonly present in oil of vitriol is just sufficient to produce the coloration, but not sufficient for causing the further change which appears to take place by reason of the presence of an excess as compared with the digitalin when a drop of the oxidising agents is added.

Digitalin remains white when heated to 200° ; at 210° it begins to aggregate, and towards 217° it melts, becoming yellow-coloured.

Analysis gave results agreeing with those obtained by Schmiedeberg which lead to the formula ($C_5H_8O_2$). This agreement may be taken as strong evidence that Schmiedeberg's digitalin was a chemically individual substance. However, the best support of this view is furnished by the behaviour of digitalin with dilute hydrochloric acid. The substance is thus split up very definitely into digitaligenin, glucose and digitalose. When pure digitalin is used the first named product separates at once in fine crystals, but when the material operated upon contains some of the other glucosides, the digitaligenin cannot be made to crystallize at all, or only by very tedious operations.

In Schmiedeberg's experiments on the splitting up of digitalin with watery hydrochloric acid he obtained besides a glucose an insoluble resinous substance—digitaliresin—which he was able to decompose again into sugar and a second resin. On repeating this experiment it becomes at once obvious that this digitaliresin cannot possibly be a chemically individual substance, for it begins to be deposited from the first moment that heat is applied, and it may easily be seen that the resin carries down with it unaltered granules of digitalin. When the application of heat is continued for the purpose of decomposing the digitalin thus mechanically carried down, the acid causes a further decomposition at the surface of the resin, while inside the mass there still remains unaltered digitalin and digitaliresin. In order, therefore, to effect a definite splitting up care must be taken that nothing is deposited while heating with the acid, and this may be done in the following way :—

The digitalin is first mixed with 8 parts of 50 per cent. alcohol, 2 parts concentrated hydrochloric acid (1·19) added, shaken together and heated for half-an-hour in a boiling water-bath under a reflux condenser. The liquid, clear at first rapidly becomes dark coloured, but does not during the heating deposit more than mere traces of resinous substance. Upon cooling, after removal from the water-bath, there is an abundant formation of brilliant acicular crystals of digitaligenin aggregated in warty masses. The crystallization takes place more readily on rubbing the sides of the glass, or on dropping in a crystal of the substance. On separating the crystals, washing with 50 per cent. alcohol, and drying, the quantity thus obtained amounts regularly to 30 per cent. of the digitalin operated upon. When the filtrate is mixed with an equal volume of water, repeatedly shaken with ether, and the ether shaken with very dilute soda solution to remove hydrochloric acid, a further quantity of the same substance is to be obtained. By repeated crystallization from the least possible proportion of 93 per cent. alcohol, digitaligenin may be obtained in colourless crystals.

Digitaligenin is insoluble in water, sparingly soluble in ether free from alcohol, and readily soluble in alcohol, especially on heating. It dissolves in sulphuric acid or ordinary oil of vitriol with the same coloration as digitalin. The dry crystals of the pure substance become highly electric when rubbed. They melt at 210°-212°. Analysis gave results leading to the formula $C_{16}H_{22}O_2$, and from the composition of several derivatives it appears very probable that this is the correct formula.

Professor Boehm informs me that when applied to frogs, digitaligenin has no action. For the purpose of identifying the remaining products of the transformation, the watery liquid which had been extracted with ether was again shaken with chloroform to remove a small quantity of resinous substance, then warmed to drive off chloroform and ether, and after cooling treated with silver oxide to separate hydrochloric acid. The liquid was then evaporated to a syrupy consistence, and left for some months to crystallize, partly alone and partly with addition of suitable solvents; but up to the present there have been no signs of crystallization, a circumstance which seems very remarkable when the further results of the investigation are considered.

An attempt was then made to obtain a knowledge of the nature of the sugar by preparing an osazone. Without much difficulty a product was obtained which crystallized very well, and was apparently an individual osazone melting at 206° C. ; but the analysis of this substance obtained in different operations gave results which were but little in accord, and did not correspond with any known member of the class of compounds. Consequently, the presence of a mixture of sugars was to be suspected, and for their examination the method of oxidation by means of bromine proved very serviceable. From one of the two acids produced a lactone was obtained which crystallized well, and from the other a readily crystallizable barium salt.

The thick syrup was mixed with 2 parts of bromine after dilution with 5 parts of water, and by means of constant shaking the bromine was absorbed rapidly. After driving off the dissolved bromine and removing the hydrobromic acid by silver oxide, the liquid was evaporated to a syrupy consistence. Within some hours crystals were formed abundantly (A) ; these were separated by a suction pump, and when washed with a few drops of water were nearly colourless. The mother liquor

was diluted and boiled with barium carbonate, the filtrate carefully saturated with alcohol, and left for some time in a closed flask, the sides of which were frequently rubbed. After some days warty crystals (B) were formed, which were separated from the mother liquor by washing with 50 per cent. alcohol and pressing. After separating the barium from the mother liquor by sulphuric acid and evaporating, a second crystallization of the substance A was obtained, and when the mother liquor from it was again converted into barium salt as before, a further quantity of the substance B was obtained. By this somewhat troublesome but certain method it was possible to separate the two acids produced by the action of bromine.

On recrystallizing the substance A, it was obtained in fine colourless crystals, readily soluble in water or alcohol, sparingly in ether; the crystals had a neutral reaction, and consisted of the lactone of a new acid, digitalonic acid. The air dry substance does not lose water in a vacuum over sulphuric acid; a little above 130° C. it begins to aggregate, and it melts at 138°–139° C. Analysis gave results leading to the formula $C_7H_{12}O_5$. On heating with potash or soda solution, salts of the acid are obtained which do not crystallize. Moderately dilute solutions of these salts mixed with silver nitrate give in a short time an abundant deposit of silver digitalonate in microscopic needles, $C_7H_{13}O_6Ag$. When this salt is heated a product sublimes in fine needles.

From what has been stated it would appear that in the splitting up of digitalin the sugar produced, digitalose,* which has the composition $C_7H_{14}O_5$, and according to its behaviour with bromine, it contains an aldehydradicle. In its composition it is closely related to rhamnose, and for that reason it ought to possess a great capability of crystallizing. Further investigation must determine what may be the explanation of the contrary character which has been described.

The barium salt B obtained from the mother liquor of the lactone was also readily purified by recrystallization; it then formed sharply defined laminæ having the appearance and composition of barium gluconate $(C_6H_{11}O_7)_2Ba + 3H_2O$.† A calcium salt prepared from it, corresponded in all respects with ordinary calcium gluconate. The lactone prepared according to the directions of E. Fischer‡ from the calcium salts gave the dextro rotation corresponding to d-gluconic acid, and hence it may be inferred that in the transformation of digitalin grape sugar is produced.

On the basis of the assumption, already referred to as being probably correct, that the composition of digitaligenin is represented by the formula $C_{16}H_{22}O_2$, the following equation is obtained :—

$$C_{16}H_{22}O_2 + C_6H_{12}O_6 + C_7H_{14}O_5 - H_2O = C_{29}H_{46}O_{12},$$

and a formula for digitalin $C_{29}H_{46}O_{12}$ which differs only by CH_2 from $C_{30}N_{48}O_{12} = 6 \times C_5H_8O_2$ or that indicated by the results of analysis of the glucoside. Whether that is really the correct expression of the molecular weight of the substance must be determined by other experiments.

However, it is sufficiently evident from the facts above stated that digitalin is to be regarded as having chemical individuality, notwithstanding the want of capability to crystallize. It follows that its physiological action must be constant, as distinguished from the varieties of commercial digitalin, hitherto known, which have been mixtures of the active and inactive constituents of digitalis, in variable proportions which rendered any safe adjustment of dose impracticable.

In the pharmacological trial of digitalin Professor Boehm has made the following observations:—

Digitalin administered to frogs in doses of 0·5 milligramme produces systolic stoppage of the heart after 15 to 20 minutes. Increase in the volume of the heart pulse could not be detected by means of the Williams Dresser apparatus, even when the doses were very carefully administered.

Intravenal injection of 2 milligrammes produced in dogs increase of blood pressure with reduction of the frequency of the pulse and increase of its volume. By increasing the dose to 4 milligrammes arhythmia was produced, and after a short time sudden stoppage of the heart.

The same effects were produced on the cat by 1 and 2 milligrammes respectively.

Rabbits were found to be less sensitive. Subcutaneous injections of 5 to 8 milligrammes respectively produced no effect. By intravenal injection of doses up to 8 milligrammes neither the blood pressure nor the pulse frequency was sensibly effected. Gradual increase of dose to 15 milligrammes caused after some time sudden stoppage of the heart even in rabbits.

The first trials of the action of digitalin on the human subject were made by Dr. Mottes in Munich, and he obtained the best results with doses of 0·25 milligramme at intervals of from 2 to 3 hours, without the occurrence of any disagreeable or dangerous symptoms.*

The use of pure digitalin in medical practice appears to recommend itself, not only in regard to the possibility of securing certainty in the dose. Hitherto it has been found that after long administration of digitalis preparations, hurtful and so-called cumulative effects have been observed, manifesting themselves especially in derangement of the stomach. This secondary action is in all probability to be ascribed not to digitalin itself, but to those substances which are associated with it in the digitalis preparations which have hitherto been used.

In any case this inference is warranted by the results which Professor Boehm has obtained in the investigation of digitonin. That substance, unfortunately, is the only one naturally associated with digitalin, except digitoxin, which has been up to the present time prepared in a state of absolute purity. It is also the one which occurs in the largest proportion. In regard to its action Professor Boehm reports as follows :—

Digitonin exerts a very energetic action in the production of local inflammatory symptoms.

---

* This name has been applied by Homolle and Quevenne (*Mem. sur la digitaline*) not to a chemically individual substance, but to a mixture of glucosides and their product of decomposition.

† The air-dry barium gluconate should theoretically lose 9·29 per cent. in drying, but the salt obtained gave only 8·17, and this was found to be the case also with barium gluconate (8·07). Herzfeld (*Annalen*, 220, 335) obtained similar results by heating barium gluconate to 115° C. By an error of calculation he gives as the theoretical amount of water 8·13 per cent.

‡ *Berichte*, xxiii., 2615.

* Professor von Ziemssen has also tried digitalin in the Munich hospital and obtained very good results.

Administered internally to a dog in doses of 0·1 to 1·0 gramme, it produces in a short time vomiting, by which, of course, any further action upon the stomach or intestine is prevented. When given in doses of less than 0·1 gramme for ten days, it did not appear to have any effect. But when injected subcutaneously, the dog refused to eat for two days, was very irritable, and would not suffer the injected places to be touched. At the end of the third day large pieces of skin were detached from the places injected, as if cut out with a knife down to the muscles of the back, and abscesses were formed, which rapidly healed.

In frogs, also, digitonin produces great local inflammation, in consequence of which these more sensitive animals rapidly succumb. In one instance marked nervous affection was noticed, with violent convulsions.*

For the purpose of ascertaining whether pure digitalin would produce local irritation when administered in the dose requisite for therapeutic purposes, Professor Boehm instituted experiments with the same healthy dog which had suffered inflammatory effects from the injection of digitonin. The animal was subcutaneously injected with 3 milligrammes of digitalin, dissolved in 1 c.c. of water, with a few drops of spirit. The dose was strong enough to produce a powerful effect, which lasted for nearly 24 hours; but at the place of injection there was not the slightest inflammation or other change to be detected. It may therefore be concluded that true digitalin does not produce inflammation when administered in the dose requisite for exerting its full general action, and therefore trial of subcutaneous injections will be admissible in the human subject.

Moreover, this experience justifies the assumption that the substances associated with digitalin and present in the preparations hitherto met with in commerce, as well as in the infusion and digitalis powder, contribute to the production of the so-called cumulative effects.

It must be admitted that digitalin has one essentially dark side in its want of crystallizability, and this I have endeavoured in various ways to find a remedy for. The chief obstacle encountered was the fact that even slight chemical alteration of the substance completely destroys its activity. Thus, for instance, when digitalin is heated only for a few minutes with acetic anhydride a finely crystallizable product is obtained, the analysis of which shows that it has the formula $C_{29}H_{44}O_{11}$, or that of a hydride of digitalin. Professor Boehm has made trial of it and found that it is entirely inert.

Note on the Preparation of Digitogenin.

The transformation of digitonin into digitogenin, dextrose, and galactose, by treatment with hydrochloric acid† takes place as already pointed out‡ in a comparatively definite manner. It is, however, subject to the disadvantage, especially when operating upon a large quantity, that the digitogenin separates in an amorphous condition, and is therefore very difficult to wash out and dry before it can be brought into a crystalline condition by means of chloroform or alcohol. There is also a possibility that the separated digitogenin may be contaminated either with portions of digitonin or with the first product of its transformation, digitoresin, either of which would thus escape complete decomposition.

The favourable results obtained in the transformation of digitalin in an alcoholic solution therefore induced me to make a trial of the same method with digitonin. The result was very satisfactory; but to ensure success strong alcohol must be used, and the heating must be continued for a long time. Experiments made by Sanda showed that the following is the best method of operating :—

A mixture of digitonin ($C_{27}H_{46}O_{14}+5H_2O$) with 8 parts of 93 per cent. alcohol, and 2 parts concentrated hydrochloric acid (1·19) is heated for an hour and a half in a boiling water bath under a reflux condenser. The whole is then allowed to cool slowly and, gradually, the whole liquid becomes filled with warty masses of digitogenin. This deposit is separated by a suction pump, washed with 80 per cent. alcohol and pressed dry. It amounts to from 23 to 27 per cent. of the glucoside operated upon. For conversion into digitogenic acid it requires no further purification. A further quantity may be obtained from the filtrate from this first crystallization. For that purpose the liquid is mixed with calcium carbonate until effervescence ceases, the greater part of the alcohol is then distilled off, the residue diluted with water and shaken out with chloroform. The chloroform solution is freed from water by sodium sulphate, chloroform distilled off, and the residue of impure digitogenin is crystallized from 93 per cent. alcohol. About 5 per cent. more digitogenin is thus obtained, making the entire yield about 30 per cent., while theory requires 36·8 per cent. This difference is to be accounted for by the circumstance that the alcoholic mother liquors from the recrystallization of the impure digitogenin obtained from the chloroform solution contain also a resinous substance—Schmeideberg's digitoresin—which would yield an additional quantity of digitogenin by further treatment with alcoholic hydrochloric acid, the transformation not having been completed in the first operation. It is interesting to note the fact that in this second transformation it is chiefly galactose that is produced. The dextrose appears to be more readily eliminated, and therefore to be separated first.

* This observation justifies the desire already expressed, that the name of "crystalline digitalin" should no longer be applied to a preparation consisting almost entirely of digitonin.—See *Berichte*, xxiv., 3953.

† *Berichte*, xxiii., 1555. ‡ *Berichte*, xxiv., 3951.

PHAGOCYTOSIS.

It has long been known that one of the leading features in the inflammatory process is the escape of the leucocytes or white corpuscles of the blood from the capillaries into the surrounding tissues. The emigration of the leucocytes is a process which can be watched in the web of the frog's foot, the fins of fish, and even in the mesentery of a mouse. The significance of this remarkable emigration has only recently been understood. The leucocytes are not only capable of making their way through the walls of capillaries, but they have the power of slowly moving from place to place and ingesting organic and inorganic substances, precisely in the same way as an amœba. When particles of finely divided carmine are supplied to living leucocytes suitably arranged on the warm stage of the microscope the ingestion process can be witnessed. It

has been shown that leucocytes are capable of digesting organic substances, a process conveniently termed intracellular digestion, and that dead tissues and larval organs are, as it were, eaten up by them. For instance, the tails of tadpoles and ascidians, small fragments of dead bone, and the fangs of milk teeth are slowly destroyed by the active leucocytes. Metschnikoff has patiently investigated the devouring properties of these amœboid cells, and finds that in addition to their action upon dead and dying tissues they attack and destroy micro-organisms, such as micrococci and bacilli; their aggressive tendency is so great that he named them phagocytes. It is now well known that many infective diseases, such as anthrax, septic fever, and tubercle, are due to the entrance into the body of microscopic bodies termed bacilli, bacteria, and the like. It is also well known that many acute febrile conditions are accompanied by an increase in the number of leucocytes in the blood. Microscopic observations have also demonstrated that when micro-organisms are present in the blood of an animal the leucocytes attack, ingest, and digest the bacteria. In cases where bacilli obtained from cultivations are injected into the tissues of a living animal, the seat of inoculation is speedily crowded with leucocytes, which begin to ingest the bacilli. In some instances the bacilli are destroyed, and in others the micro-organisms appear to exert deleterious effects upon the leucocytes and they die.

This peculiar relation of leucocytes to dead tissue and micro-organisms throws a new light upon the process of inflammation, and led Metschnikoff to regard it as practically a struggle between irritant particles and the white cells of the blood. The peculiar reaction of leucocytes to irritant bodies is now termed *phagocytosis*, and is regarded by some pathologists as underlying the chief manifestations of acute infectious fevers. Metschnikoff and some of his pupils believe they can explain immunity from infectious fevers by the protecting power exercised by the phagocytes, but the theory is not accepted by many pathologists. It is, however, an important fact that phagocytosis occurs extensively throughout the animal kingdom; it has been witnessed in molluscs, water-fleas, planarians, in tadpoles, frogs, fish, and other vertebrata, and it occurs extensively in man. There is much to be done before it is possible to decide, even approximately, the value of phagocytosis in relation to infectious diseases; indeed, pathologists are not agreed whether the bacilli themselves are the actual cause of the diseases, or a poison engendered by them after they gain access to the body, but it is quite certain that the relation of phagocytosis to infectious diseases is one that will occupy the attention of those pathologists who are working at physiological chemistry for a long time to come.

THE EVOLUTION OF MAMMALIAN URINE AS ILLUSTRATED BY THE COMPARATIVE PHYSIOLOGY OF URIC ACID.*

The study of the amorphous deposit from human urine and of the urinary excretion of birds and reptiles suggests some interesting reflections. The amorphous urate deposit is substantially the same thing as the solid or semi-solid urine of birds and serpents; all these consist of the quadriurates of potassium, sodium, and ammonium. But whereas in the urine of man and mammalia the quadriurates are only an insignificant item amid a host of other ingredients, the quadriurates constitute practically the whole of the renal excretion of birds and serpents. The urine of these creatures may be said to be exclusively composed of a substance identical with the amorphous urate sediment of human urine; or, to put it in another way, the amorphous urate is the physiological homologue of the entire renal activity of birds and serpents. The kidneys of birds and serpents are anatomically composed of the same structures as the mammalian kidneys; they are provided with the same kinds of secreting tubes and epithelial elements, the same curious Malpighian tufts and capsules—and yet how widely different is the product of their functional activity! It is not merely that there is a substitution of uric acid for urea as the final term of nitrogenous metabolism, but there is also the strongly contrasted simplicity of the urine of birds and serpents with the complexity of mammalian urine. In birds and serpents the renal function is presented to us in its primitive simplicity. In these creatures the kidneys perform one single and simple physiological act, namely, the elimination of nitrogen as uric acid. For, although the uric acid is excreted in union with bases, the quantity of these bases is the absolute minimum requisite to bring uric acid into a state of chemical combination, and thereby to deprive it of that strong crystalline character which otherwise would make its passage along the delicate exit tubules of the kidney a physical impossibility. The chlorides, phosphates, and sulphates, the lime and magnesia, the pigments, the large volume of water, all of which figure as prominent and even essential components of mammalian urine, are either wholly absent from the urine of birds and serpents, or are present only in such minute traces as might be derived from the lubricating mucus and epithelial *débris* with which the secretion is incidentally admixed.

It would be interesting to trace the successive steps along which the evolution of the complex mammalian urine took place from this simple beginning. In much that has been said and written of mammalian descent from simpler types, the eyes and thoughts of biologists have been chiefly fixed on anatomical evolution. But there is assuredly also such a thing as functional evolution. The anatomical evolution of the kidneys seems to have reached its term in the lowest vertebrate forms; the mammalian kidney presents structurally no essential advance on that of birds and serpents, but immense functional evolution has taken place, and examination of its progress through the tribes of fishes, amphibia, marsupials, and lower mammals, up to man, would prove an instructive biological study. The results of such a study would probably show the evolution of mammalian urine as turning mainly on the point that the mammalian plan requires the renal excretion to be voided, not in the solid or semi-solid form, but in the liquid form, as a watery solution. This modification at once necessitates the discarding of uric acid as a vehicle for the elimination of nitrogen. Uric acid and its compounds are strongly characterized by sparing solubility; and on no terms compatible with the conditions prevailing in the animal economy could the requisite quantity of uric acid be got into solution in a watery urine. Urea, on the contrary, is an extremely soluble substance. Therefore, in regard to the prime function of the kidney, nature solves the problem easily by substituting urea for uric acid. But why was not the problem solved completely? Why is there left in mammalian urine this small and apparently purposeless,

* Extract from the report in the *British Medical Journal*, June 18, of the First Croonian Lecture recently delivered by Sir William Roberts, M.D., F.R.S., before the Royal College of Physicians.

but to man very mischievous, residuum of uric acid? No satisfactory answer can at present be given to this question. It seems not impossible that the explanation lies in the fact that the mammalian type—the most recently evolved of the vertebrate types—has not yet, in this particular, reached its ideal perfection.

A good deal may be said in favour of this conjecture. The occurrence and proportion of uric acid in the urine of the various tribes of mammalia is remarkably inconstant. Meissner states that the urine of the carnivora does not always contain uric acid; in the urine of dogs and cats it was repeatedly found to be altogether absent. According to the same authority uric acid is only found regularly in the urine of these animals when fed on flesh and in the fasting state; it disappears when they are fed on food poor in albuminoid matters. Stadthagen found that in the urine of dogs fed on flesh the proportion of uric acid to urea ranged between 1 to 280 and 1 to 800. In the urine of rabbits uric acid is sometimes present and sometimes absent. Salomon found it always present in the urine of the pig, but only in small quantity; and its proportion to urea was only in the ratio of 1 to 150. In the case of man the quantity of uric acid excreted presents great individual variation, both in regard to absolute quantity and in its proportion to urea. The ratio of uric acid to urea in human urine appears to range between 1 to 30 and 1 to 50, and the ratio, according to Marès, is special for each individual. Dr. Haig estimates it as 1 to 33, and he regards any deviation from this ratio in the direction of plus or minus as being due either to temporary retention of uric acid in the body or to elimination of previously stored uric acid.

If we look broadly at the renal function throughout the animal series, we see that in essence it consists in a provision for the elimination of waste nitrogen. This is a function of capital importance and necessity in the nutrition of animals, comparable to the excretion of carbon by the lungs. According to all physiological analogies it must be at bottom one and the same throughout the animal kingdom. Starting from the highly complex albuminoid molecule, and descending by a train of intermediate steps, the histolytic process ends in some comparatively simple crystalline azotized body. The precise nature of the final term in the histolytic transformation is apparently of small significance, and seems to depend on what may be described as the general convenience of the economy. It may be urea, uric acid, hippuric acid, or guanine, or a mixture of all these. It is reasonable to assume that all these bodies are physiologically homologous, and that their broad physiological relations are identical. What urea is to the mammal, uric acid is to the bird and serpent; what urea is to man, urea with hippuric acid is to the horse and ox. The office of the kidneys is to separate the final term of proteid metabolism, whatever that final term may be.

These considerations point to the idea that the residuum of uric acid in mammalian urine may be something in the nature of a vestigial feature, analogous to the vermiform appendix, the ductus arteriosus, or the ear point. These rudimentary structures are now regarded by biologists as indications of the line of ontological descent. On this view, the presence of uric acid in the mammal's urine should be regarded as a "memory" of some ancestral form which eliminated its nitrogen as uric acid. The extreme inconstancy of uric acid, both in regard to its presence and its proportion, in the urine of different species and of different individuals of the same species, agrees perfectly with this theory, for vestigial structures are conspicuous for their inconstancy. Such structures, also, like uric acid, although impotent for good, are sometimes powerful for evil.

THE ORIGIN OF PETROLEUM.*

BY A. E. FORSTALL.

In dealing with the origin of petroleum, we find opinion much divided, and no such general knowledge of the subject as to warrant implicit belief in any particular theory. The various theories may be divided into two classes—those asserting a derivation from the chemical reactions of minerals or inorganic matter, and those claiming an organic origin through the decomposition of vegetable or animal matter. The theories of Berthelot or Mendeljeff are leading examples of the first group. According to the former petroleum is formed by the action of water, carrying carbonic acid in solution, upon alkali metals existing in a free state and at a high temperature in the centre of the earth. He has pointed out the reactions that would take place, resulting in the formation of hydrocarbon compounds. Mendeljeff's theory supposes the existence in the interior of the earth of metallic iron and metallic carbides at a high temperature, which by contact with water would generate metallic oxides and hydrocarbon compounds. Both theories consider the production of petroleum as continuous, the vapours rising as they are formed and condensing to liquids in the porous strata of the oil fields, thus making the supply inexhaustible as long as the necessary minerals and water exist. But these theories, though chemically perfect, are not generally accepted by geologists, since they do not accord with geological facts, which point more to the organic origin of petroleum; that is, to its derivation from the decomposition of vegetable or animal matter originally contained in the rocks in which it is found, or in closely associated strata. As is seen in considering coal, the decay of vegetation at ordinary temperatures when taking place out of contact with air produces marsh gas. Peat bogs yield inflammable gases and sometimes also members of the bitumen series closely allied to petroleum and asphalt, thus showing the decomposition of organic matter to be competent to produce petroleum.

There are two views as to the method of decomposition: One that it is a primary decomposition of organic matter in or associated with the strata, where the oil is found—the production, therefore, being *in situ*; the other, that a primary decomposition of the organic matter to hydrocarbon compounds first takes place, from which compounds oil and gas are derived by distillation and carried by hydrostatic pressure to the overlying porous strata, which act as reservoirs. The chief exponent of the theory of primary decomposition is Professor T. S. Hunt, who holds that petroleum is principally derived from animal remains contained in limestone rocks, though he admits a few cases of vegetable origin. The theory of distillation is most fully stated by Mr. S. F. Peckham, in the report on petroleum contained in the tenth volume of the 'Special Reports of the U. S. Census of 1880.' He considers that petroleum was formed by distillation principally from beds of shale containing fucoid plants and animal remains, with limestone as a minor source, basing this view upon the variations in composition of petroleum found in different portions of the same field, which he thinks can only be accounted for upon the theory of fractional distillation. In the case of the Pennsylvania oil field, the oil is derived principally from vegetable remains in rocks far below the present level of oil occurrence, the heat for its distillation having been supplied by the causes that resulted in the upheaval of the Appalachian mountain system. The evidences of this heat are to be found deep down beneath the unaltered rocks in which the petroleum is now stored. Peckham

* Abstract from a paper read at the Fifteenth Annual Meeting of the Western Gas Association, Detroit, Mich.

also considers the occurrence of large veins of solid bitumen in fissures of metamorphic rocks as a further proof of the fact of distillation.

In Vol. VI. of the 'Reports of the Geological Survey of Ohio,' Professor Edward Orton, the State Geologist, discusses the subject of the origin of petroleum quite extensively, reviewing the various theories given above, indicating their weak points, and stating his own views, derived from a special study of the Ohio fields, in connection with a general study of the whole subject. Admitting the great want of definite information that prevents any theory from being accepted as perfect, he inclines toward the idea of primary decomposition as the great factor in the production of petroleum, a decomposition including both vegetable and animal matters, according to location. Thus the large amounts of nitrogen and sulphur in the Lima and California oils, the unstable character of the latter, and their presence in limestone filled with animal remains, are strong proofs of an animal origin. These limestone oils are dark and heavy, with a rank odour, and are easily distinguished from the oils of a probable vegetable origin, such as the Pennsylvania type, coming from bituminous shales and found in sandstone. As an argument against the theory of distillation, Professor Orton cites the fact that the rocks underlying the Ohio oil fields, when studied by means of borings carried 1800 feet below the oil-bearing strata, show no signs of metamorphism. As this depth is below the only known sources of oil supply of the Pennsylvania type, the idea of distillation would seem to be condemned. In favour of the theory of primary decomposition, he notes the fact that at the present day in Trinidad, beds of slate formed in comparatively recent times beneath the sea, but now raised above its level and containing abundant vegetable remains, are yielding petroleum in large quantities by direct decomposition of vegetable tissues, this petroleum passing into asphalt as a result of exposure to the atmosphere. But if the action took place where the petroleum could be stored out of contact with the air, it would remain as petroleum. This is what has happened in the oil fields. A tropical climate seems necessary for this action. Applying the views derived from the foregoing facts to explain the origin of the oil of Eastern Ohio and Pennsylvania, the following theory is worked out: These fields were the site of a tropical sea, upon the floor of which the shales constituting the chief source of the oil were accumulated. The rivers emptying into this sea laid down sedimentary deposits of clay and sand, with occasional gravel bars. In the sea itself was a vast development of marine vegetation. Some of the especially abundant plants had very resinous spores and spore cases, which were set free in enormous quantities, and in connection with other portions of these and similar plants were carried to the bottom in a macerated condition, there to pass through the coaly transformation, resulting in the structureless carbonaceous matter that constantly characterizes black shales, and that can still be made to yield by destructive distillation members of the bitumen series. The shales, thus slowly accumulated at the bottom of this gulf, must have behaved as similar shales do now, petroleum and bitumen being formed, as in the case of Trinidad shales. The petroleum was absorbed by the particles of clay in contact with it, or if formed in the water was caught by floating particles (clay possessing the property of absorbing oils in a marked degree), being carried by them to the floor of the sea as the sediment deposited. This process continued until the materials were exhausted, producing a shale much richer in petroleum than any portion of it is at the present time. Over this was laid a bed of porous sandstone, saturated with sea water and roofed in by a very fine grained shale. Then, by a slow system of exchange between sandstone and shale, the oil reached its final reservoir.

Professor Orton claims that this theory finds more support in the present processes of nature than that of distillation, as we see the bitumen series forming to-day by the apparent primary decomposition of organic matter under normal conditions, while on the other hand we do not find this series in any cases open to observation and measurement as a result of secondary decomposition, unless the comparatively high temperatures of destructive distillation are reached. Still he admits that every theory in regard to petroleum is merely provisional, and none can be accepted as final. He summarizes his views as follows :—

First.—Petroleum is derived from organic matter.

Second.—It is more largely derived from vegetable than from animal matter.

Third.—The oils of the Pennsylvania type result from the organic matter of bituminous shales; that is, they are of vegetable origin.

Fourth.—The oils of the Canada or Lima type are derived from the organic matter in limestones, and are, therefore, probably of animal origin.

Fifth.—Oil was produced at normal rock temperatures, that of the Ohio field at any rate certainly not being the result of a destructive distillation of bituminous shales.

Sixth.—The stock in the rocks is practically complete, for though the production is still going on, the rate is so slow as to make no appreciable increase in the amount already produced in any ordinary space of time.

CINCHONA CULTIVATION IN JAMAICA.*

BY ALLAN ERIC.

Just now, when quinine is attracting so much attention on account of the extraordinary low price, something about the wide distribution of the cinchona shrub, and of the ease with which it may be propagated and grown, may be interesting. Cinchona, contrary to the ideas of many, grows more in the form of a not very large shrub than a tree. In the island of Jamaica, in the West Indies, it is found growing very plentifully, and nearly everywhere throughout the interior of the island, on the slopes of the mountain ranges, I saw it as a common shrub. It may not be generally known that there are cinchona plantations in Jamaica which yield a bark far superior to the best grown in Ceylon. Yet this is the case, though it is not as yet produced in great quantities. It is commonly supposed that the Peruvian bark tree in America grows most readily only on the slopes of the Andes, between the equator and ten degrees of north latitude, and twenty degrees south latitude. This was once correct; but in the island of Jamaica, several years ago, Peruvian bark trees were found growing on the slopes of the Cuna Cuna mountains, and while not plentiful, the bark was found to be of excellent quality. As both the climate and the soil of the mountain slopes of Jamaica were found to exactly suit the Peruvian bark tree, the people, encouraged by the wealthy planters and rich merchants on the coast, have been propagating it, and have planted within the past ten or fifteen years large plantations of cinchona which are now producing bark of good quality. The Peruvian bark tree belongs to the natural order Rubiacæ; the product is known as quina, quinquina, cinchona, or Jesuit's bark, and from this the important alkaloids are obtained.

I have seen these trees while riding over the mountain paths in Jamaica, scattered among growths of

* From the *Oil, Paint and Drug Reporter*, June 6.

cocoa, cabbage palm, pimento, fustic and logwood; but is is usually found in localities practically clear of other growths on the mountain slopes. Some of the cinchona trees are quite large; the best bark, however, comes from smaller ones, which appear as shrubs after the larger trees are felled. Cinchona exists in many varieties, chiefly distinguishable by the different localities in which it grows, but their qualities are essentially, and to all practical purposes, the same. They are all evergreen trees, and very closely resemble laurels, and still more closely the lambkill of New England pastures. The cinchona has entirely opposite leaves, and panicles of flowers which very closely resemble lilac blossoms. The flowers are white, rose coloured, or purplish, and very fragrant. Some of these flowers which I gathered and pressed in my note-book, dry as they are, retain much of their fragrance even now. The calyx of the flower is small and five-toothed, and the capsule splits from the base upward. This is the true cinchona. There is a plant of a similar species which I have seen growing in some localities in the tropics; but in this latter the capsule splits from the top downward, exactly the reverse of the true cinchona. This plant belongs to the sub-genus cascarilla. The two look very much alike, but the latter has very little or no commercial value, and no trace of the valuable alkaloids can be found in it.

The cutting and peeling of the cinchona trees are carried on by the natives in the dry season. The trees are felled as near the roots as possible, in order that none of the valuable bark may be lost; and the bark, being stripped off, is carefully dried, the quilled form of the inner bark being acquired in drying. The bark is made up into packages of various sizes, averaging 150 pounds in weight, closely wrapped in woollen cloth and afterwards in hides, and consigned to the point of shipment on the coast on the backs of mules and burros.

THE CRESOL PREPARATIONS OF COMMERCE.*

The better kinds of so-called crude carbolic acid which are dissolved to a clear solution by caustic soda contain scarcely any carbolic acid ($C_6H_5 \cdot OH$), but are mixtures of cresols ($C_6H_4 \cdot CH_3 \cdot OH$), the relative amounts of ortho, meta, and para-cresol being variable. By reason of the higher price of carbolic acid, as compared with crude cresol, it is to the interest of manufacturers to carry the separation as far as possible. This is effected by condensers surrounded by hot carbolic acid, adjusted so that only carbolic acid distils over, while cresol vapour is condensed and falls back into the still. Correctly, therefore, what is now termed crude carbolic acid should be termed crude cresol.

The observations of Ohlmüller, Jäger, and Frankel have shown that cresols—when dissolved in sulphuric acid—excel all other substance of the aromatic series as disinfecting materials. It is therefore remarkable that crude cresol has not been included in the German Arzneibuch, although in the previous Pharmacopœia it appeared under the name of crude carbolic acid. Notwithstanding the inapplicability of crude cresol in its natural condition for disinfecting purposes, by reason of its density and insolubility, a number of preparations of it have been introduced by which these objections have been overcome. These may be grouped in two classes, those which form with water a milky liquid and those which give a clear solution. The former include sapocarbol II., creolin, and cresolin, which consist of mixtures of resin soap with crude cresol, containing naphthalin and other hydrocarbons of coal tar. Another kind of creolin (Artmann's) consists of cresol sulphuric acid, in which tar hydrocarbons are dissolved and they separate on the addition of water, forming a milky liquid. The preparations of the second class consist of cresol, dissolved in various menstrua but free from admixtures of the hydrocarbons, which cause milkiness on dilution with water. The different kinds of sapocarbol are of this nature, being solutions of cresols in soap solution, and they differ chiefly in the greater or less purity of the cresol from which they are made. Lysol is a preparation of the same character. Solveol is a neutral solution of cresols in cresotate of soda. It forms a clear solution even with calcareous water, while sapocarbol or lysol give, in that case, a turbid solution in consequence of the soap they contain. Solutol is a solution of cresols in cresolate of soda. Recently another preparation has been brought out under the name of saprol. It is a mixture of crude cresols with liquid hydrocarbons, which have the effect of reducing the specific gravity, so that though the mixture is but little soluble it floats on the surface of water, forming a film, from which the soluble portion is taken up by the water and exercises a disinfecting action, while the layer of oil at the surface hinders the evolution of disagreeable odours or the dissemination of hurtful organisms. The chief objection to its use is its inflammability.

* *Pharm. Centralhalle*, 33, p. 302.

THE MASCARENE ISLANDS.*

The terribly destructive hurricane which lately visited Mauritius has called public attention to the products of this fertile island. Some account of the cultural industries of these, and adjacent islands, may therefore be acceptable, and these we are enabled to supply, as Monsieur M. F. Jadin, Chef des travaux de botanique à la Faculté des sciences, was recently despatched on a mission to the Mascarene Islands, to continue certain investigations of cryptogamic botany, which have for some time past been carried out in France for the public benefit. The *notes de voyage* of M. Jadin were communicated to the Société Languedocienne de Geographie, and published in their late bulletin. From these we quote the following:—

"The principal cultivation in both colonies (Réunion and Mauritius) is that of the sugar (*Saccharum officinale*, L.). The sugar industry includes, naturally, the production of rum and molasses. The two islands, however, do not both export their sugars to the same countries; for Réunion trades only with the French markets, having to compete against the beetroot sugar, and being obliged to make great sacrifices to sustain the conflict. Mauritius, on the other hand, sends out her supplies of sugar to the markets of India, the Cape, Australia and England. Moreover, Mauritius as a colony is devoted almost wholly to the sugar production, exporting only besides aloe fibre and a little vanilla. Réunion again attempts several small industries, and we shall see that she deserves the greatest encouragement in this line, in which she merits success.

"Whilst the cane culture in both islands is very nearly the same, Mauritius can boast of a considerable superiority over Réunion as regards the machinery used for manipulating the sacchariferous reed. Some of the sugar-mills of Mauritius are veritable palaces, with powerful steam machinery, combining all the latest improvements. On one large property, for instance, where work is carried on till nine or ten o'clock at night, they use the electric light—in fact, there is a very advanced management.

"Has the point of perfection then been reached, you will ask? By no means; we believe that both the cultivation and the manufacture are susceptible

* From the *Gardeners' Chronicle*, June 4.

of great improvements—thus, the use of the plough is almost unknown; the extraction of the sugar by the system of diffusion does not seem to be readily adopted by the colonists. In this direction there is a great deal to be done. Just now we only indicate these two points; we hope to be able, later, to treat them in greater detail.

"The two colonies export the fibre of the aloës—so-called—but these fibres are not extracted from the true aloe (*Aloe vulgaris* of Abyssinia, the aloe of Dioscorides), but from the leaf of several Amaryllideæ allied to the Agave. The principal species is the *Fourcroya gigantea*, Vent., or *Agave fœtida*, L., which locally bears the name of Aloès vert—green aloe. This plant, which in blossoming throws out a tall flower-bearing stem to a height of 6 feet, from its basal tuft of stiff leaves, does not bear seed. The flowers, which have the form of a white bell, with a very sweet odour, are never fertile; at the base of each a small bulb is put forth, which develops quickly, and when the flowers are dead, these bulbs remain and develop. As soon as each of these little bulbs has one or two small leaves unsheathed, the stalk bends under the weight of these small plants, and finishes by falling; once on the ground, the bulb develops itself into a new plant. Very hardy, thriving in the most arid and rocky soil, the Agave propagates rapidly, and without further care permits the production of fibre at a low price.

"The cultivation of vanilla is far more delicate; this Orchid requires a light soil, rich in humus, and also a support. The support generally in use throughout the Mascarenes is a Euphorbiaceous plant, the *Jatropha curcas*, L., which vulgarly bears the name of Pignon d'Inde—Indian Nut, or 'Physic Nut;' nevertheless, in Réunion especially, we have seen vanilla plantations of great importance, having the Orchid supported on one of the trees common to the country, the *Casuarina equisetifolia*, Forst., called Filao. [The translator remembers seeing vanilla grown on the stems of Palmistes, in Mauritius.] This climber also succeeds on the *Pandanus utilis*, Bory., or Vacoa, a most useful tree in sugar-producing colonies, for its leaves are largely required to make sacks for the outer covering of the sugar-bags. Besides the particular care which the plantations of vanilla require, we must not omit to mention the operation of fertilisation. As usual in all the Orchideæ, the fertilisation of the seed rarely takes place without external intervention; in order to insure a good crop, the cultivator must impregnate each blossom which he wishes to produce a pod. It is an easy operation, however, consisting merely of pressing the pollen on the stigma.

"Vanilla, aloes fibre, sugar, are the industries common to the Mascarene Islands; all the rest of which we now proceed to speak are limited almost exclusively to Réunion.

"Coffee has been for a long time a source of riches to Réunion; unfortunately a fungus (*Hemileia vastatrix*) allied to mildew has within the last few years attacked the leaves of the coffee tree. The attack of this parasite manifests itself as a minute yellow point, enlarging by degrees till the whole leaf is yellow, when it tumbles off and brings about the destruction of the tree. The agriculturists seem little disposed to meet this pest by the scientific means which succeed so well against mildew. Imbued by preconceived ideas, they prefer to give greater vigour to the plant by means of liberal supplies of manure, and they allege that good results are obtained. It is well-known that efforts of the same kind tried in France to resist the disease on the vines have only retarded the death of the plant. The Hemileia is a terrible disease; at Ceylon, for instance, where it is called the 'leaf-disease' (*maladie de la feuille*), all the coffee plantations have been devastated to such an extent that the inhabitants of Ceylon have nearly altogether abandoned the cultivation of coffee for that of tea. So vast a change of cultivation cannot possibly occur without suffering enormous losses.

"The Cassava meal or starch industry (*industrie féculière*) also gives very good results at Réunion. 'The development which the starch industry admits of in this island is such that we do not hesitate to class it as second in the order of importance,' so writes M. Ed. du Bouisson in his 'Agricultural Industry of Réunion.' Starch and tapioca are extracted from the Manioc, *Manihot utilissima*, Pohl. This industry already employs two very important mills in Réunion. They extract the fecula from the root, which contains about 20 per cent. of its weight of this article of commerce. Its cultivation is very easy, and the amount of the yield is calculated at 42,100 kilogrammes of fecula per hectare.

"The *Manihot utilissima*, or Manioc, is one of the Euphorbiaceæ which seems to be a native of oriental and intertropical Brazil. M. Alphonse de Candolle, to whom it is always safe to refer, for the origin of cultivated plants, says:—'If we are unwilling to accept this origin in oriental, intertropical Brazil, we must have recourse to two hypotheses; either the cultivated Maniocs proceed from one of the wild species modified by cultivation, or they are forms which exist solely by the action of man, after the disappearance of their kindred forms of spontaneous vegetation.' (Alph. de Candolle, *L'origine des Plantes Cultivées*, p. 50.)

"However this may be, it was on August 14, 1741, that Mahé de Labourdonnais, the great benefactor of the Mascarene islands, then Governor of the Isle of France, introduced the Manioc into that French colony. The plant met with a very bad reception. He (Mahé de Labourdonnais) brought from Brazil the plants of Manioc, which he distributed to the inhabitants, and it succeeded wonderfully. But some black people who had stolen some roots of the plant, having eaten them without duly cooking them under the ashes, died from their poisonous effect. Labourdonnais, naturally much alarmed, selected M. de Reine to manufacture some flour from the Manioc and Cassava. He sent to him, together with the memoirs of Père Labat, a root of Manioc, a basin and a plate, and ordered him to make some cakes of Manioc flour. M. de Reine succeeded completely. Labourdonnais then invited to Mon-Plaisir (his residence) a large number of colonists, ate the Manioc cakes in their presence, and made them eat some too. This celebrated repast took place on the day following the Christmas Day, 1741. Labourdonnais, as well as Messieurs Bouloc, Haché, Bernage, De Ponsy and others embraced M. de Reine in their transports of delight. Labourdonnais gave orders to have these Cassava cakes distributed gratis every morning at the bazaar or market, and, by degrees, after a little time the colonists and blacks became accustomed to use them.

"At the present day the Manioc is completely naturalised; its roots serve for nourishment to man and beast, and the féculerie (starch) industry at Réunion is on the way to complete prosperity."

HOP GROWING IN BOHEMIA.*

The United States Consul at Prague, in a recent report, says that large breweries all the world over always keep in their storehouses at least a small quantity of Bohemian hops, although the price paid is frequently a high one. This fact is a high tribute to the excellence of the Bohemian product, the superior qualities of which are attributed to peculiarly favourable conditions of soil and climate, and to careful and well-tried methods of culture. Since the sixteenth century hops have had their home in Bohemia; and their fame, then already established, has been maintained

* From the *Journal of the Society of Arts*, June 17.

and increased, and hop growing still continues to occupy a position of the first importance among the various forms of agriculture. The hop gardens are not extensive, and hop growing is confined to a comparatively small area, while the so-called hop-belt is a limited one. The total area under this cultivation amounts, according to the latest statistical returns, to about 26,000 acres, and this is divided into districts known under the names of the cities around which they centre. The largest and the best known is the Saatz district, with an area of about 10,000 acres. The neighbouring district of Rakonitz, with an area of about 600 acres, produces a grade of hops very similar in quality to that of the Saatz district; then come the Auscha district, with an area of about 4000 acres, the product of which is not considered as good as the Saatz hops; and the Dauba district, with an area of some 2500 acres, producing an inferior grade of hops. The most celebrated of these districts is the Saatz, and the hops grown there are claimed to be the best in the world. The hops of the Saatz district are again sub-divided into *Stadt*, *Bezirks* and *Kreis* classifications, according to quality; and the *Stadt*, or city hops, are the highest grade, while the *Kreis*, or circuit hops, are supposed to be somewhat inferior. In the Saatz and Rakonitz districts the hops are grown under similar conditions, and the products differ very little. The hops grow in a ferruginous, reddish clay soil, along the banks of the River Eger, while the region is protected from the cold north winds by a spur of the Erzgebirge, and the only prevailing winds are from the west and south-west. The elevation is about 800 feet above the sea-level, and the mean temperature during the year about 7° Réamur. The excellent qualities of the hops is ascribed to the peculiar properties of the soil, and to the very slight atmospheric depression. The hops of the Saatz, Rakonitz and Auscha districts are all known under the general name of red hops, while the Dauba hops are called green hops. The distinguishing marks of the Saatz are a long flower, closed at the top with innumerable leaflets—from a hundred to a hundred and fifty—which are as soft as velvet to the touch. They are characterized by a delicate spicy aroma, and the bitterness is greatly appreciated. The flower, when ripe, is of a greenish-yellow colour, with a slight reddish tint. Dauba hops, the type of green hops, have a round flower with fewer leaflets—from forty to sixty—and the odour exhaled somewhat resembles garlic. The colour of the ripe flower is of a yellowish green. Red hops form three-fifths and green hops two-fifths of the total crop. Outside the regions above mentioned the cultivation is carried on only on a small scale. The average crop in Bohemia is 9,000,000 lbs. in round numbers. The average yield per acre is not large; in the Saatz district it is between 350 and 450 lbs., while in the Auscha district, in a good season, there is a yield of 600 lbs. to the acre. The labour required for the cultivation is cheap, and hop pickers receive about tenpence for a day's labour. With a view to securing a uniformly higher standard of hop culture, there have been established, within the last two years, technical schools for the study of hop culture at Rakonitz and at Laun. These schools receive financial support from the Government of Bohemia, and also from the cities and districts where they are located. Being situated in the midst of the hop districts, every opportunity is afforded for practical work. In connection with the Rakonitz school there is an experimental hop garden, where innovations in cultivation are tried. The courses of instruction offered are both for students attending regularly and for farmers desiring special instruction. Among the regular courses of instruction are hop culture, theoretical and practical, from a botanical and technical standpoint, treatment of the soil, choice of the young plants, fastening of the poles, selection of the poles, hop picking, hop sorting, etc. The attendance at the schools has so far been considerable, and many students have come from other countries. The results have been so satisfactory that it is expected that hop culture will show a decided improvement as the schools become older and the students turn the knowledge acquired to practical use.

NOTE ON THE PRESENCE OF A CHOLESTEROL IN THE ROOTS OF HYGROPHILA SPINOSA.

BY C. J. H. WARDEN,

Officiating Medical Store-Keeper to Government; *and Assistant-Surgeon C. L. Bose, Assistant Chemical Examiner to Government of Bengal.*

In the 'Pharmacographia Indica,'* one of us described the physical properties of a principle isolated from the roots of the *Hygrophila spinosa*, which was not unlike a cholesterol. Subsequently, through the kindness of Dr. Dymock, we obtained a large supply of the roots, and were able to separate a sufficient amount of the material to admit of its thorough purification and ultimate composition being determined.

For ultimate analysis the principle was crystallized from light petroleum ether, and the combustion made in an open tube in a current of oxygen. The tube had been in use some time and was in very good working order.

The results obtained led to the following formula:—

	Calculated for $C_{26}H_{44}O$.		Found.
C_{26} . . .	312	83·86	83·80
H_{44} . . .	44	11·82	12·02
O	16	4·32	4·18
	372	100·00	100·00

At 175° C. (uncor.) the cholesterol commenced to soften, and melted at 184° (uncor.). The fusing point would appear to be higher than that of any cholesterol hitherto isolated. We were unfortunately unable to determine the specific rotatory power.

In purifying the cholesterol an alcoholic extract of the root was dried and exhausted with ether. The dry ether extract was treated with dilute sulphuric acid, and the insoluble residue taken up by ether. The ether extract was next boiled with aqueous caustic potash, the solution evaporated to dryness, and extracted with petroleum ether. The petroleum ether extract was boiled for some hours with alcoholic potash, the solution evaporated to dryness, and extracted with petroleum ether. The petroleum ether extract was of a yellow colour, and in order to decolorize it, it was dissolved in absolute alcohol, and the solution agitated with purified animal charcoal; this, however, failed to remove the whole of the colour, and the following experiment was adopted. The alcohol was evaporated off, the residue dissolved in petroleum ether, and the solution agitated with proof spirit, by this means most of the colouring matter was removed. The cholesterol was finally several times crystallized from petroleum ether, and was obtained perfectly white. A benzoyl derivative was also prepared. Evaporated with a drop of nitric acid, and the dry residue moistened with ammonia an orange colour developed, but no change was induced by the addition of caustic potash. The violet reaction with ferric chloride and HCl applied as described by Forti† was very marked. The sulphuric acid and chloroform reaction was conducted in a stoppered bottle; the chloroform layer at first became yellowish-brown, then blood red, finally darkening to reddish-purple; the sulphuric acid and stratum was of a pink colour, and in some experiments fluoresced.

* Part v., p. 39.

† *Chem. Centr.*, 1890, ii., 581–583.

The Pharmaceutical Journal.

FIFTY-FIRST YEAR OF PUBLICATION.

SATURDAY, JUNE 25, 1892.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, *17, Bloomsbury Square, London, W.C.*

Instructions from Members, Associates, and Students, respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary, 16, Bloomsbury Square, London, W.C.*

Advertisements must be sent to the Office of the PHARMACEUTICAL JOURNAL, *5, Serle Street, Lincoln's Inn, London, W.C., where Copies of the Journal may be Purchased. Cheques and Money Orders should be made payable to* "STREET BROTHERS."

BRITISH PHARMACEUTICAL CONFERENCE.

WE understand from the honorary secretaries of the Conference that all the arrangements for the forthcoming meeting at Edinburgh have now been completed, and that the details of the work carried out for that purpose by the Scottish local committee were formally approved by the Executive Committee of the Conference at its late meeting, a report of which appears at page 1076 of this week's Journal. It may therefore be anticipated that the circular of invitation to be issued by Mr. PETER BOA, the Honorary Local Secretary, will now soon be in the hands of the members. Meanwhile, however, we may take this opportunity of reminding our readers that there are but a few weeks to elapse before the time arrives at which it has been decided to hold the meeting. It may also be mentioned that this year there will be a deviation from the customary practice of holding the Conference meeting concurrently with that of the British Association for the advancement of Science. The meeting of this latter body will take place in Edinburgh; but it will be at an earlier date than that at which the Conference meeting will be held. We do not, however, apprehend that this circumstance is likely in any way to prejudice the success of the Conference meeting. It is true that some members of the Conference, who have long been in the habit of attending the British Association meetings, may find that the attraction arising from the habit and from the desire to continue it, will not, this year, be a supplementary incentive to their attendance at the Conference meeting. But those who are thus situated are only few in number, and we are, moreover, disposed to think that among the ordinarily regular attendants at Conference meetings, there will be few even of those above referred to who will not regard the attractions presented by a Conference meeting as being quite sufficient in themselves, without the adventitious charm of a British Association meeting at the same time and place.

There seems consequently to be little reason for fearing that on the score of the above mentioned separation of the times of meeting the meeting of the British Pharmaceutical Conference this year will not be well attended. On the contrary, it may be expected that it will be even better attended than is usually the case; for there are many advantages which will result from the separation of the two meetings. The opportunity of obtaining lodging accommodation, either at hotels or elsewhere, will be considerably greater, and this is a very important consideration in regard to such meetings. The possibility of obtaining rooms for the business meetings and social gatherings of the members will also be much greater than when the whole city is engaged at the same time in providing for another and much more numerous body. Besides that, the obscuring effect produced by the overshadowing importance of the British Association will no longer be involuntarily exerted, and the proceedings of the Conference will, consequently, have some chance of attracting public notice, and being recognized as dealing with matters which possess considerable interest for the whole community no less than they do especially for members of the pharmaceutical body.

There is, therefore, a bright side to the conditions under which the approaching meeting of the Conference is to take place, and, in our opinion, those conditions promise advantages, of various kinds, far counterbalancing any possible damage that might result from the separation of the meeting from that of the British Association. Moreover, the mere fact that the meeting is to be held in Edinburgh is a strong ground for anticipating that it will be a successful one. That alone should be sufficient to put altogether into the shade any apprehensions connected with the altered arrangement. Those who have attended previous meetings of the kind in Edinburgh, will not need to be reminded of the admirable manner in which they were carried out in every respect. Those who have not had that experience, will have heard enough of the beauty of Edinburgh and its neighbourhood, of the hospitality of their Scottish friends, and of the manifold sources of interest—romantic, historical, and scientific—to be found in the capital of the North, to make it a certainty that if they do not make their appearance in "Auld Reekie" next August it will only be because of *force majeure*, and they will be entitled to general compassion.

THE RELATIONS OF MEDICINE AND PHARMACY.

THE editor of the *American Journal of Pharmacy* reports in the current number of that journal a renewal of the attempt to obtain the repeal of a section of the Pennsylvanian Pharmacy Act which permits the registration of medical practitioners as apothecaries. During the sitting of the Medical

Society of the State last month at Harrisburg, Dr. Roebuck, of Lilitz, presented resolutions expressing the sense of the local Medical Society in favour of the repeal of the clause above referred to, and also suggesting that the Pharmaceutical Association should use its best endeavours to prevent druggists who are not registered physicians from prescribing. It is stated that some of the physicians present spoke in opposition to these recommendations, and that their remarks appeared to indicate the belief on their part that they were as well versed in all the details of pharmacy as those who had spent a lifetime in its practice. On the other hand a number of influential physicians adopted the view that medical education does not embrace the details of pharmacy, and that, as a rule, physicians are not able to carry out the necessary pharmaceutical manipulations, nor prepared to attend to the other numerous duties of a pharmacist. The resolutions were eventually adopted by a large majority. This proceeding points to a desire that the especial functions of the medical practitioner and the pharmacist should be completely separated, and it may be inferred that this desire prevails in the United States not only with medical men but also with pharmacists.

There are also reasons for the belief that the same desire to restrict medical and pharmaceutical practice within appropriate limits prevails to a considerable extent in this country. Though, unfortunately, we are familiar with notable deviations from such a desirable distinction, as, for instance, in Glasgow and its immediate neighbourhood, it is a matter for congratulation that the Faculty of Physicians and Surgeons in that city has taken cognizance of the evil there prevailing. As a consequence it has issued to its Fellows a reminder of the regulation which stands upon the minutes of its Council in regard to the practice of medical men keeping open shops in such a way as to convey the impression that they are the proper shops for the sale of drugs. It is pointed out that this practice is a violation of the regulation of the Faculty in that respect, and the special attention of the Fellows is called to this fact with a request that they will in future avoid everything which might have even the appearance of infringing the regulation which they have undertaken loyally to obey. This action on the part of the Glasgow Faculty is probably an indirect result of the proceedings recently taken by the Pharmaceutical Society in Glasgow; but in any case it may be taken as an indication of a community of opinion between the Faculty and the Council of the Pharmaceutical Society as to the desirability of a suitable separation of medical and pharmaceutical practice.

In other directions indications of the same feeling are also to be observed. Thus, for instance, the *Lancet*, in commenting upon a recent case in which a "death from misadventure" was considered to have been accelerated by the administration of opium, showed an absence of that uncharitable condemnation of chemists and druggists for recommending medicine in the same way that any individual has a right to do, which has been too frequently indulged in. In place of it we are glad to notice that the circumstances of the case are treated in a manner that appears more rationally considerate of the fact that undesirable confusion of the functions of pharmacists and of medical men obtains on both sides. That fact is indeed much to be regretted, and it is highly desirable that, as far as possible, a stop should be put to practices which are on either side inconsistent with the duties and the relative position of pharmacists and medical practitioners. That result, however, can only be effected gradually and by the mutual endeavours of both parties, while abstaining from angry denunciations of each other. It is in this sense that we agree with the *Lancet's* remarks in regard to the case now referred to, that while the whole trouble seems to have arisen from the meddlesome desire to prescribe, and though the druggist merely did what he was asked to do with the best intention, the case ought to serve as a most serious warning, not only against the administration of opium in cases of albuminuria, but also against counter prescribing.

A London evening paper had a paragraph some few days since stating that in the new British Pharmacopœia metric weights and measures would be adopted, to the entire exclusion of the weights and measures hitherto used in this country. No authority was given for the statement, but we are in a position to say that there is no foundation for it so far as this country is concerned. There has probably been some confusion of the United States Pharmacopœia with the British Pharmacopœia.

* * *

We desire to call attention to a letter at page 1080, in which Mr. Holmes corrects a mistake he made at the last evening meeting in speaking of a sample of lemon oil, presented by Mr. A. A. Barrett as being "so-called 'terpene free' oil." That description was incorrect, and the sample presented by Mr. Barrett was ordinary lemon oil, guaranteed pure, which had been prepared by him by a new process. As Mr. Barrett has been engaged in the endeavour to prepare the flavouring principle of lemon oil in a concentrated form by separating the flavourless terpene naturally associated with it—see *Journ. Soc. Chem. Ind.*, x., 106—Mr. Holmes appears to have fallen into the error of assuming this process to have been the new process by which the sample of oil presented to him had been prepared. The data given in the Journal (April 23rd, p. 876) are in themselves sufficient to show that the oil spoken of by Mr. Holmes was not "terpene free," but as Mr. Barrett informs us that the remarks then made, on the supposition that it was so, are calculated to prejudice his make of concentrated lemon oil, we willingly take this opportunity of stating that those remarks did not refer to it.

Paris Society of Pharmacy.

A meeting of the above Society was held June 1, the President, Mons. L. Portes, in the chair. After the usual preliminary business, the following communications were received:—

"On the Preparation of Cantharidine," by M. Debuchy. The author had made a comparative examination of the different neutral solvents used to extract cantharidine, and gave the preference to methyl formate. He also recommended the use of petroleum ether in preference to carbon disulphide for removing fatty matter, since the latter dissolves a little of the cantharidine, which is thus lost.

"On the Solubility in Water of the Sulphates of Quinine and Cinchonidine," by MM. Brunier and Chesnay. The results obtained had been applied in the assay of commercial sulphate of quinine.

"New Researches upon Boron," by M. Moissan. The author, after criticizing the methods of former investigators, described at length those adopted by himself in the preparation of pure amorphous boron, and then gave a description of the properties of this substance. He stated, in conclusion, that these properties show a great resemblance between this metalloid and carbon.

"A Study of the Plants and Medicaments of the Steppes," was read by M. Planchon; M. Grimbert gave the results of some researches on lactose; and M. Labesse sent for exhibition a sample of opium containing particles of lead.

Proceedings of Societies in London.

SOCIETY OF CHEMICAL INDUSTRY.

London Section.

Notes on some Indian Gum Samples of Known Origin.*

BY DR. S. RIDEAL.

During an investigation by Mr. Youle and myself on the relative value, for commercial purposes, of some modern substitutes for gum arabic (*Journ. Soc. Chem. Ind.*, 1891, 610) our attention was naturally drawn to the characteristic properties of those Indian gums which are brought to the London market.

The favourable results obtained from the samples which were then examined for a variety of purposes led us to devote considerable attention to this class of gum, and we found that, as a rule, a good mucilage could be reasonably expected from them, as seldom did the insoluble portions reach a very high percentage.

We advocated the use of Ghatti gum for pharmaceutical purposes at the British Pharmaceutical Conference at Cardiff during the autumn of last year† ('Year-Book of Pharmacy,' 1892, 405, *et seq.*) and have since found that many manufacturers have been induced to give these gums a further trial. Quite recently the Bombay correspondent of the *Chemist and Druggist* (March 19 issue) has again drawn the attention of English consumers to this article; he says, in speaking of Ghatti gum (finest sort), "This gum is exclusively used in India by pharmacists. The English druggist has apparently not yet found out the value of this drug, which can be had in all qualities, and is, in the best grades, double the strength of Turkish gum acacia." These remarks, whilst confirming the favourable opinion already formed, naturally lead one to imagine that in India we have gums which are very suitable for many classes of work in this country. Unfortunately the gathering of gum in India is not yet carried out with any system and little is known as to which gums would yield the best price in England. That which is at present exported is named "ghatti," "amrad," etc., from inspection, and sorting the gums when once they are mixed is a laborious and expensive operation. We thought that it would be interesting if gums of known origin from India could be sent in small quantities to this country for the purpose of examination, and that by so doing light would be thrown on the best localities for the finest sorts of gum.

Through the kindness of Professor Pedler, of Calcutta, I have had placed at my disposal a series of gums which have been collected by the Government department, from trees of known botanical origin, and in most cases from known localities, and it is the purpose of this note to briefly describe the physical and chemical properties of these gums. Amongst them the most important is the—

Acacia Arabica Gum.—In India the tree is known as the Babul tree, and abounds all over Northern India, where it is prized more for its wood, which is used for fuel and timber, and its bark, which is of value for tanning purposes, than for its gum. The yield of gum, too, is very small as compared with the yield from the same tree in other parts of the world, *e.g.*, in Arabia and Egypt. This small yield is probably due to the climatic difference of India, as the production of gum requires a dry atmosphere like that which abounds in the deserts of Arabia and Africa, the true home of the gum arabic.

Where such a climate exists as in Rajputana and Sind, the tree yields quantities of gum, but not sufficiently large to form an important item in the export trade. The indigenous product is merely used for home consumption in the interior of the country. The requirements of the seaport districts being met by the imported gum, very little of it finds its way to the seaport for export. The gum exported from Bombay to Europe is chiefly obtained from the Red Sea ports, and it is more or less adulterated with the Indian product. The Indian gum is inferior in quality to that obtained from Arabia and Africa. The colour is usually dark, and it is frequently mixed with gums of other trees, and often these admixtures contain fragments of gums which are insoluble in water. In India, acacia gum is used for medicinal purposes as well as in the preparation of sweetmeats. The true Indian gum sells at 15 to 25 rupees per hundredweight, according to quality. It is reported that barren trees can be made to yield gum by inoculating with gum from another tree, but, as far as I have been able to ascertain, no systematic experiments in this direction have as yet been tried. The samples of gum acacia sent from India consists of very hard, light, brown, irregular masses, without any marked taste or smell. They swell up in water to a pale brown jelly, and finally are completely soluble. They give a mucilage which is fairly adhesive, and with most reagents give characteristic reactions, while Ghatti gums gave negative results.

On analysis the sample gave 16·38 per cent. moisture and a fairly high ash (4·46). Its solution was very viscous, and it contained the smallest quantity of nitrogen of any of the samples examined. O'Sullivan, in a recent paper, has drawn attention to the presence of some nitrogenous substance in samples of Gedda gum, but apparently it exists in too small a quantity for isolation. On the other hand, it may be that the

* From the *Journal of the Society of Chemical Industry*, May.

† The value of Ghatti, and other Indian substitutes for gum arabic in practical pharmacy, was shown in a paper read by Mr. A. Mander before the School of Pharmacy Students' Association, and published in this Journal, April 14, 1888.—[Ed. Pharm. Journ.].

gum acid is itself sometimes partially converted into an amido compound. The quantity of nitrogen present in all these Indian samples is recorded in the table, but it is difficult to draw any conclusions from the numbers obtained.

Acacia Catechu.—From this tree the catechu of commerce is obtained. It yields a gum of a pale yellow colour, and like the gum obtained from the Babul tree, is usually completely soluble in water. Some of the specimens are almost white, and apparently in India the gum from these trees is usually of better quality than that obtained from the tree *Acacia Arabica* when grown in the same place. It is, however, not procurable in large quantities. In point of fact, none of the Indian gums at present can be obtained pure in such quantities as to form a trade article by itself; hence Indian gums imported to this country are usually of the mixed character already referred to. The sample of a case of catechu examined came from Surat, Bombay, and occurred in light brown translucent angular masses. It left a slight residue insoluble in water. The specimens at my disposal were slightly musty, so that the mucilage obtained from it had not a very good adhesive value. Its viscosity was also small, and it had a fairly low ash. The complete figures of this and the other gums are given in the table at the end of these notes.

Acacia Farnesiana.—This tree yields a large quantity of gum, and is also found in the mixed gums imported to this country. The tree grows very freely in Sind. The sample examined was furnished by the Forest Department of the North-West Provinces, and had a pale red colour. Mr. Baden Powell has described the gum as occurring in "dark conchoidal masses, translucent and transparent at the edges. Some of the pieces are much whiter." Our samples came from Bahraich and Oudh, and were mixed with bark. They dissolved completely in water, forming a deep brown mucilage which had very poor adhesive property. It did not darken on warming with normal soda, gave a slight brown precipitate with ferric chloride, and threw down a copious precipitate with alcohol. The gum contained 15·45 per cent. of moisture; ash, 2·08 per cent., and nitrogen, 0·061 per cent.

Acacia ferruginea.—This gum occurs in brown irregular masses very similar to the former sample (*A. Farnesiana*). It is entirely soluble in water and is fairly adhesive. It differed from *A. Farnesiana* in darkening with normal soda, but in other respects was very similar in character. Its moisture was high, 17·09, its ash 3·22, and it contained the highest quantity of nitrogen, 0·082, of any of the samples. Our sample came from Pauchmahals, Bombay.

Acacia leucophlœa.—This tree is generally found in Central and South India. It yields a gum which is usually as white as the true gum arabic. It was exhibited at the Colonial and Indian Exhibition and was described by Dr. Ure as "gum bassora." The sample examined came from Saltara, Bombay. It consisted of light brown irregular masses with a slight marked taste and a peculiar aromatic odour. It dissolved entirely in water to a light brown liquid, and gave a fairly adhesive mucilage. In this respect therefore our sample differed from the sample described by Dr. Ure, but it contained a certain amount of metarabin, as it gave a gelatinous precipitate with ferric chloride. Normal soda darkened the solution faintly. It yielded a white ash, gave a very viscous solution, and contained 14·65 per cent. of moisture.

Acacia modesta.—This tree yields beautiful, clear, transparent lumps of reddish gum. I learn that it is largely used by calico printers in India. The sample examined came from the Punjaub. It had an aromatic odour, dissolved completely to a pale yellow liquid, and gave a fairly adhesive mucilage. It turned yellow with normal soda, became solid on the addition of ferric chloride, and gave a thick white precipitate on the addition of alcohol. Basic acetate of lead also gave a thick white precipitate with the mucilage, and the contents of the tube became a solid mass. The sample had a fairly low ash, 2·91, contained 16·70 of moisture, and yielded a solution of medium viscosity. These were the only true acacias of which samples were sent, but, in addition, there are other gum-yielding trees, of which several samples were submitted, of which the following is a short account:—

Albizzia amara.—This tree is found in South India and yields a red coloured gum very much like the best kind of Indian acacia gums. The sample examined came from Coimbatore, North Madras. It had a fragrant smell, was entirely soluble in water, yielding a yellowish brown liquid, and was a very good adhesive gum. The liquid became thick on standing with ferric chloride, turns bright yellow when warmed with normal soda, and gave a slight precipitate with stannous chloride. The viscosity of the solution was high, being 19·28 times that of water. It contained 11·22 per cent. of moisture, 3·20 per cent. of ash, and had a very small percentage of nitrogen.

Anogeissus latifolia.—This tree is found all over India, and yields very large quantities of gum, which is also extensively used in calico printing. It is whiter than most acacia gums, but seems to possess far less adhesive power. The samples examined came from Secunderabad, near Hyderabad, and occurred in large spherical nodules. These lumps swell up to a great extent on the addition of water, consisting almost entirely of metarabin, very little liquid being strained off. It is useless as an adhesive gum. Mercuric chloride gave a white precipitate; with borax the solution became thicker. Ferric chloride darkened the liquid, showing the presence of tannin. It turned yellow with normal soda, and gave a thick white precipitate with alcohol. The gum yielded a very small ash, 1·28. The solution was very feebly viscous, viscosity Z equal to 320. It was certainly the poorest of any of the gums examined.

Bauhinia retusa.—This gum is obtained from the North-West Provinces and Oudh. It resembles Indian gum acacia in colour, and is soluble in water to a light brown liquid. The sample sent was in too small a quantity for many experiments. It yielded 3·28 per cent. ash and 10·49 per cent. moisture.

Bauhinia variegata.—This gum resembles the former, but the sample examined from Garhwall seemed to be a mixture, as amongst the dark brown masses were lighter coloured particles. It dissolved, however, entirely in water, forming a reddish-brown liquid. It had a slight aromatic smell, turned brown with the addition of normal soda, gave a thick flesh-colour precipitate with basic lead acetate, and turned solid on the addition of ferric chloride. Alcohol also threw down a thick flesh-colour precipitate. It yielded a solution which was of very poor viscosity, and is useless as an adhesive gum. It had a low ash, 2·51 per cent., and contained 13·63 per cent. of moisture.

Buchanania latifolia.—This is described as a clear resinous gum, but it resembles the true gum acacia in appearance, being nodular and covered over with fissures. It dissolves readily in water, forming a pale yellow liquid, but this solution is only very slightly adhesive. It has a sweet taste, a faint aromatic smell, and gives with ferric chloride a dark brown jelly immediately; basic lead acetate gives a thick white precipitate; mercurial chloride converts it into a jelly, and it turns bright yellow on warming with normal soda. It yielded 4·65 per cent. ash, which contained a trace of iron, contained not less than 20·73 per cent. moisture, and had a viscosity value Z equal to 0·694. The sample came from Betut, Central Provinces.

Odina Wodier.—This tree yields a large quantity of gum during the rainy season. This is white when it

TABLE I.

	Moisture.	Ash.	Viscosity.		Specific Gravity.		Nitrogen.
			η.	z.	10 per cent. Solution.	Of Solid.	
Acacia leucophlœa . . .	14·65	4·12	0·1371	1106	1·020	1·599	0·054
Acacia Catechu	15·22	2·14	0·0424	342	1·017	1·713	0·065
Acacia ferruginea . . .	17·09	3·22	0·1132	913	1·017	1·622	0·082
Acacia Farnesiana . . .	15·45	2·08	0·1325	1071	—	1·623	0·061
Acacia modesta	16·70	2·91	0·09006	726	—	1 641	0·053
Acacia Arabica	16·38	4·46	0·14470	1167	1·004	1·623	0·031
Acacia?	21·20	1·88	0·3039	2451	1·017	1·606	0·035
Albizzia amara.	11·22	3·20	0·2397	1928	1·017	1·794	0·036
Anogeissus latifolia . . .	12·40	1·28	0·0397	320	1·002	1·696	0·039
Bauhinia retusa	10·49	3·28	—	—	1·015	1·750	0·038
Bauhinia variegata . . .	13·63	2·51	0·06947	560	1·019	1·696	0·055
Odina Wodier	18·09	3·52	0·04415	356	1·013	—	0·054
Terminalia tomentosa . .	17·50	0·66	0·06510	525	1·017	1 904	0·069
Buchanania latifolia. . .	20·73	4·65	0·0860	694	1·018	1·640	0·069

TABLE II.

Gum.	Colour.	Taste.	Smell.	Solubility.	Adhesiveness.
Acacia leucophlœa . .	Light brown, irregular.	Marked.	Peculiar odour.	Entirely soluble to light brown liquid.	Fair.
Acacia Catechu . . .	Light brown, translucent, angular.	Slightly sour.	Sour.	Partly soluble to colourless liquid.	Very slight.
Acacia ferruginea . .	Brown, granular, containing bark.	Nil.	Faintly sour.	Entirely soluble to brown liquid.	Fair.
Acacia Farnesiana . .	Brown, irregular, not all the same colour.	Slightly sweet.	Nil.	Entirely soluble to brown liquid.	Very slight.
Acacia modesta . . .	Light brown, irregular.	Nil.	Peculiar odour.	Dis. completely to yellow liquid.	Fair.
Acacia Arabica . . .	Very hard light brown, irregular.	Nil.	Slight mouldy smell.	Swells up to pale brown jelly.	—
Acacia?	Brown, irregular.	Nil.	Very faint odour.	Partly soluble to light brown liq.	Slight.
Albizzia amara . . .	Light brown.	Nil.	Sweet odour.	Entirely soluble to yellowish brown liquid.	Very good.
Anogeissus latifolia. .	Light brown, partly spherical.	Nil.	Nil.	Swells up to grey mass. Little liq. strained off.	Useless.
Bauhinia variegata. .	Dark brown, containing lighter particles.	Nil.	Very faint.	Entirely dissolves to reddish-brown liquid.	—
Buchanania latifolia .	Yellowish brown; bark adhering to it.	Sweet.	Faint.	Entirely soluble to pale yellow liquid.	Slight.
Odina Wodier . . .	Dark brown.	Sour.	Sour.	Partly dissolves.	—
Terminalia tomentosa .	Translucent yellow.	Nil.	Smell like leather.	Partly dis.; soluble portion pale yel.	Fair.

hangs on the tree, but becomes dark when it falls on the ground. The gum is not much valued in India, but is sometimes used in calico printing. A sample from Secunderabad, near Hyderabad, was examined. It occurred in dark brown lumps, had undergone slight fermentation, and had a sour taste and smell. It partly dissolved in water, the remainder swelling up. With ferric chloride it gelatinized at once. It turned very dark on warming with normal soda; gave a thick white precipitate with basic lead acetate; and borax thickened the mucilage. It contained 18·09 moisture, and 3·52 ash. The solution was of very feeble viscosity.

Terminalia tomentosa.—Our sample of gum of this tree also came from Secunderabad. The tree is stated to yield gum only in small quantities. The specimen examined was very pale yellow in colour, the lumps being very glossy and transparent. Although in appearance so good, it only partly dissolved in water. The soluble portion formed a fairly adhesive mucilage, but it gelatinized and darkened in colour on the addition of ferric chloride. It was thickened with borax, and turned pale yellow on warming with normal soda. This gum was further characterized by an exceptionally low ash, 0·66 per cent. Its solution was of very feeble viscosity, and the solid had a high specific gravity 1·904.

The more important physical and chemical properties of the gums examined are tabulated above, but, in addition, the following summary of the behaviour of a 10 per cent. solution of the gums towards the following reagents may be of interest:—

1. When warmed with an equal bulk of normal soda, *A. Farnesiana* and *A. Arabica* did not darken in colour; *A. modesta*, *Albizzia amara*, *Anogeissus latifolia*, *Buch-*

anania variegata, and *Terminalia tomentosa* turned yellow; whilst the other gums darkened considerably.

2. A saturated solution of borax only appreciably thickened the mucilages from *Anogeissus latifolia*, *Buchanania latifolia*, *Odina Wodier*, *Terminalia tomentosa*.

3. Mercuric chloride gelatinized the mucilage from *Buchanania latifolia*, and gave precipitates with *Anogeissus latifolia* and *Terminalia tomentosa*.

4. Stannous chloride gave no reaction with the solutions of *Acacia leucophlœa*, *A. ferruginea*, *A. Farnesiana*, *Buchanania latifolia*, and *Odina Wodier*.

Ammonium oxalate, basic lead acetate, and alcohol gave precipitates more or less copious with all the samples examined, and, as already mentioned, ferric chloride gelatinized many of the acacia gums as well as those obtained from other trees.

Traces of phosphoric acid were found in the ashes of all the samples with the exception of *Acacia catechu*, *A. leucophlœa*, *A. modesta*, and *Bauhinia variegata*, and, although material was insufficient for an estimation, it was apparently present in fair quantity in the ashes of *Acacia ferruginea*, *Bauhinia retusa*, and *Terminalia tomentosa*.

It will further be noticed that nitrogen was found in all the gums examined, varying in amount from 0·031 to 0·082 per cent.

From this investigation it will be seen that the Indian gums vary very considerably in character, and as this examination is by no means exhaustive, I hope that further attention will be directed to the subject. Statistics are wanted as to the best localities for the growth of these different trees, and also the climatic conditions which occur in those districts. No doubt the geological structure of the country also materially influences the quality of the gum yielded by the tree; and if this paper will lead to the work being carried on in India, there can be no doubt that we shall eventually obtain from that country gums of known value and suitable for many industrial purposes.

BRITISH PHARMACEUTICAL CONFERENCE.

A meeting of the Executive Committee was held at 16, Bloomsbury Square, on Thursday, June 16, at 4·30 p.m.

Present, Mr. W. Martindale, Vice-President, in the chair, Messrs. M. Carteighe and A. W. Gerrard, Mr. R. H. Davies, Hon. Treasurer, Messrs. W. A. H. Naylor and F. Ransom, Hon. Gen. Secretaries, and Mr. M. K. Johnson, Asst. Sec. The minutes of the previous meeting were read and confirmed.

Letters were read from Mr. Peter Boa, Hon. Sec. of the Local Committee, respecting the suggested arrangements for the Edinburgh meeting, particulars of which have already been published.

It was unanimously agreed that the programme of the local arrangements as suggested by the Edinburgh Committee and submitted by the Hon. Local Sec., Mr. Peter Boa, be confirmed.

An application from the British Medical Association through its Honorary Librarian, to have a copy of the Year-Book sent annually for use in the Library, was granted.

A provisional list of officers for next year was considered.

Several gentlemen were proposed and elected to membership.

Provincial Transactions.

MEETING OF PLYMOUTH PHARMACISTS.

A meeting was held at Plymouth on Friday, June 3, at which the following local chemists were present:—Messrs. Balkwill, Barge, Breeze, Cox, Netting, Price Roper, Sloggett, Tarney, Weary, and Hunt (Loc. Sec.). Letters were received from Messrs. Allan, Codd, Woods, and Goodwin regretting inability to attend.

Mr. Netting having been voted to the chair, a letter was read from the Organizing Secretary of the Plymouth Technical Education Committee acknowledging receipt of the letter drafted at the last meeting and promising that it should receive consideration. The chief business of the evening was a discussion upon the new phase of the "poison clause," most present taking part in it. The Chairman afterwards proposed that an association be formed of those present with power to add to the number, which proposal was unanimously agreed to; the choice of title and selection of the officers was postponed till the next meeting.

NEWCASTLE-ON-TYNE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

A botanical excursion in connection with the above Association took place on Whit Monday to Morpeth and the surrounding district. The members travelled by the 1.30 p.m. train from the Central Station, and were met at Morpeth by Mr. F. E. Schofield, chemist and ex-Mayor of that town. The party was then conducted by Mr. Schofield up the course of the river Wansbeck, amongst the woods, as far as the ruins of Newminster Abbey, and on to Mitford Castle and grounds. Proceeding on the homeward journey a halt was made at Spital Hill Gardens, where various species of rare and cultivated plants in full bloom were inspected, and the occasion was improved by Mr. Schofield giving interesting and descriptive explanations for the benefit of the party. A fine plant of *Primula obconica* was seen here. After tea at Morpeth Mr. E. Hoppers' collection of orchids, which is considered the finest in the north of England, was inspected. The party was then conducted to Mr. Schofield's garden, which is full of rarities and oddities collected by Mr. Schofield during his leisure hours and summer trips.

A vote of thanks to Mr. Schofield for his kindly demonstration and assistance brought to a close a most successful and enjoyable botanical excursion.

BRIGHTON ASSOCIATION OF PHARMACY.

The annual excursion of the Brighton Association of Pharmacy took place on Monday last, when a party of about twenty-eight assembled at the Brighton railway station at 10 a.m. and travelled together to Arundel. Then embarking, the party proceeded up the river, past the Duke of Norfolk's park to Amberley. At the latter place they alighted and walked to see the ancient ruins of the castle. After about an hour's absence they returned to the yacht, and, while it steamed down the river, luncheon (provided by the host) was enjoyed. Later on in the afternoon, the tide having run out, the yacht ran aground, and, having to wait for the returning tide, it was some time before the boat was got off.

This delay caused the party to be late for dinner, which Alderman Cox had had prepared at the Bridge Hotel. It was after seven when the party sat down to this meal, which was appreciated by all.

Dinner over, the Chairman (Alderman Cox) gave the usual loyal toasts. Afterwards Alderman Botting, responding on behalf of the "friends and visitors," said that they had had a very pleasant trip up the river, and that they were all grateful to Alderman Cox for his kindness and hospitality. Excursions together by members of a trade rubbed off differences and made men like each other better.

Mr. Thomas Billing proposed the "Health of Alder-

man Cox," and in the course of an eloquent speech dilated upon that gentleman's good qualities. He said there was not a man more highly respected and looked up to in the town of Brighton.

In his reply the Alderman trusted that these annual gatherings would be productive of feelings of cordiality amongst chemists generally. He hoped that this excursion would not be the last.

Subsequently the party turned homewards, each member thanking the host and hostess for their kindness and generosity.

Amongst those present were Alderman Davey, Alderman Botting, Mr. W. D. Savage, J.P., Mr. Thos. Billing, Mr. Gibson, Mr. Marshall Leigh.

Reviews and Notices of Books.

THE TANNINS. A Monograph on the History, Preparation, Properties, Methods of Estimation, and Uses of the Vegetable Astringents. By HENRY TRIMBLE, Ph.M., Professor of Analytical Chemistry in the Philadelphia College of Pharmacy.*

This work is the first portion of a review of the chemistry of those substances which come under the general designation of tannin. It deals not only with the present state of knowledge of this subject, but also with its historical progress and the methods of testing and delivering the amount of tannin in various materials employed for technical purposes.

Though the recognition of tannin as a distinct substance did not take place until about 1890 the astringency of galls and oak bark had been attributed some thirty years previously to the presence of a peculiar principle. In 1763, Dr. William Lewis pointed out that the astringency of certain vegetable infusions and the property of producing a deep black liquor when mixed with green vitriol seemed to depend upon one and the same principle and to be proportionate to one another. A further knowledge of this subject was obtained by the subsequent study of galls and oak bark, especially in connection with the tanning of leather. After Scheele had discovered gallic acid, in 1786, Dizé, in 1791, obtained, by means of ether, a resinous astringent substance that was soluble in water and precipitated by sulphuric acid. Two years later Deyeux, a French pharmacien, published the results of an examination of various galls, and showed that the characteristic property of precipitating salts of iron was due to a "principe astringent." The more exact knowledge of this constituent was worked out by Scheele, Berthellot, and Fourcroy. The endeavours to impove the process of tanning by Macbride, Fay, and Seguin led to the conclusion that the production of leather was due to the combination of this astringent principle with the animal membrane, but for some time it was supposed that the effect produced was due to gallic acid. Eventually the separation of tannin in a pure state was effected by Proust, in 1798, and somewhat later he put forward the opinion that there were many different kinds of tannin in different plants. Apart from the determination of the composition of tannin by analysis the knowledge of tannin remained much in the same condition until 1834, when Pelouze published a memoir on the subject, in which he described the method of extracting tannin from galls by means of a mixture of ether, alcohol, and water. In 1842 Stenhouse showed that the opinion entertained as to the identity of the tannins from all sources was incorrect, and that there were at least two different kinds distinguishable by the blue or green colour they respectively produce with iron salts. In 1847 Mulder showed that the composition of tannin should be represented by the formula $C_{14}H_{10}O_9$, and in 1850 Strecker's investigations led him to regard tannic acid as a glucoside, its conversion into gallic acid and glucose being explained according to the equation $C_{40}H_{36}O_{26} + 10\,H_2O = 2\,C_{14}H_{16}O_{12} + C_{12}H_{24}O_{12}$. Our present knowledge of the nature and constitution of tannic acid is the result of the investigations published in 1867 by Lowe and in 1871 by Scheff. The former showed that tannic acid is not a glucoside but an anhydride of gallic acid. He succeeded in obtaining tannic acid absolutely free from glucose and in converting gallic acid into tannic acid. This view of the nature of tannin was confirmed and developed by Schiff, who finally came to the conclusion that the glucose present in imperfectly purified natural tannin is probably combined with digallic acid as a glucoside.

A good description of the different sources of tannic acid, its preparation and methods of determination is given, and the references to memoirs on all branches of the subject which have been published since 1791 will be very serviceable.

* Philadelphia: J. B. Lippincott Company. 1892. Pp. 168.

MANUAL OF CHEMICAL TECHNOLOGY. By RUDOLPH VON WAGNER. Translated and edited by W. CROOKES, F.R.S., etc. From the thirteenth enlarged German edition as remodelled by Dr. FERDINAND FISCHER, with 596 illustrations.*

The fact that this work has gone through such a number of editions in Germany is in itself sufficient evidence that it may be regarded as a trustworthy authority on the subject of which it treats. Concurrently with the recent rapid development of chemical industries in Germany, the subject matter has undergone repeated re-arrangement and alteration to adapt the work to the improvements which have from time to time been introduced into practice, and in the present edition new chapters have been added treating specially of water manures and thermo-chemistry.

To adapt the translation of the work to the conditions obtaining in this country considerable modifications have been introduced by the English editor, and a number of bibliographical references have been added in the text or as footnotes. The work is divided into eight sections, commencing with the technology of combustible materials in regard to the production of heat and light, to which 105 pages are devoted. The second section of 119 pages treats of metallurgical operations, the third and fourth sections of 361 pages, deal with general chemical manufactures of various kinds, the fifth with glass, earthenware, cement, and mortar, section six with articles of food, section seven with chemical industries connected with fibres and textile materials, and section eight with miscellaneous subjects. There is an appendix containing some useful tables and a good index. As a compendious and useful source of information respecting chemical industries, this book commends itself not only to the student, but also to general readers who possess an elementary knowledge of chemistry.

JAHRBUCH DER CHEMIE. Bericht ueber die wichtigsten Fortschritte der reinen und angewandten Chemie By RICHARD MEYER. Erster Jahrgang, 1891.†

The wide scope of scientific investigation at the present day has given rise to the necessity that individual workers should confine their attention to special subjects. This is the case in regard to chemistry as well as other branches of science, and though the specialization of chemical studies has its

* London: J. and A. Churchill, 11, New Burlington Street, super royal 8vo, pp. 968. Price 32s.

† Frankfurt am Main: H. Bechhold, 1892, pp. 544, 12 marks.

advantages, it has the drawback that there is difficulty in keeping up acquaintance with the work done in other departments of the science. Hence arises the need for an occasional comprehensive review of the progress made, as considered from a more general point of view. It is to supply this want in connection with chemical science that the work now referred to has been written. It is intended to furnish, in the form of connected reports, a general representation of the actual advance made during the year. The execution of this work is beyond the capability of a single individual, and therefore under the general editorship of Dr. R. Meyer, the preparation of the reports on different branches of chemical science and its technical applications, has been confided to a number of experts, each of whom is engaged in a particular pursuit and is consequently in a position to select and describe, for the information of others, the main points of the progress that has been achieved in regard to it during the past year. In this way the subjects of pharmaceutical chemistry and the chemistry of food and drink have been dealt with by Dr. Beckurts, organic chemistry by Dr. C. A. Bischoff, inorganic chemistry by Dr. Krüss, physical chemistry by Dr. Nernst, physiological chemistry by Dr. Röhmann, and several technical subjects by other writers, making altogether fourteen sections. In these reports due regard has been shown for brevity as well as thoroughness, and the usefulness of the work is enhanced by the fact of its early publication. By means of references and original memoirs the reader is enabled to obtain further acquaintance with the details of particular investigations, and in future editions of the 'Year Book' it is intended to comprise a review of the bibliography of the year.

ELEMENTS OF MATERIA MEDICA AND THERAPEUTICS. By C. E. ARMAND SEMPLE, B.A., M.B. With 440 illustrations.*

The value of an illustration in conveying details to the mind and impressing them on the memory is well known to every teacher and every student, and it would be difficult to name a subject in which illustrations are so much needed as they are in the so-called organic materia medica. Unfortunately the production of good plates is attended with so much expense as to prove a serious drawback, and this we believe to have been one of the main reasons why the majority of modern works on pharmacognosy have been issued without illustrations. Any attempt, therefore, such as the author claims to have made in the work before us should receive our careful attention.

The 'Elements of Materia Medica and Therapeutics' deals with the entire materia medica, the subject matter being classified as usual into inorganic and organic. In these two sections all the official drugs are described, including naturally those made official in the Addendum of 1890. The arrangement of the matter appears to be fairly good, and the printing, as well as binding, must meet with approval.

Of the illustrations, which the author regards as a special feature of the work, we can hardly speak in such favourable terms. Those which are interpolated in the text are with few exceptions the identical plates used by Pereira more than half a century ago, and the use which has been made of them here is, in our opinion, most injudicious. Can it be imagined for one moment that the students for whom this work is intended require as many as twenty-four illustrations of the various species of Amomum and Elettaria?

The plates which appear at the end of the work will be familiar to every pharmaceutical student as those used by Professor Bentley in his 'Organic Materia Medica.' They have been inserted almost *en bloc*.

Whatever value the text may have possessed has been materially diminished by extreme carelessness in the editing, thus the illustrations of pure and impure precipitated sulphur on page 27 have been misplaced; the directions for distilling water are unique, "the next 8 gallons are preserved, and not distilled, in order to guard against empyreuma from the charring of organic matter"! Such inaccuracies are by no means exceptional.

The author claims to have been "careful to consult the most esteemed authorities upon the subject, and bring the work entirely up to date." In our opinion it is to be regretted that his efforts have met with little success.

* London: Longmans, Green and Co., pp. i.-xxxii., 1-480. Price 10s. 6d.

FORMULAIRE DES MÉDICAMENTS NOUVEAUX ET DES MÉDICATIONS NOUVELLES. Par H. BOCQUILLON-LIMOUSIN. 3rd edition.*

Such books as this seem more in demand on the continent than here, and judging from the contents of the volume in hand, new remedies appear to be considered more seriously. Many of the drugs mentioned will probably be forgotten in a year or two, yet whilst they are in demand it is an advantage to find definite information concerning them so concisely written and compactly arranged. In the case of drugs of vegetable origin we find the name, synonym, source, part used, composition, properties and method of use of each, whilst the chemical materia medica is treated with no less detail. References are also made to the work of physicians who have investigated the therapeutic value of new drugs, or of older ones that have been employed in fresh directions. Amongst the novelties, descriptions of which are included in this edition, are antikamnia, apionine, bromol, cradine, europhen, iodopyrine, microcidine, phenol-cocaine, spermine, tuberculine, etc., etc. Probably the references to such items as these will prove most generally useful, as pharmacists will here find arranged, in a concise form, particulars as to the doses and best methods of administration of all of them.

PRACTICAL PERFUMERY. By AN EXPERT.†

This book is likely to become deservedly popular in the hands of those dealers in perfumes, etc., who act on the principle of making as many preparations as they can, that they may the more conscientiously recommend their goods as well as reap a handsomer profit. Commencing with a seasonable introduction, dealing with the generalities of style in preparing goods for sale, the first section is occupied with a detailed and classified list of the pommades, essential oils, etc., forming the basis of the perfumer's art. It is wisely suggested here that everything used should be of the finest quality procurable. Following this comes a chapter on simple extracts from pommades, then we have ten pages of high-class bouquets, comprising many that are in every-day demand. Eau de Cologne and lavender water each occupy, as their importance demands, a separate section, and are both treated with considerable fulness of detail. Satchets; liquid, powder and paste dentifrices; cosmetiques and general toilet preparations, are all treated of at length. The final pages of the book are occupied with descriptions of artificial and refined perfumes; benzoic aldehyde, citral, heliotropin, artificial musk, nitrobenzol, safrol, terpineol, and vanillin having their origin and uses explained. The cost of the work will be many times repaid by the mere suggestions it contains.

* Paris: J. B. Baillière et Fils. 18mo., pp. 322. 3 fr.

† London: *The British and Colonial Druggist*, pp. 43. Cloth, 1*s.* 6*d.*

Obituary.

JOSEPH EWING, DUMFRIES.

It is with regret that we have received the intimation of the death of Mr. Joseph Ewing, Chemist, Dumfries, the father of Mr. James L. Ewing, Chairman of the Executive of the North British Branch of the Pharmaceutical Society. Mr. Ewing was born in the year 1826, in the town of Ayr, and served his apprenticeship in Greenock. Having studied for some time in Anderson's College, Glasgow, he became assistant to Mr. Duncan, Dumfries. About the year 1849 he began business for himself in Sanquhar; but he subsequently acquired Mr. Duncan's business, returning to Dumfries in 1859, and living there till his death on the 17th instant. Mr. Ewing was eminently successful in business. He built up a large connection as a pharmacist, and he also carried on an extensive business as a manufacturer of aerated waters. He was not much known to the outside world, but he occupied a high position in Dumfries. Kindly in disposition, shrewd and clear-headed, always interested in public affairs, but never neglecting his own, he came to be regarded by his fellow-townsmen with no ordinary respect. He was a man of sterling integrity, and his devotion to principle at one time cost him the highest position in the burgh, although at a later period the Provostship might have been his for the taking. At the time of his death he was Chairman of the School Board, to which office he had been elected for five consecutive triennial periods. He took an active interest in political and municipal affairs, and was especially zealous in sanitary reform while he sat on the Council. He was a director of Moorhead's Hospital and was also Session-clerk of Dumfries parish. It is, however, in connection with his School Board work—in all the departments of which he took a heavy share—that he will be best remembered. His death was very sudden, but it was known that he had for a long time suffered from a serious malady. So late as the Tuesday before he died he was at business, but a sudden change for the worse took place on the Thursday night, and he died on the following day. Mr. Ewing was 66 years of age at the time of his death.

Notice has also been received of the death of the following :—

On the 30th of May, C. W. Lascelles Scott, Ulverston, Chemist and Druggist. (Aged 25 years).

On the 14th of June, William Kerr, Dunfermline, Chemist and Druggist.

On the 15th of June, John Gould, London, Pharmaceutical Chemist. (Aged 74 years).

Parliamentary and Law Proceedings.

The Pharmaceutical Sociey of Great Britain v. G. H. Burley.

On the 22nd instant, in the County Court of York, holden at Selby, the Council of the Pharmaceutical Society of Great Britain sued G. H. Burley, of Ousegate, Selby, for recovery of penalties.

Mr. C. W. Langley Flux appeared for the Council.

Mr. J. K. Burton, of Selby, represented the defendant.

His Honour gave judgment for £10, the amount of two penalties and costs.

Communications, Letters, etc., havebeen received from Messrs. Corbyn, Stacey and Co., Wright and Farr, Allan, Maben, Leigh, Hill.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith. Matter intended for publication should be written on one side of the paper only.*

Jalapin and Jalapurgin?

Sir,—A solution of the question raised by Mr. J. C. Umney concerning the use of the word jalapin in commerce probably affects wider interests than appears at first sight. For twenty years or more two preparations have been in the market, one entirely soluble in ether and the other not so. It is not merely of importance to the wholesale dealer to know which he should supply, it is of still greater importance to the dispenser of medicines to know which should be used when jalapin is prescribed by medical men. The student in the examination room finds the same difficulty. The name jalapin being applied to two different substances, the examiner may use the word in one sense and the examinee in another.

It is very necessary that a distinction should be drawn between resin of jalap, decolorized resin of jalap, and jalapin in the purely chemical sense of the word. Resin of jalap, as prepared by the process of the British Pharmacopœia, and even the same product decolorized, still contains a percentage of resin soluble in ether, and therein differs from the body called by some chemists jalapin, which is insoluble in ether. Probably the best way to meet the commercial difficulty would be by the recognition in the next Pharmacopœia of a decolorized resin of jalap under the name of jalapin, restricting it by the ether test to the resin insoluble in ether. The use of the initials B.P. after the word jalapin would then ensure a definite product being understood by both physician and dispenser, as well as by the wholesale dealer and manufacturer.

The use of the word jalapurgin is hardly likely to commend itself generally, since it does not lend itself well to abbreviation in prescriptions, and it also implies purified resin of jalap, not jalapin in the chemical and more accurate sense.

It is obvious that the name jalapin cannot be forced upon other countries. If the soluble resin be imported from Germany or France it would still be jalapin, not jalapin, B.P. For the sake of distinguishing the resin soluble in ether, it would be, perhaps, advisable to at once adopt some other name in trade lists, since official recognition of a decolorized and purified resin of jalap as jalapin, B.P., cannot take place for some time. The name orizabin, suggested by Professor Flückiger, has the disadvantage that orizaba root is practically unknown in European commerce, and that the jalapin soluble in ether is usually obtained from *Ipomœa simulans*, *i.e.*, Tampico jalap. The introduction of a new name where a practicable one already exists is not readily effected. Indeed, Professor Flückiger himself doubts (*ante*, p. 1060) whether the name orizabin, suggested by himself so long ago as 1883, will be satisfactory to manufacturers, pharmacists, and medical practitioners. It is equally difficult to discard a name long in use, of which "milk of sulphur" affords an excellent instance. The difficulty may perhaps be met by the more general adoption of a word already in use in some manufacturer's trade lists, viz., scammonin. This might well be employed to indicate the resin of jalap soluble in ether, at all events until it be proved that the resins of scammony, Tampico jalap, and orizaba jalap are different substances. So far as the chemical and therapeutical evidence goes at present they appear to be identical

E. M. Holmes.

Chloroform.

Sir,—Although the literature of chloroform is accumulating at a rapid rate, perhaps I may be allowed a word in reference to the papers of Biltz noticed in your last issue.

Whatever may have been the current opinion in Germany, the fact that chloroform decomposes more readily—just as it is more nearly absolute—has been known in this country for many years. That, however, is not the whole

truth. The proneness of chloroform to decompose depends to some extent on the manner in which it has been purified.

I think it is in the highest degree improbable that accidents have occurred in the administration of chloroform from the presence of carbonyl chloride. If the amount were considerable, the surgeon would observe that something was wrong with the chloroform; while if only traces were present, there is no evidence to show that these would be dangerous. At the same time, it would probably be advisable to add to the tests of the Pharmacopœia some such directions as the following: "When chloroform is shaken with water, the latter should not impart a red colour to blue litmus paper." It ought also to be an instruction that chloroform should be stored in the dark. I think Biltz's statements regarding the proportion of alcohol required to preserve chloroform for a reasonable length of time must be accepted with all reserve. I had an opportunity the other day of inspecting samples which were made at the time of the Crimean War. These are still in perfect condition, although they have a specific gravity of 1·4975 at 60° F. With reference to the detection of traces of alcohol by means of the chromic acid test, I believe I have tried that test in nearly every conceivable form, and have found it eminently unsatisfactory. The iodoform test is much better.

I have some difficulty in comprehending the paragraphs on the action of sulphuric acid on chloroform. Ethyl alcohol and ethyl chloride give no appreciable colour with sulphuric acid. It is easy to jump to a rash conclusion from the sulphuric acid test. For example, a chloroform which contains a mere trace of linseed oil derived from luting, will give a decided reaction with sulphuric acid; although, physiologically speaking, the sample is of irreproachable purity.

Edinburgh. D. B. Dott.

The Active Principle of Senna.

Sir,—In connection with the two specimens of senna products presented by me to the Society's Museum in Edinburgh, I wish to state that although the solution of cathartic acid from its compound with lime undoubtedly contains the cathartic principle of senna (acting in an average dose of 60 minims), yet the crystals referred to I have found to be sulphate of magnesia. When Mr. Neill called on me, I had just found that, on concentrating the cathartic acid solution, an abundant crystallization was produced; but I had not yet submitted it to examination, and was therefore ignorant of its nature. The examination proved it to be as above stated. The question suggested itself to my mind—might not the cathartic action of the solution depend upon the sulphate of magnesia?—but I found that such an idea was quite untenable. I got from 7½ ozs. of senna—which was represented by 7½ ozs. fld. of the essence—only 50 grs. of ash; and from 42 ozs. 250 grs. of sulphate of magnesia. It is therefore evident that so small a quantity could not have any appreciable effect in the cathartic action of the solution. The caustic lime I prepared from carrara marble, and yet it must have contained magnesia, unless that base may have been derived from the senna itself. It is easy to account for the sulphuric acid, as it was used to set free the acid from the lime compound.

I enclose 60 grains of sulphate of magnesia got from 10 ozs. fld. of the essence. It separated at once in crystals from a concentrated solution of the cathartic solution on the addition of strong rectified spirit.

Edinburgh. Thos. G. Smith.

Chrysarobinum, Synonyms of which are Araroba Powder, Goa Powder?

Sir,—The present Pharmacopœia describes chrysarobinum as "the medullary matter of the stem and branches of *Andira araroba*; dried, powdered, and purified, etc." At the same time it is stated that the synonyms are "Araroba powder and Goa powder." Now allow me to suggest that in the next edition of the Pharmacopœia, in order to avoid the present apparent confusion, the description of "Araroba or Goa powder," as "the medullary matter of the stem and branches of *Andira araroba*," be applied distinctly and exclusively to the natural product, which contains impurities and accidental foreign matter such as earth, pieces of the wood, etc. Also, as distinctly and separately, the name "chrysarobinum" should be applied to that substance which is "the medullary matter of the stem and branches of *Andira araroba* purified by solvents" (benzole, etc.); dried and powdered, containing not less than 80 to 84 per cent. of chrysarobinum.

Camberwell. Henry Geo. Type.

A Correction.

Sir,—I have received a letter from Mr. Arthur A. Barrett, who is at present at Messina, requesting me to point out in the columns of the Journal that the specimen presented by him to the Museum of the Pharmaceutical Society, and described by me at the evening meeting of the Society in April (*ante*, p. 876) under the name of "A New Form of Essence of Lemon," was not, as then supposed, "terpene free," but a distilled oil of lemon of the ordinary strength. Consequently the remarks made at the evening meeting are in no way applicable to his "concentrated," or "terpene free" oil.

It is evident, therefore, that it was through a misunderstanding on my part that the specimen presented by Mr. Barrett as having been prepared by his new process was supposed to be "terpene free."

17, *Bloomsbury Square.* E. M. Holmes,
Curator of the Museum.

Percentage Solutions.

Sir,—I think that the article on "Percentage Solutions," which appeared in a recent issue, without comment and without notification of the nationality of the paper from which it was taken, may prove misleading.

The *Pharmaceutical Review* is, I believe, an American paper, and the method advocated by Mr. Caspari would be correct for the United States, as their liquids are weighed and not measured.

In England the correct way of making percentage solutions is to make the solution up to such a volume that a definite quantity of the substance is contained in a hundred parts by volume and not parts by weight.

Reference to the inj. morph. hypoderm., B.P., will show that this view is correct, as there it is expressly stated that ten minims contain one grain of acetate of morphine.

Ph.C.

*** We think our correspondent is mistaken in supposing that the article he refers to is misleading. It is intended to correct an erroneous impression and practice which prevails in the United States in regard to what should be understood by a percentage solution. A similar error obtains in this country, where the term percentage solution as applied is a misnomer that might well be corrected. In the article referred to the true principle upon which a percentage solution should be prepared is explained, and we think our correspondent will find it worth careful reperusal. The solutions here called percentage solutions do not, as supposed, contain a certain number of units of weight in one hundred units by volume, and though they are very near to that, precision is sacrificed to supposed convenience, the contents of some of the solutions being referred to grain measures, while in other cases they are referred to minims.—[Ed. *Pharm. Journ.*].

We understand from an Oxford correspondent that in the extension of the University buildings the site of the old established pharmacy of Mr. G. T. Prior, the Society's local secretary, has been taken for that purpose, and that Mr. Prior has consequently removed to 45, Holywell St.

R. Madgwick.—The ext. hamamelidis liq., B.P.C., would seem to be indicated in the prescription, of which you send a copy.

Malt and Hop Extract.—We have seen it stated that Mr. E. Boustadt, of Cheshunt, is preparing such an extract.

Scientia.—If you will refer to the editorial note on page 1029 of the Journal (June 11) you will see that the Council has taken the necessary preliminary steps to deal with such cases.

G. C.—The only standard for the doses of medicinal agents is individual medical opinion, and since that is subject to great diversity, the doses given in the Pharmacopœia cannot be regarded otherwise than merely approximative.

INDEX TO VOLUME XXII.

(THIRD SERIES.)

FIFTY-FIRST YEAR OF PUBLICATION.

ABERDEEN and North of Scotland Society of Chemists and Druggists, 38, 263.
Abrin, Analogy of Ricin to, 425.
Absinthiin, 1004.
Acetyl Fluoride, 1001; Reactions of, 1001.
Aconine, on the Formation and Properties of, and its Conversion into Aconitine (Dunstan and Passmore), 729.
Aconite Bases (W. R. Dunstan and W. H. Ince), 55, 74; (A. H. Allen), 447.
Aconitine, Characters of, 57.
— Effect of Heat on, 76.
— Estimation of (J. C. Umney), 488.
— Specific Rotation of, 75.
Aconitum Napellus, on the Alkaloids of True, 729.
Adoindin, 268.
Adonin, 268.
Adrian, Report on Standardizing, 10.
Adulterated Oil of Eucalyptus, 707.
Adulteration, Liability for, 921.
Advice, A Word of (O. Corder), 60.
Aerated Waters, Manufacture of (F. S. Wokes), 466.
— Waters, Standards for (G. Lunan), 600.
Æthyl Sulphate, 615.
African Copaiba (J. C. Umney), 449.
Agar, Preparation of Nutritive, 870.
Alantic Anhydride, 347.
Albuminoids, Composition of, 915.
Alcohol Corresponding to Antipyrin, 812.
— Dehydrating, 751.
— Solvent Action of (E. H. Farr and R. Wright), 1, 255, 469, 569.
Alcohols in Leaves, 690.
Aleurone Grains, Permanent Preparations of, 750.
— Grains as an Aid to Diagnosis, 751.
Alkaloid Mydriatic in Lettuce (T. S. Dymond), 449.
— Salts, Incompatibility of Borax with (Christiaens), 612.
Alkaloids in Aristolochia Indica, 246
— in Hydrastis Canadensis, 267.
— in Seed of Delphinium Staphisagria (Charalampi), 68.
— of Angustura Bark (Beckurtz and Nehring), 612.
— of Areca Nut, 267, 691.
Alkaloids of Chelidonium majus (König), 89.
— of Indian Hemp, 267.
— of Scopolia atropoides, 267.
— of the Root of Sanguinaria Canadensis (König), 89.
— The History of the Official, 731.
Alliance, The Scientific, 891.
Aluminium, Certain Alloys of (Wright), 1015.
— Worth of, 48.
America, Proprietary Medicines in, 49.
American Medical Association Section of Pharmacy, 50.
Amylene as an Anæsthetic, 346.
Anacardic Acid as a Hair Dye, 265.
Anæsthesin, History of, 821.
Analgen, 813.
Anemonin, 1005.
Angustura Bark, Constituents of (Beckurtz and Nehring), 612.
Anhydroaconitine, 76.
Aniline Dye Supplied in Place of Syrup of Violets, 488; (A. H. Allen), 508.
Anise, Australian, 817.
— Star, 50.
Anniversary, The Society's, 967.
Annual Dinner, The, 756, 963.
Answers to Correspondents, 40, 100, 120, 144, 184, 204, 264, 284, 304, 324, 364, 384, 424, 448, 468, 488, 568, 588, 608, 628, 648, 688, 709, 748, 768, 788, 808, 828, 848, 888, 908, 960, 980, 1000, 1020, 1060, 1080.
Antipyretic, Another, 87.
— Paracresotic Acid as an, 694.
Antipyretics, Evolution of, 265.
Antipyrin and Isoantipyrin, 811.
— Alcohol, 893.
Antiseptic Field Dressings, 247.
Antiseptics, Notes on Some New (Walton), 901.
Antitoxin (Zizzoni and Cattani), 82.
Apoaconitine, 76.
Apoatropine, 692, 1006.
Apothecaries' Act, Prosecution under the, 17.
Apotheker-Verein Meeting at Magdeburg, 189.
Atropamine, 692.
Aqua Destillata (J. C. Hyslop), 699.
Areca Nut, Alkaloids of (Jahns), 267, 691.
Arecaidine, 267, 692.
Arecaine, 267, 691.
Arecoline, 267, 692.
Aristin, 551.
Aristolochia Argentina (O. Hesse), 551.
— gigas from Kew Gardens, 388.
— indica (W. Dymock and C. J. H. Warden), 245.
— reticulata, Volatile Oil of (J. C. Peacock), 5.
Aristolochine, 551.
Arrow Weed, 64.
Arsenic Trisulphide, Solubility of, in Water (W. Duncan), 523.
Art and Pharmacy, 800.
Artemisia Herba alba, 347.
Artificial Musk, 693.
Aspidium athamanticum (Kürsten), 85.
Assimilation of Green Parasitic Plants, 689.
Assistants, Unqualified (Prosecution of), 10; (Letters), 100, 120.
Association of Naturalists and Physicians, Copper in Peas Discussion, 366.
Atomic Weight of Fluorine, 705.
Atropamine in the Ripe Berries of Atropa Belladonna, var. lutea (Schütte), 429.
— and Apoatropine, 692.
Atropine and Homatropine, New Isomers of, 893.
— Use of, in Lead Poisoning (Dr. F. R. Humphrey), 429.
Australene, 271.
Azoimide, Action of, on Living Organisms (O. Loew), 594.
Aztec Pharmacy, 899.

BACILLI in Sputum, 815.
Bacillus denitrificans, 691.
— of Measles, 889.
— producing Amyl Alcohol (Perdrix), 619.
— Staining Tubercle, 761, 869, 981.
— The Influenza, 791.
— Tuberculosis, Earthworms and, 695.
— Tuberculosis, Protection Against, 890.
— Vinegar Fatal to Cholera, 817.
Bacteria and Field Mice, 1004.
— Colouring Material Produced by 693.

Bacteria, Drawings of, 981.
— in Lymph, 817.
— in Milk, 814.
— in the Mouth, 812.
— Nitrates Decomposed by, 691.
Bacteriological Laboratory, 950.
Bacteriology (J. Leffingwell Hatch), 271, 289, 330.
— Address on (Sir Joseph Lister), 128.
— Section of, International Congress of Hygiene, etc., 128.
Bacterio-Therapeutics (J. R. Logan), 498.
Bacterium Amylozymicus, 619.
Bailahuen, 879.
Baking Powder, Law Relating to, in Indiana, 478.
— Powders (Donington), 623.
"Balancofouna," 347.
Balfour, Professor I. Bayley, Botanical Enterprise, 410.
Ball, the Chemists', 990.
Baly Medal, Award of, to Professor M. Foster, 353.
Barium Carbide, 811.
Barnard, John, Death of, 110, 113.
Barometer, A Lecture (Sloane), 946.
Barrett, A. A., Oil of Lemon, 50, 876, 1080.
Bates, H. W., Obituary Notice of, 687.
Batrachians, Poisonous Secretion of, 1001, 1007.
Beans, Jumping, 64.
Beaver Farm, A, 694.
Beeswax, Adulterated Mogador, 1004.
Belladonna Root, Hyoscyamine in (Schütte), 429.
— Tincture of (E. H. Farr and R. Wright), 469.
Belladonnæ, Collodium, 70, 327, 364, 384, 404, 424, 468.
— Glycerinum, 70.
Benevolent Fund, Administration of, 333; (A. McNaught), 363.
— Fund, Contribution from Surplus of Junior Pharmacy Ball to the, 734.
— Fund, Council Discussions on the, 736, 755, 839.
— Fund, Elections of Annuitants on the, 366, 460, 478.
— Fund, Legacies to the, 228, 458, 459, 562.
— Fund, Proposed Increase of Annuities on the, 755; (Bradley), 787; (Prosser), 807; (Vizer), 827; (Troke), 827.
— Fund, The, and Local Secretaries (J. Hart), 467.
Benzene Formulæ (E. F. Harrison), 418.
— Hexachloride, Reduction of, 692.
Benzoic Sulphinide (R. de Roode), 246.
Benzol for Microscopical Work, 751.
Benzoyl-Naphthol (Yvon and Berlioz), 426.
— Sulphonic Imide, 246.
— Tropeine (Giesel), 165.
Bernays, Professor A. J., Death of, 562.
Bill, Pharmacy Acts Amendment, 13.
Billing's, Dr. J. S., Proprietary Medicines in America, 49.
Biological Water Analysis, 870.
Birch Oil, 4; (W. H. Breisch), 593.
Birmingham, Visit of Sheffield Pharmacists to, 204.
Bismuth, Basic Gallate of, 82.
— Mixture, Note on a (W. Duncan), 522.
Blackpool Chemists' Dinner, 626
Blood Corpuscles, 357.
— Discs, Identification of, 357.
Bocquillon-Limousin, Letter relating to International Congress, 459, 478.
Bombelon on Tuberculin, 425.
Books Received, 39, 284, 445, 487, 507, 527, 568, 608, 628, 687, 707, 763, 807, 868, 888, 940, 960, 980, 1038.
Boraginæ, Active Principle of, 694.
Boracic Acid, Compound of, with Borax (Jænicke), 346.
Borax and Chloral (Dujardin), 165.
— Solution, 346.
Boric Acid, Action of, on Germination, 693.
Boron (Moissan), 814.
Botany as an Aid to Pharmacists (Humphrey), 662.
— Early, and Materia Medica, 205, 209; (G. Fog), 568, 589, 649, 961.
— of Gambia, 691.
Botanical Collectors, An Aid to, 892.
— Enterprise in Relation to Pharmacology (Professor I. Bayley Balfour), 410.
— Nomenclature, with Especial Reference to 'Pharmacographia' (G. C. Druce), 749, 789, 941.
Bottle, Mr. A., Libel upon, 685, 760.
— Mr. A., Presentation of a Portrait to, 8, 10.
Bournemouth as a Health Resort (Thomson), 97.
Bracken—*See Pteris aquilina.*
Brady, The late H. B., Address from the Chicago College of Pharmacy on the death of, 743.
Bread, Fermentation of (Boutroux), 406.
Breweries, Utilization of Waste Products in, 106.
Brighton Association of Pharmacy, 336, 1017, 1038, 1076.
— Junior Association of Pharmacy, 276; Inaugural Address (H. W. K. Pears), 321, 359; Annual Dinner, 380, 866.
Bristol Pharmaceutical Association, 567.
British Association, Address to the Biological Section (Francis Darwin), 220, 239, 260.
— Association, Address to the Chemical Section (W. C. Robert Austen), 277, 500.
— Association for the Advancement of Science, Meeting at Cardiff, 160; Editorial Remarks on, 168.
— Association, The President's Address (W. Huggins), 160, 175, 196.
— Medical Association, Meeting at Bournemouth, 96.
— Medical Association, Place of Meeting for 1892, 99.
British Pharmacopœia, Report for 1891, Editorial Remarks on the, 1011.
— Plants, New, 1007.
— Plants, Uses of (Wardleworth), 676.
Broad, J. N., Death of, 580.
Brouardel, Dr., Speech at International Congress of Hygiene, etc., 123.
Bruce, Mr. Gainsford, Introductory Sessional Address, 285.
Bunsen, Presentation to, 822.
Bye-Law, Amendment of a, 1030, 1034, 1050.
— Laws, The New, 476; (W. Ward), 803.

Cactus grandiflora as a Cardiac (P. W. Williams), 374.
Calabar Beans, Spurious, 439.
Calamine, Note on (D. B. Dott), 774.
Calcareous Soil, Pteris aquilina on, 690.
Calcium Oxalate, Crystals of, 751.
— Phosphates, Solubility of, in Phosphoric Acid, 809.
Calomel, Action of Hydrocyanic Acid upon, 1007.
Calumba Root, Spurious, 438.
Cambial Activity in Plants, Cause of, 690.
Camera, A Simple Photo-Micrographic, 792.
Camphene, 270.
Camphoid (Wm. Martindale), 831, 868.
Camphor, Carbolate of, 891.
— Hygroscopic Character of (Errera), 268.
Canadine (Professor Schmidt), 267.
Cangoura, Contribution to the Study of, 982.
Cannabinine (H. F. Smith), 267.
Capsicum Annuum, Constituents of, 1004.
Capsules, Dispensing Liquids in, 797.
Carbohydrates, Assimilation of, 810.
— in Plants, Formation and Transport of (M. W. Sapoznikow), 108.
Carbolic Acid, Synthetical (H. W. Jayne), 592.
Carbon Monoxide, Metallic Compounds of, 166.
Carbonic Acid, Effects of the Respiration of (Dr. W. Marcet), 182.
— Acid, Orthoxydiphenyl, 813.
— Anhydride, The Use of Liquid, 822.
Carnaüba Wax (Morong), 673.
Carrion Flower, the Great, 388.
Carum Gairdneri, Root of, as a Vegetable (Professor H. Trimble), 429.
Cascara, Miscible Liquid Extract of (Moss), 701; (Spencer), 788; (Martindale), 827.
Castor Bean, The Culture of the, 987.
— Oil (Dott and Stockman), 745.
— Oil Emulsion (P. van Aspern), 332.
Casuarinaceæ, Fertilization of, 689, 892.

Cachchu, Note on (G. Claridge Druce), 553.
Cause of Cambial Activity in Plants, 690.
Cell Contents, Crystallizing, 815.
Celloidin, Embedding Delicate Objects in, 695.
Cellulose, Tests for, 689.
Cements for Microscopical Slides, 869.
Censure on Chemists, Unfounded, 806; (Warrell), 807.
Cepacaballo, 879.
Ceratanthera Beaumetzi (Heckel), 347.
Chelerythrine, 89.
Chelidonium majus, Alkaloids of, 89.
Chemical Action at a Distance (Ostwald), 166.
— Compounds, Constitution of (C. E. Boucher), 27.
— Industry, Society of, 35, 53, 397, 486, 567, 781, 867, 951, 1015.
— Patents, German, 518.
— Society, 55, 74; (Dinner of the), 822.
Chemical Works, Inspection of, Editorial Remarks on, 1047.
Chemicals, Foreign, Importation of (J. C. Umney), 434; (W. H. Hobbs), 468.
Chemistry and Physics in Relation to Hygiene (Sir H. Roscoe), 131.
— of Photography (F. Park), 474; (Cooper), 1057.
Chemists' Assistants' and Apprentices' Association of Victoria, 280.
— Assistants' Association, 294; (Inaugural Address, W. L. Williams), 311, 356, 392; (Conversazione), 353, 409, 417, 434, 460, 482, 519, 639, 661, 699, 747; (Dinner), 734, 801, 884, 901, 953, 993; (Stead), 1000; (Long), 1020; (Elections), 1038.
— Association, Western (of London), 356, 384.
— Ball, 580, 596.
Cherry Laurel Fruits, 817.
Chester Chemists' Association, Grant to the, 742.
Chicago Exhibition, 777.
— International Congress at, 871, 873.
"Chili," An Algerian Vermifuge (Battandier), 347.
Chilian Remedies, 878.
Chinese Plants, New, 1001.
Chloral and Borax, 165.
Chloralamide, The Solubility of (G. Lunan), 805.
Chloride of Copper and Lithium (Chassevant), 427.
Chlorodyne, Sale of, Without Poison Label, 928; (Press Opinions), 946, 949.
Chloroform, 10, 20, 32, 40; (A. H. Mason), 40, 691, 1041; (Dott), 1079.
— Impurity in (Brown), 769.
— Purification of, by Freezing, 429, 691.
Chloroformium Medicinale Pictet, 754, 1041.
Chlorophyll, Chemistry of, 815.
— Composition of (Monteverde), 406.
— Formation of, 348.
— in the Leaves, Substances which Accompany, 889.
Chlorosis, Washing out the Stomach in, 695.
Cholesterin in the Oil of Sabadilla Seed, 85.
Cholesterol, Note on the Presence of a, in the Roots of Hygrophila spinosa (C. J. H. Warden), 1070.
Choline, 691.
— Neurine and Related Compounds, 814.
Chromo-Sulphuric Acid, 810.
Chrysarobinum (Type), 1080.
Cicuta maculata (R. Glenk), 69.
Cinchona Bark from New Granada, 875, 898.
— Cultivation in Jamaica (Eric), 1067.
Cineole, 577.
Cinnamon Leaves and Root, Essential Oil of (E. Schmidt), 268.
Citral, 894.
Cleansing Used Slides and Covers, 751.
Cloves, Oil of, Testing (H. Thoms), 450.
Clusia, Anatomical Characters of the Genus, 869.
Coagulation of the Blood, Preventing, 695.
Coal and Coal-Gas, 706.
— Spontaneous Ignition of, 166.
Coating for Pills, Salol as a, 348.
Coca Bases, History of the (C. Liebermann), 61; (O. Hesse), 101.
— Leaves, The Commercial Varieties of, 874.
— Plants in Cultivation, 817; (Dyer), 848.
Cocaine, Reactions of (Stead), 902.
Coco de Mer, 1003.
Cod Liver Oil Emulsion (P. van Aspern), 332.
Coffee, Adulteration with Chicory, 761.
Colchicum, Tincture of (R. A. Cripps), 364.
Collodion for Infiltrating Plant Tissues, 751.
— of Belladonna, 70, 327.
Collodium Belladonnæ (Unofficial Formulary, B.P.C.), 70; (M. Conroy), 327; (J. C. Umney), 364; (J. Linford), 384; (R. Reynolds), 404; (T. Maben), 424; (G. Barker), 468.
Colophony, 270.
Coloration of Hypobromite of Sodium, 694.
Colour, Influence of Temperature upon (Nichols and Snow), 428.
Colouring Material Produced by Bacteria, 693.
Columbian World's Congress of Pharmacists, 658.
Compositæ, Styles of, 476.
Confectionery, Poisonous (Harrison), 980.
Conference, British Pharmaceutical:—
Bell and Hills Fund, Presentation of Books, 258.
Editorial Remarks, 71, 145, 1071.
Election of Officers, 259.
Financial Statement, 152
Formulary Committee, 258
Meeting in Edinburgh, 777, 785, 997.
— of Executive Committee, 170, 356, 546, 823, 950, 1076.
— of the, at Cardiff, 152, 170, 189, 211, 229, 250.
Place of Meeting for 1892, 258, 356.
President's Address (W. Martindale), 153.
Report of Executive Committee, 153.
— of the Unofficial Formulary Committee, 159.
Suggested Introduction of Subjects of more General Interest, 208; (W. Kirkby), 224.
Unofficial Formulary of the, 70, 73.
Conference, British Pharmaceutical; Papers read at the:—
Aconite, Suggestions for the Assay of (A. H. Allen), 230.
Alcohol, Solvent Action of, on Drugs in making Tinctures (E. H. Farr and R. Wright), 255.
Cascara Sagrada, Extracts of (J. Moss), 250.
Castor Oil with Malt Extract (S. M. Burroughs), 251.
Copaiba, Estimation of Volatile Oil in (R. A. Cripps), 193.
Eucalyptus, Oil of (R. H. Davies and T. H. Pearmain), 235.
Extractum Euonymi Siccum (M. Conroy), 189.
Galbanum, Liquid Persian (E. M. Holmes), 194.
Gums, Indian, for Pharmacy Work (Dr. S. Rideal and W. E. Youle), 190.
Henbane, Alkaloidal Value of (A. W. Gerrard), 213.
— Seed, Constituents of (F. Ransom), 215.
Ipecacuanha, Preparations of (W. H. Symons), 174.
— Report upon (R. A. Cripps and A. Whitby), 170.
Liquor Strychninæ, Dispensing of (T. Shepheard), 255.
Lozenges, Medicated, Report on (F. Davis), 253.
Nux Vomica and Opium, Proposed Method of Standardizing Extracts of (M. Conroy), 229.
Opium used in Medicine (E. M. Holmes), 252.
Phosphoric Acid, Glacial (J. Hodgkin), 216.
Water Supply of Cardiff (T. Hughes), 211.
Congress, International Botanical, 1014.
— International, of Pharmacists, 32.
Copaiba Balsam, Spurious, 439.

Copaiba Balsam, African, 439; (J. C. Umney), 449.
Copley Medal, Award of, 454.
Copper Albuminate, Digestion of (Charteris and Snodgrass), 622.
— and Lithium, Double Chloride of, 427.
— Hygienic Importance of (Professor Lehmann), 179.
— in Food (Professor Lehmann), 179.
— in Galenicals, 695, 701.
— in Preserved Peas, 72, 78, 107, 243, 366, 400, 621, 1049; in Fruit, etc., 1014.
— Oleate of (Pitsche), 1009.
— Salts, Action of, on Fungi, 86.
Cork Cells, 89.
Coroners and the Pharmacy Act, 798, 827.
Coroners' Juries, 595.
Corradi, Professor, Speech at International Congress of Hygiene, 124.
Correspondents, Answers to, and Errata, 40, 100, 120, 140, 164, 184, 204, 264, 284, 304, 324, 364, 384, 424, 448, 488, 568, 588, 608, 628, 648, 688, 709, 748, 768, 788, 808, 828, 848, 868, 888, 908, 940, 960, 980, 1000, 1020, 1040, 1060, 1080.
Costus Oil, 894.
Cotton, Microscopic Examination of, 30.
— Seed, Nitrogenous Bases in, 898.
— Seed Oil, Detection of, in Olive Oil, 90.
Council Meetings, 11, 112, 294, 367, 455, 630, 735, 833.
— Meetings, Editorial Remarks on the, 9, 109, 293, 365, 452, 629, 733, 832, 1029.
Cough Tablets, 324.
Cresol Preparations of Commerce, The, 1068.
Cresols, Solutions of, 165.
Crookes, W., Electrical Evaporation, 24.
Croonian Lectures, Dr. Burdon Sanderson, 253.
Croton flavens as an Insecticide, 166.
— Seeds, Spurious, 439.
Crystalline Ferric Oxychlorides (Rouseau), 427.
Cupreine, Conversion of, into Quinine (Grimaux and Arnaud), 348.
Curious Plants, 890.
Curriculum, Medical, at Cambridge University, 10.
Cusparidine, 613.
Cusparine, 613.
Cutch, Pale (Kuth), 878.
Cutlers Company, 208.

DADIGOGO, 347.
Daiyagowa-nori, 406.
Davison, the late Mr. Ralph, Legacy from, 228.
Davy Medal, Award of, 454.
Decimal System, 1003.
Definition of Medicines, Authoritative, Editorial Remarks on, 121.
Dental Surgery, Use of Drugs in, 460.
Dermatol (B. Fischer), 82.
Desiderata for the Museum, 908.
Detannated Orange Wine, 70.
— Sherry, 70.
Dextrine, The Formation of (M. R. Petit), 831.
Diastase, 751.
Diastatic Enzyme in Plants, 30.
Digestion, Hypnotics and, 83.
Digestive Ferments, Influence of Temperature on, 915.
Digitalein (Houdas), 609, 694.
Digitalin, 694; (H. Kiliani), 1061.
Digitogenin, 1064.
Digitonin, 1064.
Digitoxin, 694.
Dioclea violacea, 1007.
Dipentene, 270, 574.
Disease, Prevention of the Spread of (Surg.-Gen. J. M. Cunningham), 127.
Dispensing Charges (Lennox Browne), 404, 409; (G. Lunan), 447.
— Charges, Sir J. Sawyer on, 409.
— Mistakes in, 50, 183, 264, 282, 343, 402, 443, 454.
— Notes (Mitchell), 524.
— of Medicines in Hospitals, 756.
— Queries, 284; (G. le Seelleur), 468.
Dittmar, Death of Professor, 659, 687.
Divisional Secretaries (H. Wiggins), 468.
Doctor of Pharmacy, Degree of, 756.
Doliarin, 429.
Donation of Optical Apparatus by Mr. A. Kinninmont, 416.
Dott, D. B., Calamine, 774.
— D. B., Castor Oil, 746.
— D. B., Chloroform, 10, 20, 32, 40.
— D. B., Narceine, 747.
— D. B., Opium Assay, 745.
Drawing Microscopical Preparations, A Simple Method of, 797.
Drawings of Bacteria, 981.
Dreams, Scientific (Albert de Rochas), 225.
Druce, G. C., Botanical Nomenclature, 749, 789, 941.
— G. C., Catechu, 553.
Drugs, Examination of Powdered, 981.
— Quality of Low Priced, 658.
— Spurious (T. H. Wardleworth), 438, 614.
— The Retail Prices of, 872, 900.
— Use of, in Dental Surgery, 460.
Dundee Chemists' Assistants' and Apprentices' Association, 37, 59, 100, 183, 203, 294; Inaugural Address (T. Maben), 340, 362, 443, 487, 523, 626, 664, 806, 997.
— Chemists' Assistants' and Apprentices' Association, Educational Arrangements of the, 249.
Dunstan, Professor, Aconite Bases, 55, 74, 729.
— Professor, Double Cyanides, 769.
— Professor, Laboratory Shaker, 730.
Dymock, Death of Dr., 993.
Dymond, T. S., Alkaloid in Lettuce, 449.

EARLY Closing, 50, 495.
Earthworms and Bacillus Tuberculosis, 695.
Easton's Syrup (Hallaway), 787; (Ingham), 788; (Barton, Turner), 808; (Martindale), 828.
Eczema and Hatbands, 695.
Edinburgh Chemists' Annual Ball, 645.
— Chemists' Assistants' and Apprentices' Association, 37, 276; Inaugural Address (J. Lothian), 337; Presentation of Prizes, 399, 442, 487; Conversazione, 495, 499, 522, 583, 663, 706, 804, 887, 958, 997.
— Evening Meetings in, 744.
— Pharmacists' Athletic Club, 826, 908, 1038.
— University Extension at, 900.
Education and Examination, 675.
— and Examination, Preliminary (Schmidt), 983, 989.
— Pharmaceutical, 453.
Educational Arrangements at Sheffield, 228; at Leeds, 276; at Nottingham, 248; at Durham, 248; at Dundee, 249.
— Conditions, Our, 227.
Electric Light, Effects of, upon the Eyes, 694.
Electrical Evaporation (W. Crookes), 24.
Electrolytic Production of Chlorine and Caustic Soda, 561.
Element, A New, 891.
Elixir Rhei (Unofficial Formulary, B.P.C.), 70.
Ellwood, T. A., The Pharmacopœia Standards of Purity, 392.
Embedding Delicate Objects in Celloidin, 695.
Endoconidium temulentum (Prillieux), 476.
Epithelial Casts in Urine, 357.
Errata, 120, 184, 384, 488, 688, 788, 848, 868, 888, 940, 1040.
Ereaut, Mr., Death of, 622.
Eserine Sulphate (Priestley), 808.
Essential Oils, Notes on (Schimmel and Co.), 292, 328.
Ethics, A Point in Pharmaceutical (T. Maben), 185; (W. Kirkby), 223; (Press Comments on), 249.
Eucalyptus, 814.
— as a Disinfectant (Dr. Curgenven), 111.
— Honey, 50.
— Leaves of, 815.
— Oil (Dr. Thoms), 165, 815.
— Oil, Adulterated, 707.
— Oil of Commerce, 877.
— Oils, Notes on (J. H. Maiden), 944.
Eugenol, Benzoyl and Cinnamyl, 81.
Europhen, 81.
Evaporation, Electrical, 24.
Evolution in the Flower (Professor J. R. Green), 385.
— of Mammalian Urine, 1065.
Ewing, Mr. Joseph, Death of, 1079.
Exalgin Poisoning, 694.
Examination, Preliminary (Moss), 39.

Examination, Preliminary, Editorial Remarks on, 31.
— Preliminary, Letters on (J. Moss), 39; (Moss, Stark), 60; (Hyslop), 80; (Moss), 119, 664.
— Regulations, The New, 407.
— Schedules, The New, 274.
Examinations in Edinburgh, 116, 376, 638, 928.
— in London, 93, 353, 519, 676, 698, 901.
— Pharmaceutical (F. Davis), 488.
— Report of, 16.
— Superintendents of, 457.
Excise Prosecution, 20, 304, 305.
Excretions, Microscopic Examination of, 358, 981.
Exeter Association of Chemists and Druggists, 59; Annual Dinner, 1018.
Explosives, Dangers of the Manufacture of, 781.
Extract of Malt, Pharmaceutical Uses of (J. Gordon), 64.
Extracts, The Purity of (W. W. Will), 701.

FABIANA imbricata, 267.
Farm, A Beaver, 694.
Farmer, Mr. C. A., Death of, 478.
Farr and Wright, Tinctures, 1, 255, 469, 569.
Fats and Oils, On the Adulteration and Impurities in, 914.
— and Saponification (E. Davies), 399.
Fenchene, 270.
Fermentation (Donald), 626, 659, 757.
— of Bread, 406.
Ferri Carbonas Saccharata, Note on (Geo. Coull), 805.
Fertilization of the Casuarinaceæ, 689.
— of Flowers, 90.
— of Gymnosperms, 689.
Field Dressings, 247.
Filicic Acid, 84.
Filicin (Poulsson), 85.
Fixing and Hardening Tissues, 982.
Flames, Illuminating (Lewes), 904.
Floral Formulæ (E. B. Sherlock), 519.
Flower, Period of Formation of the, 889.
Flowers and Insects, 90.
Fluorine (Moissan), 986.
— Atomic Weight of, 705.
— Chemical Relations of (Davis), 668; (Parry), 688.
— Isolation of (Jones), 1036.
— Physical Properties of, 816.
Flückiger, Retirement of Professor, 561, 756.
— Testimonial to, 775, 873, 948.
Fog, London, in Parliament, 694.
Fogs, Town (Dr. W. J. Russell), 133.
Food Adulteration (Dr. P. F. van Hamel Roos), 138.
Food and Drugs Act, 73.
— and Drugs Act, Bill to Amend, 73.
— and Drugs Act, Decision in Regard to Copper in Peas, 243, 400.
Food and Drugs Act, Prosecutions Under, 91, 223, 243, 488, 507, 707, 761, 806, 999.
— and Drugs Act, Reports of Analysts on Defective Drugs and Medicinal Preparations, 494.
— Poisoning (Dr. G. Ballard), 129.
Football Club, The Pharmaceutical, 800.
Forest, In a Tropical, 772.
Formation of the Flower, Period of, 889.
Formulary, Unofficial, of the British Pharmaceutical Conference, 70, 73.
Frangulin (Thorpe and Miller), 612.
French Pharmaceutical Qualification, 1040.
— Pharmacy, An Aspect of, 1048.
Fungi, Resistance of, to Corrosive Sublimate (H. W. Russell), 70.
— Trehalose in, 518.

GALACTOZYMOSE Destroyed by Heating Milk, 269.
Galenicals, Copper in, 695, 701.
Galipidine, 613.
Galipine, 613.
Galls, Production of Vegetable, 1002.
Gambia, Botany of, 691.
— Medicinal Plants of, 613.
Gambier, 614.
— Cultivation of, 892.
— Manufacture of, 1003.
Gases, Noxious, Discharge of (A. S. Fletcher), 138.
General Medical Council, Memorial to, on the Medical Curriculum, 388.
Genoa, Hanbury Botanical Institute at, 873, 1014.
— International Botanical Congress at, 1014.
Geography and Materia Medica (Holmes), 770.
George, Henry, on Druggists' Prices, 872.
Geraniol, 894.
Geranium Oil, Detection of, in Rose Oil (Panatjotow), 268.
Germination, Action of Boric Acid on, 693.
— Influence of Poisons on (Cornevin), 610.
— Physiology of, 1003.
Ghatti Gum, 224.
Gherkins, Artificial Colouring of, 673.
Ginger, Curing of, 890.
— from Fiji, Note on a (E. H. Gane), 802, 890.
— Preserved, 987.
Ginseng Plant at Kew, 890.
Glacialine (Mee), 788.
Gland, Thyroid, Use of the Secretion of the (Dr. G. Murray), 348.
Glasgow Chemists' and Druggists' Assistants' Association, 340, 383, 423, 463, 500, 547, 584, 626, 706, 783, 805, 907.
— Proposed Botanic Institute for, 900.
— Prosecutions under the Pharmacy Act at, 849, 852, 868.
Glucose, combination of Iodine with (F. P. Mann), 332.
Glycerine of Belladonna, 70.
— Suppositories with Boric Acid (Peter Boa), 804.
Glycerinum Belladonnæ (Unofficial Formulary, B.P.C.), 70.
Glycosurea Produced by Oxalic Acid, 347
Goa Powder of Commerce (W. Duncan and T. S. Tweedie), 543.
Gold Chloride, Commercial (J. C. Umney), 902.
Grafting on Underground Parts of Plants (Daniel), 611.
Granilla (Shaw), 1055.
Green Crops, Supply of Food Material in (Frank and Otto), 611.
— Professor, Evolution in the Flower, 385.
Greening of Etiolated Leaves (Palladin), 348.
Growth and Germination (Godlewski), 609.
— Curvatures in Plants (Francis Darwin), 220.
Guaicol Carbonate, 812.
Guaiacum, Tincture of (Andrews), 642.
Gum Barks (D. Hooper), 573.
— Ghatti (A. Mander), 224, 1073.
Gums, Varnish (Stevenson), 1043.
Guvacine (Jahns), 267, 691.
Gymnosperms, Fertilization of, 689.

HÆMOGALLOL and Hæmol, 813.
Hanbury Herbarium, Catalogue of the, 873.
Hardening Tissues, 982.
Harveian Oration (Dr. W. H. Dickenson), 353.
Hatbands, Eczema and, 695.
Hay Fever, Menthol in (Dr. Lennox Wainwright), 83.
Heliochromy, Composite (Ives), 1015, 1035, 1053.
Hellebore Root, Spurious White, 877.
Hellebores of the Ancients, 618.
Hemiterpenes, 270.
Henbane, Tincture of (E. H. Farr and R. Wright), 255.
Herbarium Prize, Conditions Relating to the, 110.
Hills, Thomas Hyde, Death of, 407, 455.
— Thomas Hyde, Obituary Notice of, 430, 445.
— Thomas Hyde, Legacy from the late, 458, 742.
Hofmann, Death of Professor, 950.
Holmes, E. M., False Pellitory Root, 405.
— E. M., Geography and Materia Medica, 770.
— E. M., Indian Opium, 688, 868.
— E. M., Jalapin, 1079.
Honey, Eucalyptus, 50.
— Sugar, 111.
Homatropine, New Isomers of, 893.
Honours, Birthday, 990.
Hop Growing in Bohemia, 1069.
Horse-eye Beans, 439.
Hoseason, J. H., Appointment as Assistant Lecturer on Materia Medica at Owens College, 353.

Hospitals, The Dispensing of Medicines in, 756.
Howie, W. L., Pharmaceutical Antiquities in Germany, 443.
Humic Acid, Spontaneous Oxidation of (Berthelot and André), 611.
Humphrey, J., Botany as an Aid to Pharmacists, 662.
— J., Microscope for Students, 21, 325, 489.
Hyaline Casts in Urine, 357.
Hydrargyrum lactatum, 50.
Hydrastine, Relation to Narcotine (Professor Schmidt), 267.
Hydrates, Tests for (W. B. Cowie), 442.
Hydriodic Acid, Action of, upon Quinine, 348.
Hydrazoic Acid (Curtius), 611.
Hydrobromic Acid, Preparation of, 7
Hydrocarbons of the Methane Series, Nitration of, 692.
Hydrocotoin and Protocotoin, 692.
Hydrogen, Occlusion of, by Lead, 890.
— Occlusion by Metals, 816.
Hygiene and Demography, International Congress of, 111, 123, 179, 202.
— as a Subject of the Medical Curriculum, 388.
Hygrophila spinosa, Note on the Presence of a Cholesterol in the Roots of (C. J. H. Warden), 1070.
Hyoscine, Commercial (Professor E. Schmidt), 267.
— Scopolamine, 1021.
Hyoscyamine, Conversion into Atropine (Schütte), 429.
— in Belladonna Root (Schütte),429
— in Stramonium Seed, 429.
— in the Seed Herb and Root of Anisodus luridus, 429.
Hypnotics and Digestion (Dr. J. Gordon), 83.
Hypobromite of Sodium, Coloration of, 694.
Hypophosphites, Compound Syrup of (Ingham), 788; (Turner), 808; (M.P.S.), 828.

Ilex Paraguayensis, Histological Structure of the Leaves of (E. Collin), 348.
Illegal Sale of Poisons (G. Melvin), 508.
Illuminating Flames (Lewes), 904.
Ince, J., Modern Pharmaceutical Nomenclature, 669.
— J., Trade of the Nineteenth Century, 404.
Indian Brandee, 647, 659.
— Drugs and Products (T. Stephenson), 544.
— Gums of Known Origin (Rideal), 952.
— Hemp as an Intoxicant, 1003.
India-Rubber, New Granada, 878.
Inflammable Buttons, 816.
Influenza, Antiseptic Remedies for (Robertson and Simson), 611.
— Bacillus, 791.
— Salicin in (Dr. E. B. Turner), 83.
Injectio Morphinæ Hypodermica, Improved Formula for (J. G. Sharp), 848.
Injurious Effects of Sulphonal, 695.
Insecticides in Agriculture (C. Whitehead), 86.
International Pharmaceutical Congress, 849, 871, 873.
Intoxicating Rye, 476.
Invert Sugar, Reduction of, 1006.
Iodide of Starch, 693.
Iodine Preparations, Note on the Official (W. G. Mackenzie), 602, 628.
— Purification of, from Chlorine, 705.
— Solubility of, in Chloroform (W. Duncan), 544; (Cripps), 668.
— Volumetric Solution of (J. H. Hoseason), 583.
Iodo-β-naphthol (Braille), 426.
Iodoform, Deodorizing, 1002.
— Effects of an Excessive Dose, 388.
— Excessive Dose of, 1005.
Iodometric Estimation of Nitric Acid in Nitrates, 705.
Ipecacuanha, Analysis of (R. Cripps), 224; (A. Gunn), 244.
— Assay of, 891.
— Inf. Rad., 424, 468.
— Tinctures of (J. C. Umney), 417.
— Value of Unofficial Parts of (D. Hooper), 591.
Ipoh Arrow Poison (Wray), 613.
Ireland, Natural History of, 892.
— Pharmaceutical Society of, 16, 33, 53, 74, 141, 209, 277, 301, 307, 389, 479, 497, 519, 582.
— Pharmacy Act, Prosecutions under the, 163.
Iron and Carbon Monoxide, Volatile Compound of, 705.
Is Progress Continuous? 899.
Isoantipyrin, Antipyrin and, 811.
Isomer of Camphor from Oil of Mentha Pulegium, 693.
Isomerism of Hydrocarbons, 578.
Isoquinine (Lippmann and Flussner), 349.
Isovanillin, Vanillin and, 691.
Ivatt, A., Appointment of, Teacher of Pharmaceutical Chemistry at Sydney College, 366.

Jaborandi, Pernambuco, 875.
— Tincture of (E. H. Farr and R. Wright), 1.
Jalap, Spurious, 438.
Jalapin and Jalapurgin (Holmes), 1079.
— What is? (Umney), 888; (Morson and Son), 908; (Flückiger), 1060; (Holmes), 1079.
Jalapurgin and Orizabin (Flückiger), 1060; (Holmes), 1079.
Jatropha Curcas Seeds Imported as Croton Seeds, 439.
Johnstone *v.* Tilden and others, 1057.
Junior Pharmacy Ball, 734.
Jury Service, 921.

Kamala, Percentage of Ash in, 894.
Kath, 878.
Kawa-nori, 406.
Keene, Mr. Edward, Death of, 495.
Kefyr, Yeast Cells in (Mix), 610.
Kew *Bulletin*, 800.
— The Royal Gardens at, 412.
Kirkby, W., Appointment as Lecturer on Pharmacognosy at Owens College, 353.
— W., Lecture on Pharmacognosy at the Manchester Pharmaceutical Association, 497.
Klebs, Dr., on Tuberculin, 425.
Kola as a Dietetic, Note on (Peter Boa), 841.
— Nuts, Spurious, 439.
Kolamin, 813.
Korosi, M. J., Speech at International Congress of Hygiene, 124.

Labelling Slides, 982.
Laboratory Apparatus (Shaw), 759.
— Shaker, On a Simple, 730.
Lac Insects in the United States, 1046.
Lancet, The, on the Prosecution of Unqualified Assistants for selling Poison, 10.
Landseer's Pictures, Pharmacists and, 800.
Laing, A., The Future of Pharmacy, 383.
Lavender, Oil of, 894.
Lead, Action of Water on (Dr. J. H. Garrett), 179.
— Double Chloride of, and Magnesium, 86.
— Impregnation of Water with, Conditions which Favour the (Dr. J. Brown), 86.
Leaves, Etiolated, Greening of, 348.
Lecture on Pharmacognosy (W. Kirkby, 497).
Leeds Chemists' Association, 466.
— Chemists' Association, Educational Arrangements of the, 466.
— Chemists;—Price List, 122.
— Remarkable Rainfall at, 169.
Leicester Chemists' Association, 263, 785, 998.
Lemon, A New Form of Essence of, 876; (Poppelreuter), 960, 1080.
— Essence of, 894.
— Oil of, 50.
— Oil of, Contaminated with Copper, 655.
— Syrup of (Robins), 903.
Lenses, Cleaning, 981.
Letters, Mysterious (J. W. T. Morrison), 80.
Libel upon a Chemist, 685, 760.
Licences for the Sale of Stamped Medicines, etc., 208.
Limonene, 270, 574.
Linamarin (Jorissen and Hairs), 165.
Linseed, Adulteration of (J. van den Berghe), 406.
— Cake, Testing of, 406.
— Meal, Adulteration of, 761.
Liquor Bismuthi et Ammonii Citratis (Hendry), 663.
— Cocainæ Hydrochlor. B.P. (I. Lothian), 523.
— Strychninæ, 688, 697, 708, 767, 787, 807, 843, 880.
Liquors, Strength of, 697; (Luff), 768, 800; (Martindale), 828.

Liquorice Plant as found on the banks of the Tigris and Euphrates (Consul Chenevix Trench), 247.
— Russian, 1004.
Literary Query (Foster), 424.
Lithium Nitride, 693.
Liver, The Chemistry of the (Luff), 884.
Liverpool Chemists' Association, 334, 438, 546, 676, 823, 866.
— Pharmaceutical Students' Society, 362, 399, 466, 498, 524, 643, 784, 804, 866, 958.
Local Government Board Report on Drugs, 453.
— Secretaries and their Duties (C. A. Arkle), 527.
— Appointment of, 305.
— Election of (C. Swinn), 324 (Progress), 324; (C. E. Pickering), 363; (Apprentice), 363; (Progress M.P.S.), 384; (Plebian), 447.
London Fog in Parliament, 694.
— Institution, 904.
Louisiana, Vegetable Drugs Produced in (C. Mohr), 45.
Lozenges (Pharmakos), 284.
Lupanine (Siebert), 609.
Lupinus Albus, Alkaloids of, 894.
Lycopodium, Adulteration of, 869.

Magnesia in Drinking Water (Dr. P. Frankland), 181.
Maize, Proteids of, 898.
Male Fern, Vermifuge Principle of (Poulsson), 84.
— Flowers of the Walnut, 690.
Malic Acid in Succulent Plants, 90.
Manchester Pharmaceutical Association, 336, 423, 497, 603, 679, 782, 808, 887.
Manganese Ore, Note on a (W. Duncan), 523.
Mannitol, Decomposition by Bacilli, 1002.
Martindale, W., Camphoid, 831, 868.
— W., Strength of Liquors, 828.
— W., Syr. Ferri Quin. et Strych. Phos., 828.
Mascarene Islands, The, 1068.
Masonic Charities, Election of Chemists and their Relatives, 249.
— Lodge, Foundation of a, for Medical Men, 249.
Masrium, a New Element, 891.
Maté, 348.
Materia Medica, The Relation of Geography and (Holme's), 770; (Ransom), 808.
Mayors, Appointment of Pharmacists as, 388.
Measles, Bacillus of, 889.
Medical Curriculum, Additions to the, 388.
— Progress (Dr. T. Lauder Brunton), 102.
— Scales, Revised, 873.
Medicated Wine, Sale of, 620.
Medicinal Plants, Cultivation of, in Japan, 510.
— Plants, North American (J. M. Maisch), 66.
Medicinal Plants of Gambia, 613.
— Preparations, Synonyms of, 142.
Medicine and Pharmacy, The Relations of, 1071.
— Fatal Misuse of, 806.
— Preventive, Address on, by Sir Joseph Fayrer, 125.
— Relations of Pharmacy with, 430.
Medicines, Authoritative Definition of, Editorial Remarks on, 121.
— Hints on the Preservation of (Lascar), 1042.
— Patent, and the Pharmacy Act (letter), 424.
Mel Boracis (R. Robinson), 164; (T. Massie), 204.
Melampyrum, Poisonous Properties of, 1028.
Menthol in Hay Fever, 83.
Mercuric Pyroborate, 813.
Mercurous Salts, Action of Light upon (Roe), 641.
Mercury, Double Cyanide of Zinc and (Dunstan), 769.
Metals, Crystallization of, 1001.
Methane Series, Nitration of Hydrocarbons of the, 692.
Method of Science, The (J. Robb), 423.
Methylated Spirit, Chemist fined for the Sale of, 122.
— Spirit (General order relating to), 92; (E. J. Millard), 100, 516; Use of, 276.
— Spirit, Illegal Sale of, 304, 748.
— Spirit, Illegal Use of, 998.
Methylene Blue in Malaria, 345.
— Blue in Medicine, 816.
Mexico, Agricultural Industries of, 591.
Microbes in Air, Estimation of (E. W. Lucas), 63.
Micro-Chemical Reactions in Practical Botany (Ward), 785.
Micro-Organisms in Their Relation to Chemical Change (Frankland), 953.
Microscope for Students (J. Humphrey), 21, 325, 489.
— How to learn with the (Grierson), 775.
— The Choice of a (Gubb), 1007.
Microscopical Preparations, A Simple Method of Drawing, 797.
Microscopy and Pharmacy (A. M. Whelpley), 897.
— Notes on Pharmaceutical, 650, 750, 869; (Bull), 888, 981.
Midland Counties Chemists' Association, 263; (Conversazione), 353, 376, 441, 487, 499, 705, 826, 908, 959, 1017; Address by Sir James Sawyer, 353, 377.
Milk (A. W. Stokes), 747.
— Artificial Human (Clague), 651; (Smith), 688; (Clague), 709; (Smith), 767; (Clague), 787, 812.
— Effect of Heat upon (Dr. Leeds), 269.
— of Sulphur, The Sale of (Editorial Remarks), 91; (E. Brown), 120.
— Preparation of Germ free (Dr. Leeds), 269
"Mineral Naphtha," Definition of, 92.
Minor Examination, Hints to Students preparing for the (A. Russell Bennet), 568.
Miscible Liquid Extract of Cascara (Moss), 701; (Spencer), 788.
Mistletoe, Assimilation of, 689.
Mohun, Mr. M., Death of, 580.
Moissan, H., Boron, 814.
— Fluorine, 986.
Month, The, 81, 165, 265, 345, 425, 609, 689, 809, 889, 1001.
Morgan Medal, Award of, to Sir Alfred Garrod, 353.
Morrema Brachystephana as a Galactogogue, 268.
Morrenine (Arata and Gelzer), 268.
Morrenol, 268.
Moss, Applicability of, to Pharmaceutical Purposes (Walton), 643.
Mounting Microscropic Preparations in Balsam, 750.
Movements of Minute Objects, 1002.
— of Plants, Photographic Representation of the, 889.
Mucuna Urens, Seeds of, Imported as Calabar Beans, 439.
Muna Muna, 878.
Musk, Artificial, 266, 693.
— Tincture of (V. der Voorst), 89; (E. Brown), 120.
Mydriatics, ψ-tropine a Probable Source of (Liebermann), 165.
Myristicin, 815.
Myxœdema, Remedy for, 348.

Napelline, 729.
Narceine, Note on (D. B. Dott), 747.
National Wholesale Druggists' Association of the United States, Discussion on the Prices of Proprietary Articles, 388.
Natri, 879.
Naturforscher Verein, 334.
Neurine, 814.
Neutrality (A. H. Allen), 752, 772.
Neutrality, Indicators of (R. A. Cripps), 510.
Newcastle-on-Tyne Chemists' Assistants' and Apprentices' Association, 363, 440, 499, 568, 644, 706, 886, 1076.
— on-Tyne Chemists' Assistants' and Apprentices' Association, Address by Mr. B. S. Proctor, 318.
— on-Tyne Chemists' Assistants' and Apprentices' Association, Inaugural Address (G. F. Merson), 317.
Nitrate of Silver and Seeds, 1005.
Nitrates Decomposed by Bacteria, 691.
Nitration of Hydrocarbons of the Methane Series, 692.
Nitric acid in Nitrates, Estimation of, 705.
— Oxide, 1004.
Nitride of Lithium, 693.
Nitrides, Metallic (Maquenne), 611, 814.
Nitrification (R. Warrington), 86, 90, 476.
Nitrifying Schizomycetes (Dr. G Loew), 476.

Nitrogen, Assimilation of, by Plants, 988.
— Fixation of Free, by Plants, 1045.
Nitrogenous Bases Present in Cotton-seed, 898.
Nitrometer, A Form of (J. E. Whitley McFall), 482.
Nomenclature, Botanical (Druce), 749, 789, 941.
— Modern Pharmaceutical (Ince), 669.
North and North Western Chemists' Association (Annual Meeting), 399, 1057.
Northern Senega (L. E. Sayre), 793.
Nottingham and Notts Chemists' Association, 336; (Annual Dinner), 498, 1016.
Nutmeg Cultivation in Jamaica, 656.
Nut-Oil Trade in India, 656.
Nux Vomica, Extract of (R. A. Cripps), 264; (M. Conroy), 284.

Obituary, 39, 80, 119, 164, 204, 264, 284, 343, 363, 403, 445, 487, 527, 568, 627, 666, 687, 707, 763, 807, 848, 868, 887, 940, 960, 991, 1018, 1060, 1079
Occlusion of Hydrogen by Lead, 890.
Œnanthe Crocata (J. Austen), 204.
Oil as a Reserve Material in Plants (Suroz), 610.
— Olive, Detection of Cotton-Seed Oil in (Vitali), 90.
— of Rosemary (R. A. Cripps), 343.
— of Sassafras, 491.
— of Wine (Power), 614.
Oils, Burning, for Lighthouses (Edwards), 681, 778.
Ointment of Oleate of Mercury, 70.
Oleum Æthereum (Power), 614.
Opium, Alkaloids in (Adrian), 612.
— Assay (D. B. Dott), 746.
— Chinese, 1004.
— Extract of (R. A. Cripps), 264; (M. Conroy), 284.
— Traffic in India, 675.
— Used in Medicine in India (Warden), 667; (Holmes), 688; (Warden), 828; (Holmes), 868.
Organic Acids, Distribution in Succulent Plants (J. Aubert), 90.
— Analysis, New Method of, 813.
Ortho-oxyethyl-ana-mono-acetyl-amido-quinoline, 81.
Osmosis and its Relation to Plant Life (Garnett), 993.
Outsiders, The Society and (Long), 709.
Oxalic Acid, Pharmacology of (Kobert), 347.
Oxygen, Utilization of Atmospheric, 705.

Pachyma Cocos, 86.
Paget, Sir J., Speech at the International Congress of Hygiene, 125.
Paico, 879.
Panax Gum, 892.
Pannic Acid (Kütsten), 85.
Panul, 879.
Paracresotic Acid as an Antipyretic, 694.
Parasites, Detection of, by the Microscope, 357.
Parasitic Plants, Assimilation of Green, 689.
Pareira Brava from Bahia, The Microscopical Characters of a Spurious (W. M. Holmes), 829, 880.
— True and Commercial (Ringer and Brooke), 703.
Paris Society of Pharmacy, 676, 1073.
Passmore, F., Death of, 516.
Patent Medicine Stamps, 208.
Pathology for the Pharmaceutist (J. W. Stainer), 356.
Pea Root, Tubercles of the, 90.
Peas, Copper in Preserved, 72, 78, 208, 243, 400, 454, 586.
— Coloured with Copper, Prosecutions for the Sale of, 208.
Pectic Substances in Plants, 689.
Pellitory Root, False (E. M. Holmes), 405; (J. G. Prebble), 548.
Pental, an Anæsthetic (Professor V. Mering), 346.
Pentenes, 270.
Pepsin Wine (J. Clark), 597; (Fisher), 628.
Percentage Solutions (Caspari), 1027, 1080
Perfumes, Cultivation of Plants for, 890.
— Vegetable, 690.
Perique Tobacco (A. L. Metz), 206.
Petroleum Industry of Gallicia (Boverton Redwood), 567.
— Solidification of (Dr. S. Rideal), 398.
— The Origin of (Forstall), 1066.
— Transport of, 654.
Phagocytosis, 1064.
Pharmacy (Rural and Urban), 783.
— Act, Coroners and the, 798.
— and Medicine in their Relations to the Public, 820; (Rentoul), 823.
— and Poisons Acts, Meeting at Windsor, 362.
— Ball, 873.
— Law, 674, 776, 783.
— Relations with Medicine, 430.
Pharmaceutical Nomenclature, Modern (Ince), 669.
— Society and Outsiders, 709.
— Society's Jubilee, Address from Tasmania, 108.
Pharmaceutist, Pathology for the, 356.
Pharmacists, Physicians and the Public (Sir J. Sawyer), 467.
Pharmacology, Botanical Enterprize in Relation to (L. Bayley Balfour), 410.
Pharmacopœia, Russian, 50.
— Standards of Purity (T. A. Ellwood), 392; (R. A. Cripps), 448.
Pharmacopœial Formulæ, 799.
Pharmacopœias, Comparison of (Drs. Thoms and Hirsch), 334.
Pharmacy Acts, Prosecutions Under, 223, 322, 524, 584, 605, 622, 645, 665, 760, 806; (Glasgow), 833, 849, 852, 868, 887; (Chlorodyne), 928, 937, 938, 959, 1079.
Pharmacy, Advances in (E. B. Sherlock), 358.
Phellandrene, 270, 578.
Phellonic Acid, 89.
Phenocoll, 265.
— Compounds, Tests for, 266.
Phenol derivatives, New, 266.
Phloronic Acid, 89.
Phosphorous Oxide, 809.
Phosphorus, Allotropic Forms of (H. M. Vernon), 349.
— Permanganate of Potassium as an Antidote to, 809.
— Recent Researches on the Oxides of (T. S. Dymond), 801.
Photographic Plates, Action of Colours on (Knuth), 610.
— Plates, Chemistry of (Cooper), 1057.
— Representation of the Movements of Plants, 889.
Photography, Chemistry of, 891, 1057.
— in Colours, 1003 (Ives), 1015, 1035, 1053.
Photo-Micrography, a Simple Camera for, 792.
Physic, New, Dr. B. W. Richardson, 406.
Physicians' Prescriptions, Chemists and (Blackburn, Shapley, Morrison), 667; (Startin), 688; (Sangster), 709; (Young), 786; (Chapman), 787.
Physiology of Seeds, 690.
Pichi (Dr. Lyons), 267; (Loudenbeck), 268.
Picroadonidin (Podwissotzky), 268.
Picropodophyllotoxin, 84.
Pictet, Purification of Chloroform by Freezing, 428; (J. F. Macfarlan and Co.), 548, 628; (Raoul, Pictet and Co., 608, 691, 754; (Dubois-Reymond), 754, 1042.
Pills, Coating of Iron (H. Wyatt), 333.
Pimento Cultivation in Jamaica (Eric), 985.
Pinene, 270.
Piperazine Diethylemediamine, 812.
Pipette, A Simple Method of Calibrating a Delivering, 986.
Pitman, Mrs., Death of, 518.
Placenta Tissue, Microscopic Examination of, 358.
Plants, British Poisonous, 891.
— Curious, 890.
Plowman, S., in Hobart Town, 92; Address by, to the Assistants' and Apprentices' Association of Victoria, 280.
Plymouth, Meeting of Chemists and Druggists at, 337, 547, 1076.
Pneumonia, Immunity against, 890.
Podophylloquercetin, 84.
Podophyllotoxin, 84.
Podophyllum, Constituents of the Rhizome of (R. Kürsten), 84.
Poison Bottle-Stand, 695.
— Cangoura, a New Convulsive, 982.
— Law, Editorial Remarks on, 1030.
— Medicinal Preparations Containing, Report on (Dr. B. H. Paul), 386.

Poison Problems, 1048.
— Proprietary Medicines Containing, 387, 424; (Lane), 679; (Pratt), 688; (Pickard), 709; (Clark), 888; (Editorial), 916, 960.
— Proprietary Medicines Containing, Sale of, Without Poison Label, 928.
Poisoning, Alleged, by a Cough Mixture, 1058.
— at a County Asylum, 282.
— at a Workhouse Infirmary, 343.
— by Aconite, 343.
— by Antikamnia, 454.
— by Arsenic, 402.
— by Belladonna Plaster, 478.
— by Carbolic Acid, 282.
— by Epsom Salts, 388.
— by Exalgin, 694.
— by Iodoform, 388.
— by Laudanum, 324.
— by Lead, 666, 873.
— by Liquor Strychninæ, 402, 466.
— by Medicine, 264.
— by Misuse of Medicine, 806.
— by Morphine, 343, 454, 548.
— by Œnanthe Crocata (J. Austen), 204.
— by Pilocarpine, 454.
— by Strychnine, 183, 223, 323, 402, 443.
— by Vermin Killer, 78, 223.
— by Water Impregnated with Lead, 353, 387.
— by Weed Killer, 264, 276, 283, 402, 445, 796.
— Chronic Arsenical, 816.
— in a Workhouse, 263.
Poisons, Export of, 638.
— Sale of (Dr. G. Danford Thomas), 139; (C. J. S. Tompson), 184; (Marshall Leigh), 359.
— Sale of (T. H. Powell), 363; (Hearon and Co.), 384, 558, 657, 698.
— Transmission of, by Sea (Board of Trade Notice), 594.
Polarized Light in Botanical Work, 751.
Pollination, Evolution of Methods of, 890.
Polyterpenes, 270.
Potassæ Liquor (J. Petrie), 583.
Powdered Drugs, Examination of, 981.
Prasiola Japonica, 406.
— New Edible (Professor R. Yatabe), 406.
Precipitates, Oxidizable, Simple Method of Washing (J. A. Forret), 225.
Preliminary Education and Examination (Schmidt), 983, 989.
— Examination (J. Moss), 39, 60, 119; (A. C. Stark), 60; (J. C. Hyslop), 80; (Latter), 164.
Prescriptions, Chemists and Physicians' (Althaus), 648.
— Illegible, British Medical Journal on, 10.
— Legibility of, 10.
Preventive Medicine as a Subject of the Medical Curriculum, 388.
Preventive Medicine, Section of Hygienic Congress, 125.
Primary and Secondary Education, Their Relative Importance in the Training of the Pharmacist (G. F. Schacht), 549.
Prophylactic Influence of Tobacco, 695.
Proprietary Medicines, Protection of Prices (W. Johnston), 548.
— Medicines, Sale of, Without Stamps, 748.
— Preparations Containing Poison, The Labelling of, 990; (Priest, Barrass), 1020.
— Preparations, The Sale of, 1029.
— Preparations, The Trade in, 516.
Protocotoin, Hydrocotoin and, 692.
PROVINCIAL TRANSACTIONS:—
Aberdeen and North of Scotland Society of Chemists and Druggists, 38, 263.
Brighton Association of Pharmacy, 336, 1017, 1076.
— Junior Association of Pharmacy, 276, 321, 359, 380, 866.
Bristol Pharmaceutical Association, 567.
Dundee Chemists' Assistants' and Apprentices' Association, 37, 59, 100, 183, 203, 294, 340, 362, 443, 487, 523, 626, 664, 806, 997.
Edinburgh Chemists' Assistants' and Apprentices' Association, 37, 276, 337, 399, 442, 487, 495, 499, 522, 583, 663, 706, 804, 887, 958, 997.
Exeter Association of Chemists and Druggists, 59, 1018.
Glasgow Chemists and Druggists' Assistants' Association, 340, 383, 423, 463, 500, 547, 584, 626, 706, 783, 805, 907.
Leeds Chemists' Association, 466.
Leicester and Leicestershire Chemists' Association, 263, 785, 998.
Liverpool Chemists' Association, 334, 438, 546, 676, 823, 866.
— Pharmaceutical Students' Society, 362, 399, 466, 498, 524, 643, 784, 804, 866, 958.
Manchester Pharmaceutical Association, 336, 423, 497, 603, 679, 782, 808, 887.
Midland Counties Chemists' Association, 263, 353, 376, 441, 487, 499, 705, 826, 908, 959, 1017.
Newcastle-on-Tyne Chemists' Assistants' and Apprentices' Association, 317, 363, 440, 499, 568, 644, 706, 886, 1076.
Nottingham and Notts Chemists' Association, 336, 498, 1016.
Sheffield Pharmaceutical and Chemical Society, 314, 333, 440, 662, 681, 803.
Southampton Chemists' Assistants' Association, 366.
Sunderland Chemists' Association, 58.
Pteris Aquilina on Calcareous Soil, 690.
Ptomaines of Infectious Diseases, 817.
Puleone, 693.
Putty Powder (W. Duncan), 523.
Pyrazol Derivatives, Nomenclature of the, 892.
Pyrotechny (T. A. Ellwood), 420.

QUERY, A Literary (J. Foster), 424.
Quinine, Action of Hydriodic Acid upon, 348.
— and Quinidine, Constitutional Difference Between (Skraup), 349.
— Conversion of Cupreine into (O. Hesse), 348.
— Hydrochlorides, 580.
— Lactate (Vigier), 82.
— Light Sulphate of, 813.
— Use of, at Panama Canal, 111.

RADISH, Formation of Starch in the, 751.
Raphides, the Cause of the Acridity of Certain Plants (R. A. Webber), 515.
Reduction of Benzene Hexachloride, 692.
Redwood, Death of Professor, 763, 832, 833.
Register and Calendar, 595.
Report of the Government Visitor upon the Examinations in London, 850.
Resin, Oil of, in Turpentine, 817.
Revenue from Medicine Stamps, 208.
— Licences for the Sale of Stamped Medicines, etc., 208.
Review of the Year 1891, 529.
REVIEWS AND NOTICES OF BOOKS:—
Anæsthetics, Discussion on (Downey), 980.
Aristoloches, Les (Dr. L. Planchon), 525.
Arzneimittel nicht in dem Arzneibuch (Deutschen Apotheker Verein), 50.
Chemical Technology, Manual of (Wagner), 1077.
— Theory, An Introduction to (Scott), 762.
Chemistry, Watts' Dictionary of, vol. iii. (Morley and Muir), 1040.
— for Schools and Colleges, Elementary Systematic (Professor Ramsay), 627.
— Outlines of General (Ostwald), 761.
— Outlines of Theoretical (L. Meyer), 761.
— Principles of (Mendeleeff), 1058.
— a Short Text-Book of Inorganic (Kolbe), 1040.
Cooley's Cyclopædia of Practical Receipts (North), 762.
Electricity up to Date (Verity), 763.
Epidemic Pneumonia (Eminson), 687.
Fields and Lanes, Lessons from (Grierson), 786.

REVIEWS AND NOTICES OF BOOKS—continued.
Hospital Annual, Burdett's, 867.
— Reports, St. Bartholomew's, 867.
Hypnotic Suggestion, The Practice of (Dr. G. C. Kingsbury), 527.
Indigestion (Dutton), 807.
— (Herschell), 807.
Jahrbuch der Chemie (Meyer), 1077.
Leprosy (Thin), 1000.
Manuale Pharmaceuticum Seu-Promptuarium (Hager), 999.
Materia Medica and Therapeutics, Dictionary of (Leonard and Christy), 786.
— Medica and Therapeutics, Elements of (Semple), 1078.
— Modern (Helbing), 60.
— Recent (Lescher), 867.
Medical Annual, 980.
Medicaments Nouveaux, Formulaire des (Bocquillon-Limousin), 1078.
Mental Diseases, An Epitome of (Shaw), 1000.
Methods and Formulæ, Microscopical (Squire), 1019.
Nueva Farmacopea Mexicana de la Souedad Farmaceutica de Mexico, Appendice A la Segunda Edicion de la. Mexico, 1890, 525.
Perfumery, Art of (Piesse).
Pharmacographia Indica (W. Dymock, C. J. H. Warden and D. Hooper), 39.
Pharmacopœia of the University College Hospital (Gerrard), 786.
Pharmacopœia,Prescriber's(Kemp and Co.), 118.
Pharmacopœias of Twenty-nine London Hospitals (P. Squire) 118.
Pharmakognostischer Atlas (Moeller), 1039.
Photography Applied to the Microscope (F. W. Mills and T. Charters White), 527.
Practical Dispensing for Students (Thompson), 786.
— Medicine, Contributions to (Sir James Sawyer), 507.
— Perfumery, 1078.
— Pharmacy (B. S. Proctor), 1059.
Prescriptions, The Book of (Beasley), 786.
Public Health (London) Act, The, 1891 (Macmorran).
Surgical Handicraft (Pye and Crowle), 826.
Tannins, The (Trimble), 1077.
Typhoid Fever, The Treatment of (Yeo), 826.
Veterinary Counter Practice (*Chemist and Druggist*), 38.
Wattles and Wattle-Barks (J. H. Maiden), 526.
Reymond du Bois on Pictet's "Laboratoire a Basses Temperatures," 429.
Rhatany (W. H. Burrell), 508.
Rhizoma Pannee, 15.
Richter, Dr. Victor von, Death of, 305.
Ricin, the Albumose of Castor Oil Seed (Ehrlich). 425.
Ringworm Parasite, 357.
Rivers, Self Purification of (Dr. Percy Frankland), 202.
Root Tubercles of the Pea, 90.
Rose, Mr. Alfred, Death of, 518.
— Oil of, Test for (Panazotow), 611.
— Otto of, 894.
Roses, Concentrated Acid Infusion of (Hendry), 664.
Roth, Dr. W., Speech at International Congress of Hygiene, 125.
Royal Gardens at Kew, 412.
— Institution, Lectures, 625, 661, 953.
— Society of Edinburgh, 760.
Rumex, American Species of, 1002.
Rushton, W., Use of Drugs in Dental Surgery, 400.
Russian Pharmacopœia, 50.
Rye, Intoxicating, 476.
— The Origin of, 891.

SABADILLA Seed, Fat and Essential Oil of (E. Opitz), 85.
Sabinella, 879.
Saccharin, 246.
Saffron, Adulteration of (Collardot), 85
Sale of Food and Drugs Act, A New Point in the, 990.
— of Poisons, 359, 363, 508, 558.
Salicin in Influenza, 83.
Salicylic Acid from the Oil, 1002.
— Acid Reaction (Schneegans and Gerock), 609.
Salicylamide (Dr. W. R. Nesbitt), 346.
Salicylate of Bismuth (Causse), 427.
— of Bismuth, Basic, 427,
— of Calcium (Torjescu), 427.
Saliva and Pathogenic Micro-Organisms, 890.
Salol as a Coating for Pills (Dr. le Ceppi), 348.
— New Method of Preparing, 692.
Salophen (Goldmann), 612.
Sandal Wood (Adrian), 44; (P. L. Simmonds), 65.
Sandford, Mr. George Webb, Death of, 966, 978, 990, 991.
Sangster, Mr. John, Death of, 495.
Sanguinaria Canadensis, Alkaloids in the Root of, 89.
Sanguinarine (König), 89.
Sarsaparilla, Spurious, 438.
Sassafras, Oil of, 491.
Sawyer, Sir James, Pharmacists, Physicians, and the Public, 467.
Schmidt, Professor, Canadine, 267.
— Professor, Hydrastine, 267.
— Professor, Hyoscine, 267.
— Professor, Scopolamine, 1021.
Schizomycetes, Nitrifying, 476.
Scholarships, Pharmaceutical, 917, 950.
School of Pharmacy Football Club, 454.
— of Pharmacy Students' Association, 16, 366; (Election of Officers), 421, 583, 623, 662, 703, 759, 802, 980, 1036.
School of Pharmacy Students' Association, Annual Report, 16; Jubilee, 421, 483.
— Staff, Appointment of, 11.
Science Papers, 372, 459.
Scopolamine, 267, 1006 (Schmidt), 1021.
Seabeans, 439.
Seaweeds (Jack), 664.
Sediments, Urinary, 357.
Seeds, Physiology of, 690.
Seidlitz Powders (C. E. Sage), 419.
Self Help, 187.
Seller, Meaning of the Term, in the Pharmacy Act, 294.
Senega, Concentrated Infusion of, (Hendry), 663.
— Northern (Sayre), 793.
Senna, Aden, 874.
— The Active Principle of (Smith), 1080.
Sesame Oil, Detection of in Olive Oil, 90.
Sewage, Disposal of (Dr. J. C. Thresh), 135.
— Effect of Soil and Vegetation upon (Dr. A. Carpenter), 136.
Sheffield Pharmaceutical and Chemical Society, Inaugural Address (R. Hampson), 314, 333; Annual Dinner, 333, 440, 662, 681, 803.
Shell Fish, Colouring Matter in, 1005.
Sherry, Detannated, 70.
Shilakawa-nori, 406.
Shop Life (W. L. Currie), 463.
Show Bottles, Origin of Coloured (Savage, Spoor), 1020.
Shukai (W. Dymock and C. J. Warden), 552.
Silica, Action of Carbon upon Sodium Sulphate in presence of, 692.
Silica in Plants, 1028.
Silver, Allotropic (Carey Lea), 349.
Skin Varnishes, Unna's Medicated, 732.
Smoke from Factories (A. E. Fletcher), 135.
Société de Therapeutique, Report to, on Standardizing, 10.
Society of Arts, 681, 778, 1015, 1035, 1053; Royal Medals, Award of, 454.
— of Chemical Industry, 35, 53, 397, 486, 567; Annual General Meeting, 35, 53; President's Address, 35; Visit to Power and Sons' Distillery, 53; Visit to Guinness's Brewery, 54.
SOCIETIES IN LONDON, PROCEEDINGS OF:—
Chemical Society, 55, 74, 822.
Chemists' Assistants' Association, 294, 311, 353, 356, 392, 409, 417, 434, 464, 482, 519, 639, 661, 699, 734, 747, 801, 884, 901, 953, 993, 1000, 1020.
London Institution, 904.
North and North Western Chemists' Association, 399, 1057.
Royal Institution, 625, 661, 953.
School of Pharmacy Students' Association, 16, 366, 421, 483, 583, 623, 662, 703, 759, 802, 980, 1036.

Societies in London, Proceedings of—continued.
Society of Arts, 681, 788, 1015, 1035, 1053.
Society of Chemical Industry, 35, 53, 397, 486, 567, 781, 867, 951, 1015, 1073
Western Chemists' Association (of London), 356, 384.
Sodium Arseniate, Note on (Geo. Coull), 847.
— Sulphate, Action of Carbon upon, in Presence of Silica, 692.
Solanaceous Bases, Alteration of (Dr. Schütte), 429.
Solutions (H. G. Garnett), 484.
Somerset House Laboratory, 207.
Sophorine, Physiological Action of (Plugge), 609.
Sound and Heat, Connection between (S. T. Preston), 269.
Southampton Chemists' Assistants' and Apprentices Association, 366.
Specific Gravity Determination for Practical Purposes (Wright), 867.
— Gravity of Powdered Substances, 816.
Spirit of Nitrous Ether, Prosecution for the Sale of Defective, 507.
— Sale of without Licence, 647.
Spring Flowers (Austen), 827.
Spurious Drugs, 614.
Sputum, 357.
— Tubercle Bacilli in, 815.
Stachyose, 269.
Staining Tubercle Bacilli, 751.
Stamps, Medicine, 208.
Standards, Electrical, 188.
Standardizing Preparations of Potent Drugs, 10.
Stapelia Gigantea at the Royal Horticultural Society, 388.
Star Anise (Joly), 50.
Starch, Composition of, 815.
— Formation of, in the Radish, 751.
— Iodide of, 693.
State Hygiene Section of International Congress of Hygiene, etc., 138.
Stem, Detection of, in Root Drugs (Bastin), 652.
Stereochemistry, 41, (T. P. Blunt), 118.
Sterilized Milk, 269.
Still, Prosecution for Use of, without a Licence, 960.
Stills, The Law Relating to, 988.
Stomach, Washing out the, 695.
Strontium Salts in Medicine (Terré, Sée, C. Paul, Dujardin-Beaumetz), 426.
Strychnia Liquor (Ough), 688, 697; (Hyslop, Linford, Clower, Lance, Umney), 708; (Martindale, Lanarkshire, Johnston, Smith, "Spot," Luff), 767; (Ough, Hallaway), 787; (Turver), 807; (Duncan), 843.
Strychnine as an Antidote to Chloroform, 454.
— Constitution of (Tafel), 83.
— Solubility of Acid Sulphate of (Geo. Coull), 846.
Styles of Compositæ (J. S. Chamberlain), 476.
Suberinic Acid (Gilson), 89.
Suberin and Cork Cells (F. A. Flückiger and Gilson), 89.
Succulent Plants, Distribution of Organic Acids in, 90.
Sugar Honey, 111.
— Industry of Mozambique, 1046.
Sulphonal, Injurious Effects of, 695.
Sulphonic Acids of the Cinchona Bases (O. Hesse), 562.
Sulphur, Alleged Decomposition of, 1005.
— in Plants, 816.
— Mine, Japanese, 673.
Sulphuric Acid Process, Recent Theories of the (Potter), 1025.
Sulphurous Acid, Micro-Chemical Detection of, 751.
— Oxide, Decomposition of, by Carbon, 810.
Sunderland Chemists' Association, 58.
Sunflower-Growing in Eastern Europe, 831.
Suppositories (Hetherington), 466.
Sylvestrene, 270, 577.
Symbiosis and Symbiotic Fermentations (Prof. Marshall Ward), 794, 870, 895.
Symes, Dr., Address to Liverpool Pharmaceutical Students' Society, 362.
— Dr., Address to Liverpool Chemists' Association, 546.
Synonyms of Medicinal Preparations, 142; (G. Ellinor), 440.
Syrup Ferri Quin. et Strych. Phos. (Hallaway), 787; (Ingham), 788; (Barton, Turner), 808; (Martindale), 828; (Barton), 868.
Syzygium jambolanum in Glycosuria, 347.

Tablets, Compressed, 204.
Tannin, Micro-Chemical Reactions of, 751.
Tapeworm, Head of the, Recognition by the Microscope, 357.
Tari Pods, 878.
Tariric Acid, 692.
Tartaric Acid, Adulterated, Prosecution for the Sale of, 223.
— Acid, New Synthesis of, 1005.
— Acid, Note on (W. B. Cowie), 442.
Tasmania, Pharmacy in, 92; Address from Pharmaceutical Society of, 108.
Te de Burro, 880.
Tea and Coffee (McFall), 639.
Teachers' Registration and Organization Bill, 111.
Telephone, London and Paris, 167.
Terebenthene, 271.
Terpenes and Camphors (O. Wallach), 270, 350, 553, 574.
Terpinene, 270, 578.
Terpinolene, 271, 578.
Tetanus antitoxin (Zizzoni and Cattani), 82.
Theophilus Redwood, 755, 763.
Thermometer, An Acoustic, 269.
Thermometers, The Accuracy of Chemical, 131.
Thilanin, 426.
Things to Do (P. MacEwan), 442.
Thompson, Alderman, Presentation of Address to, 58.
— Sir William, Elevation to the Peerage, 562.
Thomson, Dr. J. Roberts, Presidential Address to the British Medical Association, 97.
Thymacetin, 692.
Thymol, Hygroscopic Character of (Clautrian), 268.
Thyroid Gland, Secretion of, 348.
Tincture of Musk (Van der Voorst), 89.
Tinospora Barks, Root of, Imported as Calumba Root, 439.
Tissues, Dehydrating and Hardening, 867.
— Disintegration of Woody, 981.
— Fixing and Hardening, 982.
Titanium and its Compounds, 893.
Titles, A Question of (Justice), 424.
Toads and Frogs, Poison of, 1001, 1007.
Tobacco, Prophylactic Influence of, 695.
Trade of the Nineteenth Century (J. Ince), 404.
— Representation, 696; (Chemist and Druggist), 768.
Transactions of the Pharmaceutical Society, 11, 51, 73, 93, 112, 294, 367, 389, 432, 479, 495, 519, 543, 563, 581, 596, 622, 735, 874, 918, 1031, 1050.
Annual Dinner, 963.
— General Meeting, 967.
Annuitants, Death of, 566, 1014.
Auditors, Election of, 978; Report, 840.
Barnard, Mr. J., Death of, 113, 294.
Bell Scholarships, Award of, 114.
— and Redwood Scholarships, Examination Questions, 51.
— and Redwood Scholarships' Committee, 114.
Benevolent Fund Committee, 12, 113, 295, 367, 458, 565, 634, 736, 837, 1033.
— Fund, Discussion respecting the, 839.
— Fund, Grants from the, 12, 113, 295, 367, 458, 565, 634, 736, 837, 1033.
— Fund, Legacies to the, 458, 459, 566, 837.
Bequests to the Society, 458, 742.
Brady, Mr. H. B., Death of, 743.
British Pharmaceutical Conference, Delegates to the, 114.
Bye-law, Proposed alteration of, 1034, 1050.
— Laws, New, Order of Council relating to, 479, 564.
Chester Chemists' Association, Application for a Grant, 742.
Chicago College of Pharmacy, Address from the, 743.
Clark, Dr. Inglis, Resignation of, 376.

TRANSACTIONS OF THE PHARMACEUTICAL SOCIETY—continued.
Divisional Secretaries, Appointment of, 458.
Committees, Appointment of, 1032.
Council, Election of, 977.
— Meetings of the, 11, 112, 294, 367, 455, 563, 630, 735, 833, 918, 967, 1031, 1050.
— Members who Retire, 630.
— Nominations for Election to the, 836.
— Special Meeting of the, 1050.
— Prizes Examination, 117.
Dymock, Brigade-Surgeon, The late, 1033.
Election of Annuitants, 296, 460.
— of Associates, 11, 112, 294, 367, 564, 630, 735, 835, 919, 1031.
— of Corresponding Members, 919.
— of Council, 977.
— of Members, 11, 112, 294, 367, 564, 630, 735, 835, 918, 1031.
— of Officers, 1031.
— of Students, 11, 113, 294, 565, 631, 735, 836, 919, 1030.
Evening Meetings, 299, 389, 410, 495, 543, 596, 744, 757, 874.
Examination Regulations, Discussion on the New, 371.
Examinations in Edinburgh, 116, 376, 638, 883, 928.
— in London, 93, 353, 495, 519, 676, 698, 883, 901.
— Reports of the, 16, 116, 370, 566, 743, 926.
— Visitor's Report on the, 850.
— Written, Appointment of Superintendents and Deputy Superintendents, 375, 457.
Examiners, Appointment of, 11, 456, 564, 1031.
— Special Report from the Board of, 370.
Finance Committee, Reports of the, 11, 113, 295, 367, 457, 565, 631, 736, 836, 920, 1033.
Financial Statement, 910.
First Examination, 51, 94, 306, 354, 519, 581, 622, 850, 926.
— Examination, Attendance at the Centres, 94, 355, 375, 623, 928.
— Examination, Certificates Received in Lieu of, 93, 354, 519, 623, 698, 926.
— Examination, Questions Set at the, 52, 306, 581, 850.
General Purposes Committee, Reports of the, 16, 114, 298, 373, 459, 566, 638, 743, 841, 925, 1034.
Grants in Aid of Technical Instruction (Mr. A. Bottle), 369, 547.
Ground Rents Committee, Report of the, 743.
— Rents, Discussion on Investments in, 457.
Hills, T. H., Legacy from the Late, 742, 837.
— T. H., Resolution Respecting the Late, 455.

TRANSACTIONS OF THE PHARMACEUTICAL SOCIETY—continued.
Hanbury, Mr. Thomas, Donation of Books from, 372.
Herbarium Prize, Award of, 115.
Hofmann, Prof. von, The Late, 1033.
International Pharmaceutical Congress, 116, 459.
Introductory Sessional Address, 285.
Kinninmont, Mr., Donation from, 459.
Law and Parliamentary Committee, Reports of the, 637.
Leeds Chemists' Association, Application for a Grant, 297.
Letters of Thanks, 11, 459, 567, 735.
Library, Donations to the, 13, 114, 306, 368, 479, 582, 659, 758, 851, 951, 1050.
— Museum, Laboratory and House Committee, Reports of the, 13, 113, 368, 459, 566, 636, 741, 837, 921, 1034.
Local Secretaries, Appointment of, 298, 373, 840.
— Secretaries in Scotland, 459.
Major Examination, 93, 116, 353, 376, 495, 638, 676, 698, 840, 883, 901, 928.
— Examination Questions, 676, 883.
Manchester Pharmaceutical Association Scholarship Regulations, 115.
Meetings in Provincial Centres Suggested, 459, 635, 742.
Minor Examination, 93, 116, 354, 376, 495, 519, 638, 698, 901, 928.
Modified Examination, 901.
Museum, Donations to the, 13, 114, 306, 389, 479, 582, 660, 747, 758, 851, 951, 1050.
Nominations for Council and Auditors, 836.
North British Branch, Executive of, 432, 882.
— British Branch, Executive of, Election of, 1050.
— British Branch, Executive of, Report of, 920.
Passmore, F., The Late, 563.
Pharmacy Acts Amendment Bill, 13.
Poisons, Sale of, Examination of Minor Candidates in the Law Relating to the, 925.
Preliminary Examination, *see* First Examination.
Prizes, Award of, 114, 300.
— Distribution of, 300.
Professors, Appointment of, 11.
— Reports of the, 299, 925.
Redwood, Professor, Death of, 833.
— Scholarship, Award of the, 114.
— Scholarship Regulations, 298, 368.
Register, Additions to the, 919.
— Restorations to the, 113, 295, 367, 457, 631, 836, 919, 1032.
Report, Annual, 909.
— Registrar's, 632.

TRANSACTIONS OF THE PHARMACEUTICAL SOCIETY—continued.
Report, Solicitor's, 925.
Research Committee, 13, 370, 837, 921.
— Laboratory, 370.
— Laboratory Certificate, 459.
Robbins' Fund, 458.
Russell, Mr., Resignation of, 372.
Sandford, Mr., The Late, 1032.
Scholarship Examination Papers, 51.
School of Pharmacy Examination Questions, 73, 96, 743, 841.
— Staff, Appointment of, 11.
Sessional Address by Mr. Gainsford Bruce, Q.C., M.P., 114, 285, 300.
Stas, J. S., Death of, 564.
Tasmania, Address from the Pharmaceutical Society of, 116.
Titles of Honour, 635, 921.
Tupholme, Mr., Death of, 564.
Watts, W. Manning, The Late, 563.
Weed Killers, 459.
Trehalose in Fungi (E. Bourquelot), 518.
Trimble, Professor H., Carum Gairdneri, 429.
Tropical Forest, In a, 772.
Tropid, 893.
Truffles, French, 558.
Tubercle Bacilli, Staining, 751, 869, 981.
Tuberculin, 82, 345, 425.
— Preparation of, 345.
Tuberculinum, 425.
Tuberculocidin (Klebs), 425.
Tuberculosis, Bacillus of, 357, 695.
— Chloride of Zinc in (Launelongue), 182.
— Helenin in (Dr. T. J. Bokenham), 347.
Tubers, Physiology of Development in, 1001.
Tu-chung Bark (Weiss), 613.
Tumenol, 425.
— Preparation, Report on (Professor Neisser), 426.
— Sulphonic Acid, 426.
— Sulphone, 426.
Turner, William, the First English Botanist, 509.

UNCOMOCOMO, 85.
Unguentum Hydrargyri oleati (Unofficial Formulary, B.P.C.), 70.
United Drug Association of Cincinnati, Injunction against the, 189.
Uric Acid, Comparative Physiology of (Roberts), 1065.
Urine, Albumen in, 812.
— Evolution of Mammaliam, 1065.
— Examination of, 356 (A. W Hudson), 508; (J. A. Forret), 528.
— Microscopical Analysis of, 981.
— Test for Grape Sugar in, 1003.
— Testing, Notes on (L. Siebold), 603.
Urostigma Dolarium, Milky Juice of (Dr. Peckolt), 429.
— Species of, Used Medicinally in Brazil, 429.

VACCINE Lymph, Bacteria in, 817.
Vanilla, 614.
Vanillin and Isovanillin, 691.
Varnish Gums (Stevenson), 1043.
Varnishes, Unna's Medicated Skin, 732.
Vegetable Perfumes, 690.
— Sections, Bleaching, 869.
— Sections, Double Staining, 751, 869.
— Silk, 268.
Vegetables, Preserved, Copper in, 107.
Vermifuge, A New, 347.
— Principle of Male Fern (Poulson), 84.
Vermin Killer, Sale of, 78.
Vinegar, The Manufacture of (Nettleton), 1015.
Vinum Aurantii Detannatum (Unofficial Formulary), 70.
— Xericum Detannatum (Unofficial Formulary), 70.

WALES, Prince of, Address as President of the International Congress of Hygiene, etc., 123.
Walnut, Male Flowers of the, 690.
Warden, C. J. H., A Cholesterol in Hygrophila spinosa, 1070.
— C. J. H., Indian Opium, 667, 828.
Washing out the Stomach in Chlorosis, etc., 695.
Water, Composition of (Lord Rayleigh), 625.
— Corrosion of Iron Pipes by, 181.
— Importance of Magnesia in, 181.
— Impregnation of, with Lead, 86, 353, 387.
— Solvent Action upon Lead, 86, 179.
— Supply for London, 31.
— Volatile Organic Matter in (W. C. Young), 397.
Watts, Mr. W. Manning, Death of, 478.
Wax in Leaves, 690.
Weber, Professor W. E., Death of, 10.
Weed Killer, Poisoning by, 264, 276, 283, 402, 445, 706.
— Killer, Sugar Damaged by, 79.
— Killers, Poisonous, 248, 579, 607, 646.
Weights and Measures (Hupp), 1010.
Western and North Western Chemists' Associations of London, Annual Dinner, 421.
— Chemists' Association (of London) Annual Meeting, 356 (Appointment of Officers), 384.
Williamson, Prof., Farewell Address Presented to, 698.
Windsor, Meeting of Chemists and Druggists at, 362.
Wine, Detannated Orange, 70.
— Sale of, by Chemists, 78.
— Sale of, without Licence, 20, 78.
Women, Employment of, in Pharmacies, 169.
Wood, Distillation of (Ramsay and Chorley), 951.
Woody Tissues, Disintegration of, 981.
Wormseed, Barbary, Source of, 347.
Wortcraft, Saxon, 205.
Wright, R., Tinctures, 1, 255, 469, 569.

YEAR, The, 1891, 529.
— Book of Pharmacy, Correction of, 709.
Young Pharmacists, Work of (Mac Ewan), 626.

ZANZIBAR and its Products, 793.
Zinc, Double Cyanides of Mercury and (Dunstan), 769.

CONTRACTIONS OF TITLES.

*The following is a list of the contractions and the corresponding full titles of Journals most frequently used in "The Month." The titles prefixed by a * are those of official Journals.*

Amer. Drug. = American Druggist. New York. Monthly.
* *Amer. Journ. Pharm.* = American Journal of Pharmacy. Philadelphia. Monthly.
Annalen = Justus Liebig's Annalen der Chemie. Liepzig. Monthly.
* *Apot.-Zeit.* = Apotheker-Zeitung. Organ of the Deutsche Apotheker-Verein. Berlin. Twice a week.
* *Apot. Zeit. Rep.* = Repertorium der Pharmacie. Supplement to the Apotheker-Zeitung.
* *Archiv* = Archiv der Pharmacie. Berlin: J. Greiss. Twice a month.
* *Berichte* = Berichte der deutschen chemischen Gesellschaft. Berlin. Once or twice a month.
* *Brit. Med. Journ.* = British Medical Journal, London. Weekly.
Bull. Com. = Bulletin Commercial. Supplement to L'Union Pharmaceutique. Paris: Pharmacie Centrale de France. Monthly.
* *Can. Pharm. Journ.* = Canadian Pharmaceutical Journal. Toronto. Monthly.
Chem. Zeit. = Chemiker Zeitung. Cöthen. Twice a week.
Chem. Zeit., Rep. = Chemisches Repertorium. Supplement to the Chemiker Zeitung.
* *Compt. Rend.* = Comptes Rendus des Séances de l'Académie des Sciences. Paris: Gauthier-Villars. Weekly.
Deut.-Am. Apot.-Zeit. = Deutsch-Amerikanische Apotheker Zeitung. New York. Twice a month.
Deut. Med. Woch. = Deutsche medicinische Wochenschrift, Berlin. Weekly.
Drug. Circ. = Druggists' Circular. New York. Monthly.
Glas. Med. Journ. = Glasgow Medical Journal. Glasgow: A. Macdougall. Monthly.
L'Union Pharm. = L'Union Pharmaceutique. Paris: Pharmacie Centrale de France. Monthly.
Med. Bull. = Medical Bulletin. Philadelphia. Monthly.
Med. Chron. = Medical Chronicle. Manchester: Heywood. Monthly.
Med. Pr. Circ. = Medical Press and Circular. London: A. A. Tindall. Weekly.
* *Monatshefte* = Monatshefte für Chemie. Vienna. Monthly.
Mon. Scient. = Moniteur Scientifique. Paris. Monthly.
Münch. med. Woch. = Münchener medicinische Wochenschrift. Munich. Weekly.
* *Ned. Tijdsch. Pharm.* = Nederlandsch Tijdschrift voor Pharmacie, Chemie en Toxicologie. The Hague. Monthly.
Nouv. Rém. = Les Nouveaux Rémèdes. Paris. Twice a month.
Pharm. Centralh. = Pharmaceutishe Centralhalle. Dresden. Weekly.
Pharm. Post = Pharmaceutische Post. Vienna. Weekly.
Pharm. Rec. = Pharmaceutical Record. New York. Twice a month.
Pharm. Runds. = Pharmaceutische Rundschau. New York. Monthly.
Pharm. Zeit. = Pharmaceutische Zeitung. Berlin: J. Springer. Twice a week.
* *Pharm. Zeit. Russl.* = Pharmaceutische Zeitschrift für Russland. St. Petersburg. Monthly.
Répertoire. = Répertoire de Pharmacie et Archives de Pharmacie reunis. Paris. Monthly.
Scient. Amer. = Scientific American. New York. Weekly.
West. Drug. = Western Druggist. Chicago. Monthly.
* *Zeit. öst. Apot.-Ver.* = Zeitschrift des allgemeinen österreichischen Apotheker-Vereines. Vienna. Weekly.
Zeit. phys. Chemie = Zeitschrift für physiologische Chemie. Strasburg: J. Trübner. Monthly.

WELLCOME LIBRARY INSTITUTE

W. I. RICHARDSON, PRINTER, 4 AND 5, GREAT QUEEN STREET, LINCOLN'S INN FIELDS, LONDON, W.C.